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Designing Blended Learning for Accounting in Tertiary Education: The PACE-IT Model

A thesis submitted to the School of Education, National University of
Ireland Galway, for the degree of Doctor of Philosophy by

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List of Acronyms and Abbreviations

AAA	American Accounting Association
ACCA	Association of Chartered Certified Accountants
AECC	Accounting Education Change Commission
AICPA	American Institute of Certified Public Accountants
AIT	Athlone Institute of Technology
BAA1	Bachelor of Arts in Accounting, Year 1
BALAW1	Bachelor of Arts in Accounting and Law, Year 1
BERA	British Educational Research Association
BL	Blended learning
BLE	Blended learning environment
CA	Communication apprehension
CIMA	Chartered Institute of Management Accountants
CSILE	Computer-supported intentional learning environment
CLT	Cognitive load theory
CPA	Certified public accountant
DBR	Design-based research
DIT	Dublin Institute of Technology
f2f	Face-to-face
FA	Financial accounting
HE	Higher education
HEA	Higher Education Authority
HEI	Higher education institution
ICT	Information and communication technology
IMI	Intrinsic Motivation Inventory
ISSE	Irish Survey of Student Engagement
IT	Information technology
LC	Leaving certificate
LIT	Limerick Institute of Technology
LMS	Learning management system
M	Mean
MBA	Master of Business Administration
MS	Microsoft

NSSE	National Survey of Student Engagement
NUIG	National University of Ireland Galway
OCA	Oral communication apprehension
PACE-IT	Pedagogy, autonomy, collaboration, engagement, interaction, technology
PRCA-24	Personal Report on Communication Apprehension
REC	Research Ethics Committee
SCORM	Shareable Content Object Reference Model
SD	Standard deviation
STEM	Science, technology, engineering and mathematics
TILT	Tools - Interfaces - Learner's Needs - Tasks
TPACK	Technological pedagogical content knowledge
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VLE	Virtual learning environment
ZPD	Zone of proximal development

Declaration

I declare that the work presented in this thesis is, to the best of my knowledge and belief, original and my own work, except as otherwise acknowledged in the text. The material has not been submitted, either in whole or part, for a degree at this or any other university.



Orlaith Kelly

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*John O’Donohoe
(1956 – 2008)*

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Abstract

Technological advancements have engendered evolving work roles for professional accountants as they navigate the trajectory of their careers. This has prompted calls for the transformation of accounting education at tertiary level. Accounting programme delivery must adapt to incorporate innovative teaching practices which provide students with future-focused and lifelong learning skills, in preparation for employment in a dynamic global workplace. This study set out to investigate if and how blended learning – a combination of face-to-face and online learning modes – could be designed and deployed to enhance the learner experience of introductory accounting students in tertiary education.

Cognisant of the dearth of research into accounting education practices and the disconnect between accounting education research and practice, this study aimed to advance theoretical knowledge through the use of a design-based research approach in developing theory-informed innovative teaching strategies in introductory accounting. The blended learning design implemented within this study is rooted in an emerging theoretical framework, the PACE-IT framework, which was informed by the literature and the researcher's professional interests and experience. Underpinned by six theoretical concepts, namely pedagogy, autonomy, collaboration, engagement, interaction and technology, the PACE-IT framework evolved over the course of the study. The intervention integrated innovative and interactive pedagogies and technologies aimed at enhancing the overall learner experience.

This was a longitudinal study, taking place over three design cycles with 68 student participants, which allowed the researcher to progressively test and refine the blended learning intervention through a series of successive iterative implementations. Evaluation took place using a range of methods including surveys, interviews, learning journals, VLE activity logs, student assessment materials, think aloud protocols, discussion forum interactions and instructor observations. The data derived from these evaluations were the subject of critical analysis, informed by the PACE-IT design model, with resultant design changes implemented in each subsequent cycle.

This thesis has made a significant and tangible contribution within the field of accounting education. Firstly, the research has demonstrated, in methodological fashion, that a blended learning intervention which enhances the learning experience of students can be effectively designed and implemented for use in introductory accounting education settings at tertiary level, thereby making a meaningful contribution to learning theory in the area of accounting education.

Furthermore, this study provides a practical research output in the form of the blended learning intervention and associated learning resources, which were designed within the introductory financial accounting modules to enhance learner experiences.

Finally, the detailed narrative account of the blended learning intervention design, along with the PACE-IT design model and guidelines, may be adapted and adopted by other design researchers, educators and educational technologists to guide the development and implementation of similar learning interventions in cognate learning contexts.

Chapter 1 Introduction

1.1 Chapter introduction

This thesis is concerned with the design and development of a blended learning intervention within introductory accounting tertiary education. The opening chapter of the thesis describes the research background detailing the evolution of, and issues pertaining to blended learning within higher education. The structure of Irish accounting education and the study context are described, along with a justification of the rationale for undertaking the study. The areas of interest are translated into research questions, which provide the focus for the work. The chapter concludes by summarising the structure of the thesis and specifying how the research narrative is designed to answer the thesis' principal research question – how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?

1.2 Blended learning in higher education

In the modern era, the worldwide expansion in the use of digital technologies has seen a significant policy focus and investment in building digital capacity within Irish higher education (Department of Education and Skills, 2011; European Commission, 2016; National Forum for the Enhancement of Teaching and Learning in Higher Education, 2018a). As new technologies emerge and networks grow, teaching practices have extended and evolved, with increasing instructor-reliance on a multiplicity of tools and techniques in support of human learning and development. Within its *Strategic Plan 2018-2023*, The Technological Higher Education Association (2018, p. 13) recognises the challenges and opportunities posed by the “digital revolution” on higher education, highlighting it as a key concern for the association, due to its implications for traditional teaching and learning.

Enrolment levels in Irish tertiary education have exhibited remarkable growth over the last twenty years and are expected to continue to increase over the coming decade (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2015a; Department of Education and Skills, 2016a; Higher Education Authority, 2018; Organisation for Economic Co-operation and Development, 2019)

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with a commitment expressed within *Project Ireland 2040* to expand capacity across the higher education technological sector in response to the growing population (Government of Ireland, 2019, p. 8). Not only is the student body growing rapidly, but it is also becoming even more diverse. Government policies to increase participation and widen access to higher education are instigating increases in adult, international, remote and non-traditional learners (Higher Education Authority, 2015, 2018; Department of Education and Skills, 2016b, 2018). These strategies are likely to contribute to a continuing evolution in the diversity of learners within the sector, creating an imperative to serve the demands of students from disparate academic, cultural, and social backgrounds.

The effect of digitization in a global knowledge society, causing a fast flow of information and rapid knowledge decay, has placed new demands on workers for continuous learning and knowledge upskilling. This has resulted in demands for the cultivation of a lifelong learning culture to combat low participation rates and ensure the sustainable development of the Irish economy (Department of Education and Science, 1995; Department of Education and Skills, 2011, 2016a; Higher Education Authority, 2012, 2018; Expert Group on Future Skills Needs, 2018). While the past has witnessed an emphasis on fulltime course delivery within Irish higher education (National Forum for the Enhancement of Teaching and Learning, 2015, p. 16), it is envisaged that in the future, higher education institutions (HEIs) will move towards becoming centres of lifelong learning with increasing flexibility of provision (Higher Education Authority, 2018, 2019).

The affordances offered by novel and emerging digital technologies in offering new learning possibilities, which allow students to learn in innovative ways and extend lifelong learning opportunities to a diverse student population, have spurred an impetus to move towards flexible learning environments (Department of Education and Skills, 2011, 2018; UNESCO, 2015; European Commission, 2016; National Forum for the Enhancement of Teaching and Learning in Higher Education, 2018a; Higher Education Authority, 2019). While there is evidence of an expansion in online course provision in Ireland in response to demands for increased accessibility and flexible learning needs (Higher Education Authority, 2015, 2018; National Forum for the Enhancement of Teaching and Learning in Higher Education, 2018b),

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the Higher Education Authority (HEA) anticipates that digital transformation will play an even greater role in future higher education (HE) course delivery; thus, a commitment has been expressed to develop a *HE Digital Transformation Framework* which will include a focus on improving online and blended modes of delivery (Higher Education Authority, 2018).

Online learning, commonly described as “access to learning experiences via the use of some technology” (Moore, Dickson-Deane and Galyen, 2011, p.130), “overlaps with the broader category of distance learning, which encompasses earlier technologies such as correspondence courses, educational television, and videoconferencing” (Means *et al.*, 2013). It is seen as an attractive form of educational provision due to the flexible learning opportunities it provides in responding to students’ lifestyles (Allen and Seaman, 2011; Moskal, Dziuban and Hartman, 2013). However, Noble (1998, p. 7) expressed strong criticism of the move towards distance learning in the US, whereby control of course content is removed from lecturers and delivered as “pre-packaged courses” without the accrual of large cost-savings as claimed. Describing it as “the commercialisation of higher education”, he argued that educational quality is sacrificed in order to minimise costs, thus adversely affecting student performance and increasing drop-out levels. Others have also raised concerns raised regarding courses delivered wholly online due to issues surrounding student disengagement, dropout rates, technological problems, scope for academic dishonesty and diminished quality relative to face-to-face delivery, some of which are caused by reduced social and collaborative learning opportunities (Young, 2002; Norberg, Dziuban and Moskal, 2011; Salmon, 2011).

Accordingly, blended learning (BL), which combines online learning with face-to-face (f2f) instruction, has become increasingly prevalent in higher education in recent years, due to the additional affordances it offers (Graham, Woodfield and Harrison, 2013; Moskal, Dziuban and Hartman, 2013; Alammary, Sheard and Carbone, 2014; Beattie, 2014; Adams Becker *et al.*, 2017). Assertions have been made that it is capable of extending learning and thinking through the integration of online reflective written communication with instantaneous verbal f2f interactions, thereby combining “the best of both worlds” (Young, 2002; Garrison and Kanuka,

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2004; Watson, 2008; Kenney and Newcombe, 2011; Norberg, Dziuban and Moskal, 2011; Moskal, Dziuban and Hartman, 2013; Montgomery *et al.*, 2015).

Blended learning is not a new concept, with Norberg, Dziuban and Moskal (2011) dating its origins back to the medieval period when the practice of students listening to their professor reading from a manuscript was replaced by the ‘technology’ of textbooks. Others view BL as commencing with the advent of computer technologies in the last half century allowing f2f classes to be complemented by various forms of computer-based training (Bersin, 2004). According to Friesen (2012), the use of BL has been apparent since the advent of the Internet and World Wide Web in the 1990s; however, the relevance of its application in the higher education context increased significantly following publication of the first *Handbook of Blended Learning* (Bonk and Graham, 2006) and *Blended Learning in Higher Education: Framework, Principles, and Guidelines* (Garrison and Vaughan, 2008).

As early as 2002, the president of Pennsylvania State University recognised hybrid instruction as “the single greatest unrecognized trend in higher education today” (Young, 2002, p. A33). Within a highly cited article, Garrison and Kanuka (2004) proffered BL as a way to transform learning and teaching by compelling reflection on education design, thus repositioning higher education in response to challenges such as changing student demographics, increasing competition, technological innovations and funding deficits. “Societal and governmental needs for blended approaches” have been observed (Bonk, Kim and Zeng, 2006, p. 550), such as when the SARS and Covid-19 crises forced adaptations to educational practices to remove physical contact (Bonk, Kim and Zeng, 2006; National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020b).

Since then, BL has continued to gain traction in educational settings. Recognised as a key trend in higher education in the *2017 Horizon Report* (Adams Becker *et al.*, 2017), through its ability to support policy objectives on widening access to higher education while also enhancing efficiencies in education provision, it has recently been described as “the harbinger of substantial change in higher education” (Dziuban *et al.*, 2018, p. 13). Laumakis, Graham and Dziuban (2009, p. 86) assert that “blended learning has established a culture of sustainability in higher education, providing accessibility to the most diverse student population in history; with the

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unanticipated side effects of raising students' expectations and their standards for learning as well." Irish higher education community members, when reflecting on the challenges involved in the relocation to remote teaching in response to Covid-19, advocated a blended approach to teaching, learning and assessment, due to its affordances in "leveraging the strengths of different modes, while attending to the needs of discipline and context" (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020b, p. 8).

The success of flexible delivery modes hinges on equal means to access, use, and gain benefit from the use of digital technology. Thus, consideration must be given to the "digital divide", described by Iivari, Molin-Juustila and Kinnula (2016, p. 1) as "the polarization between those who have access and ability to develop their skills related to digital technology, and those who have not". In order to maximise e-learning platform effectiveness, all students must have access to appropriate technology and a suitable internet connection outside of class time (McCoy *et al.*, 2016). The need to ensure pervasive high quality broadband access to all parts of Ireland has never been more evident since the onset of Covid-19, with broadband quality variations discernible across the Irish HE population throughout the crisis (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020b).

Issues have been raised surrounding inequitable access to innovative educational technologies and internet connectivity across socio-demographic groups (McCoy *et al.*, 2016; Dziuban *et al.*, 2018), with an imperative to consider technology access among lower income students in order to avert the risk of "tacit social exclusion" when facilitating learning using technology (Coetzee, Leith and Schmulian, 2019, p. 465). Information and communication technologies (ICTs) play a huge role in promoting broad and flexible lifelong learning opportunities and equal educational access for those who are vulnerable, people with disabilities, and other marginalised groups. However, access to technology and appropriate infrastructure, coupled with ICT training, is pivotal in achieving inclusion for these groups (UNESCO, 2015).

1.3 Historical developments in accounting education

The long-standing critical debate around the state of accounting education in universities and colleges within the USA, where the main corpus of literature is located, intensified in the 1980s, culminating in the publication of the Bedford Committee Report (American Accounting Association Bedford Committee, 1986) and the ‘Perspectives on education: capabilities for success in the accounting profession’ white paper issued by the Big 8 accounting firms (Arthur Andersen *et al.*, 1989). These documents were critical of the failure of accounting education to react to the rapid pace of change occurring in the profession due to technological advancements, globalisation and increased accounting regulation. They were highly critical of the untenable technical focus of programme content in providing students with skills which are incongruent with the needs and demands of a knowledge society, calling for a change of emphasis to provide students with generic skills, such as communication and critical thinking, for working in a rapidly changing global workplace. Changes recommended included innovative teaching practices which would equip students with future-focused skills while also fostering an ability to learn independently in preparation for lifelong learning (Black, 2012).

As an outgrowth of these concerns, the Accounting Education Change Commission (AECC) was set up in 1989, by the American Accounting Association (AAA) with the support of the Sponsors’ Education Task Force, which represented the largest public accounting firms in the US, to act as a catalyst for accounting education change. According to the AECC, the objective of accounting programmes was to “prepare students to *become* professional accountants not to *be* professional accountants at the time of entry to profession” (AECC, 1990, p. 307, italics in original) reflecting the idea that students should be provided with a broad skillset in preparation for a lifetime of education. There was evidence of these issues being replicated in other countries such as Australia, New Zealand, Canada, the UK and Ireland (Healy and McCutcheon, 2008; Chen, 2014; Ellington, 2017) with Sundem and Williams (1992, p. 56) asserting at that time, that the objectives for change delineated by the AECC appeared “equally applicable to accounting education throughout the world”.

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While the AECC did invoke some change in US accounting education over its nine year existence (Flood, 2014), it was deemed insufficient by many, including Albrecht and Sack (2000), who expressed formidable trepidation about the future of accounting education in their renowned monograph ‘Accounting education: Charting the course through a perilous future’. Subsequently, the Pathways Commission on Accounting Higher Education, formed in 2010 by the AAA and the American Institute of Certified Public Accountants (AICPA) to study the future structure of higher education for the accounting profession, published a report which acknowledged the absence of systemic change in accounting education, attributing it to impediments existing at institutional, departmental, programme and individual levels. It was critical of the disconnect between accounting education research and practice, the lack of focus on teaching excellence and the absence of technology use in the accounting classroom, asserting that accounting students are frequently exposed to technical material in a way which is disembodied from the real world. The report concludes with an appeal to accounting educators to challenge the impediments which exist in order to achieved sustained renewal and innovation in accounting education (Behn *et al.*, 2012).

Despite the long-standing debate around the need for change, accounting educational approaches exhibit little evidence of reform in order to adequately prepare accountants for their long-term careers (Diamond, 2005; Behn *et al.*, 2012; Boyce *et al.*, 2012, 2019; Flood, 2014; Lawson *et al.*, 2014; O’Connell *et al.*, 2015; Pincus *et al.*, 2017), with Apostolou *et al.* (2017b, p. 2) in an analysis of accounting education literature over a 20-year period witnessing “the same basic message”, regarding the need for educational change in order to remain relevant to practice, being perpetually repeated.

1.4 Structure of Irish accounting education

Students’ first primary exposure to accounting education in Ireland occurs at secondary level, through a junior cycle Business Studies subject, followed by a specialised Accounting subject offered in senior cycle, which is examined in the terminal Leaving Certificate examination at ordinary and higher level. The current Accounting syllabus covers primarily financial, but also some management

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accounting topics and was last updated in 1995 (National Council for Curriculum and Assessment, 2020). Uptake of the subject has declined at leaving certificate level since its inception, with possible causes attributed to the perceived difficulty of the subject and the volume of material to be covered (Byrne and Willis, 2003; State Examinations Commission, 2018).

This study explores the design of BL within an introductory financial accounting module at tertiary level. Introductory financial accounting is a compulsory module within all higher education accounting degree programmes, as well as in many other programmes in the business, law, and administration fields. In general, instructors assume a limited prior accounting knowledge among college entrants, to accommodate students who may not have taken the subject at secondary level.

Participants within this study are first-year undergraduate students enrolled on the Bachelor of Arts in Accounting and Bachelor of Arts in Accounting and Law programmes at Athlone Institute of Technology. The majority of students pursuing accounting degree programmes progress to work within accountancy firms while they undergo further study in order to obtain a professional accountancy qualification. In Ireland, the professional accountancy qualification landscape is dominated by four main accountancy bodies: Chartered Accountants Ireland, Chartered Institute of Management Accountants (CIMA), Association of Chartered Certified Accountants (ACCA) and the Institute of Certified Public Accountants (CPA Ireland). In pursuing an accountancy qualification, students are granted examination exemptions if they have previously undertaken an accredited accountancy programme.

While professional accountancy body accreditation is seen as essential for student recruitment to degree programmes (Ellington and Williams, 2017), it is perceived as restricting accounting education providers leading to an emphasis on technical content delivery using didactic teaching approaches, limiting the ability to achieve a broader education which will engender students' transferable skills (Albrecht and Sack, 2000; Pan and Perera, 2012; Bayerlein and Timpson, 2017; Ellington and Williams, 2017; Douglas and Gammie, 2019; Healy *et al.*, 2020). Graduates in a recent Irish study attached value to the exemptions from professional examinations gained throughout their undergraduate studies (Cashman Rahilly, 2018); however,

they also acknowledged the benefits which would be gained from a workplace-focused curriculum in providing them with broader business skills some of which, according to Cashman Rahilly (2018), could be achieved through innovative assessment methods rather than replacing exemption-gaining modules.

1.5 Study context

This study is located in Athlone Institute of Technology (AIT), a higher education institution (HEI) within the technological sector, which is located in the midlands of Ireland. The 2011 National Strategy for Higher Education initiated a new chapter of reform in Irish tertiary education through the reconfiguration of the institutional landscape to provide a coherent and co-ordinated system of HE. As part of this reform, in 2019, AIT commenced a collaborative process with Limerick Institute of Technology (LIT) to form a new Technological University (TU) consortium, which is currently working towards achievement of designation as a TU for the midlands and mid-west (AIT-LIT Consortium, 2020). It is envisaged that each TU will have a distinct focus in supporting development and innovation and creating “a regional lifelong learning anchor where people can learn at their own pace, anywhere, anytime without barriers, ensuring that all learners are supported and have opportunities to develop to their fullest potential” (Technological Universities Research Network, 2019, p. 9). Within its *Strategic Plan 2019-2023*, AIT has expressed a commitment to deliver flexible education and training, provide lifelong learning routes and invest in digital infrastructure which facilitates online, blended, and distance learning in support of a broader student demographic.

1.6 Biographical motivation

The professional development, interests and experience of the researcher impacted significantly on how and why this study was undertaken. Prior to embarking on this study, the researcher had lectured on accounting programmes at tertiary level for seventeen years, preceded by experience teaching at second-level and working within an accountancy practice.

In her role as lecturer, the researcher regularly observed students within accounting modules experiencing difficulties when integrating theoretical and technical

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knowledge as they attempted to grasp new accounting concepts. These problems were exacerbated by the fact that many students were reluctant to ask questions in class to seek clarification, exhibiting some levels of discomfort in acknowledging their lack of understanding. Invariably, the researcher found herself acting as a ‘sage on the stage’ rather than a facilitator of learning, with students passively absorbing the information, rather than actively participating in the learning process. In addition, reluctance was observed among learners to take responsibility for their own learning by engaging in learning activities outside of class. This manifested itself in a lack of preparedness for class, which further contributed to reduced student engagement, and a lower level of student-staff class interactions. Consequently, the researcher perceived a need to explore ways to increase student participation, engagement, and interactivity in her introductory accounting class, in order to stimulate active student involvement in the learning process, and promote more effective learning of the course material.

The researcher, whose first exposure to digital technologies occurred in secondary education, recalls how her educational experiences were transformed through the advent of modern technologies, such as Microsoft Office tools and Windows graphical user interfaces. Subsequently, screencasting which allows lecturers to create purposive learning materials enabling students to learn at their own pace, and communication tools, such as discussion boards and email, which facilitate collaborative learning ensued, two examples of the myriad of technologies which can be effectively deployed in an accounting learning environment. This first-hand experience of the impact that technology can have on a student’s life has shaped the researcher’s teaching, particularly in her current position as a lecturer of accounting in AIT. However, she is acutely aware that today’s students’ use of technology extends far outside of the realms of education, and therefore their skills and perceptions in relation to educational technology are likely to be manifold.

Despite the rapid technological change which has taken place since her early student years, the researcher has observed little change in the way in which accounting is taught. When she became involved in a collaborative project funded by the *National Digital Learning Repository (NDLR)*, which developed online resources to aid in teaching introductory financial accounting topics to first year students, the

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researcher's interest in exploring the potential of technology to infuse educational change within the classroom was further evoked. This prompted the researcher's interest in investigating if online resource usage could achieve positive learning benefits for students at introductory accounting level. Cognisant of the disconnect between accounting education research and practice, the researcher received inspiration from the literature centred around research-led and evidence-informed teaching practice (Jones, Procter and Younie, 2015; Connolly *et al.*, 2020) which has impelled her towards researching her own practice with a view towards positively impacting on student learning.

1.7 Research questions

The primary motivation for this research arose out of the researcher's professional interests and experience as detailed above. Furthermore, the learning affordances provided by emerging digital technologies have enabled flexible ways of learning and teaching in serving an increasingly diverse student population. Digital technologies have also initiated changing work roles for accounting graduates, serving as a catalyst for change within accounting education towards the deployment of innovative teaching practices in order to equip students with future-focused and lifelong learning skills. These influencing factors prompted the researcher's desire to investigate if the flexibility offered by online resource provision through a BL approach would infuse autonomy among learners to encourage them to take responsibility for their own learning, while also increasing levels of motivation, engagement and interest in the accounting subject. It is with these points in mind that the researcher embarked on this study, of which the pertinent research questions are detailed below.

1. How can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?
 - a. Does blended learning create new engaging and collaborative possibilities for learners of introductory accounting to enhance their learning experience?
 - b. If so, what are these new engaging and collaborative possibilities?

2. What are the characteristics of an effective blended learning intervention in introductory accounting at tertiary level?

1.7.1 Students' learning experience

This thesis aims to create a BL design which will enhance the learning experience of introductory accounting students; therefore, it is important to clarify what is denoted by the term 'learning experience'. A detailed discussion of the concept of education is beyond the scope of this research, thus the researcher directs the reader to Freire (2001) and Dewey (1938) for an in-depth account of the aims of education and their relation to the student's learning experience. Dewey (1938) stresses the role of the educator, as group leader, in shaping and using the environment of learners to ensure a positive learning experience. His principle of *continuity of experience* directs that what a student learns in one situation will help him gain understanding in a future situation. Hence, there is a responsibility on the educator to determine students' past experiences and identify real-life activities to build on them as part of the learning process.

The definition of learning experience applicable to this research, which is adapted from that proffered by the UNESCO International Bureau of Education (2013), is as follows: *an organised learning interaction or activity which transforms learner perceptions, facilitates conceptual understanding, yields emotional qualities, and nurtures the acquisition of knowledge, skills and attitudes.*

In the context of the accounting classroom, this entails providing learning and assessment activities, which take into account students' prior knowledge and experience and are appropriate to learner needs. It would involve activities which are both challenging and engaging, which students would be willing to immerse themselves in, and from which they would derive enjoyment. There should be evidence of an arousal of interest among students and a motivation to complete activities both within and outside of class, along with an increased confidence in relation to the subject and improved conceptual understandings. In the context of this research, if the BL intervention can achieve such outcomes, it will have facilitated an enhanced learning experience for accounting students.

1.8 Research narrative

The current chapter outlines the research questions, having described the rationale for undertaking this research.

Chapter two, the literature review chapter, comprehensively reviews the extant, relevant research in the area. This encompasses literature relating to accounting education, the BL concept, the definition of learning experience, together with educational technology use in accounting. The review of the literature provides ideas for what an effective BL intervention might entail, and also for the methodological approach which one might adopt to enhance the learning experience for introductory accounting students.

Following on from the methodological requirements identified through the review of the literature, chapter three describes the methodological approach adopted in this research. Design-based research (DBR) is identified as the methodology most fitting to address the methodological requirements of the study, due to its capacity to align practice and theory in creating effective design solutions, while also advancing scientific knowledge in relation to the design of innovative and interactive educational environments. This chapter also addresses the relevant ethical issues pertaining to the study.

DBR concerns itself with theory development so as to ensure long-term educational improvement (Cobb *et al.*, 2003), thus chapter four sets out the theoretical framework, which provided the conceptual underpinning for the research study. The themes arising from the literature review and theoretical framework act to provide an emerging and evolving PACE-IT prototype model. The themes underpinning the PACE-IT model which guided the thesis' empirical, iterative, implementation work include pedagogy, autonomy, collaboration, engagement, interaction and technology.

Chapters five, six and seven, elucidate the practical implementation of the research taking place over three iterative design cycles, together with presentation and analysis of data using the PACE-IT model as an evaluative framework.

Chapter eight presents a discussion of the findings over the three design cycles, detailing how the learning experience of the introductory accounting students was

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increasingly enhanced as the BL intervention was refined in each subsequent iteration.

Finally, chapter nine presents the conclusions of the research. This chapter details PACE-IT, the prototype design model which informed the BL design intervention, along with its associated design guidelines, which describe the characteristics of the BL design solution. As will be discussed in the next chapter, very little systematic design research has been previously undertaken in relation to BL use within introductory accounting education. Thus, the rigorous longitudinal design process articulated throughout this thesis, along with the design guidelines, are the major contributions of this research. This is due to their ability to be shared with, and applied by those working within cognate contexts, while also advancing theoretical understandings of learning.

Having detailed how the research questions have been answered through the thesis, and the iterative development of the PACE-IT design model, chapter nine concludes the thesis with recommendations for future research along with a depiction of the researcher's learning journey. The structure of the research narrative is illustrated graphically in Figure 1.1.

Introduction

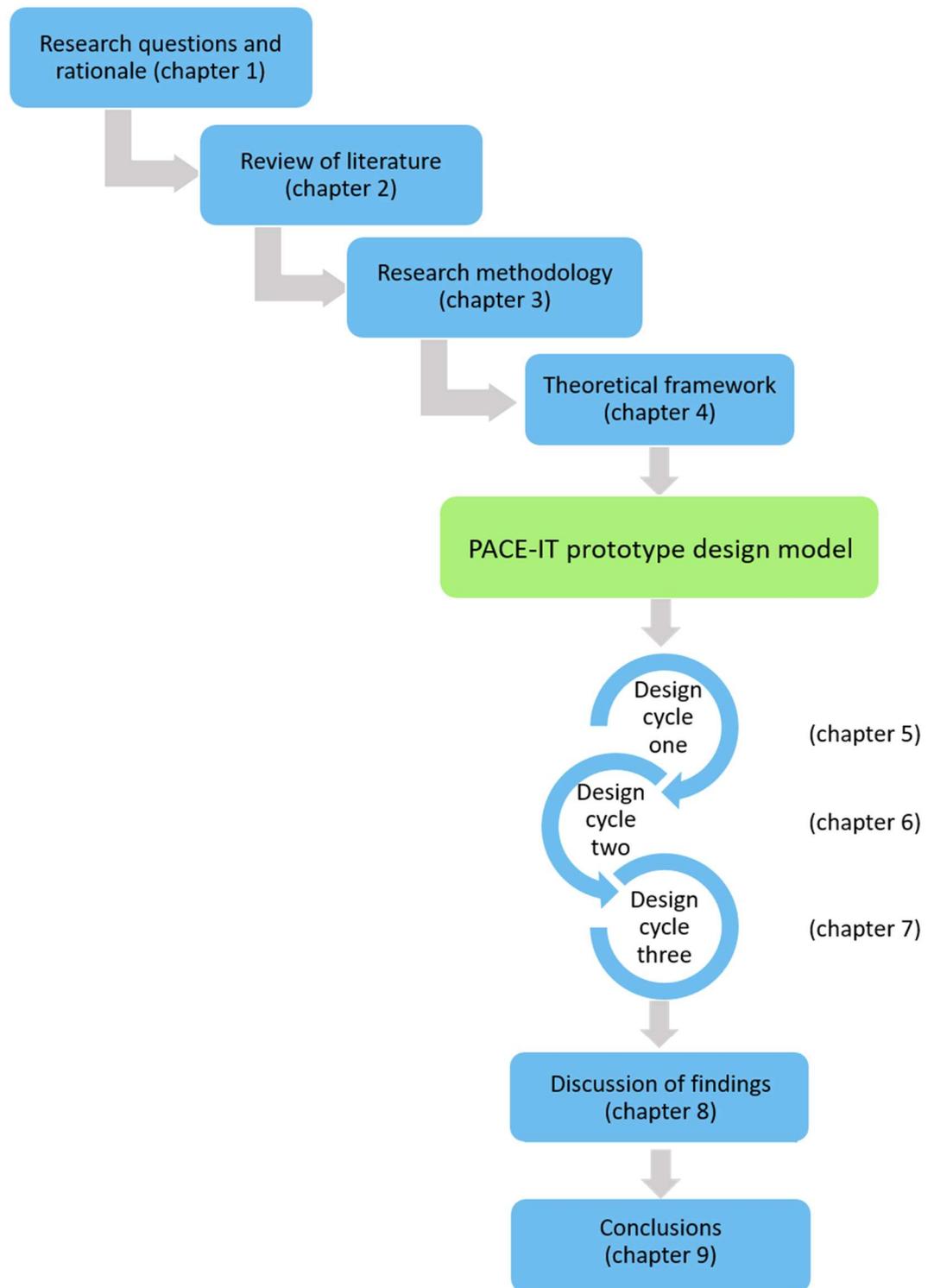


Figure 1.1 *Research narrative*

1.9 Chapter summary

This chapter has provided the background to the research, situating it within accounting education in the technological sector of Irish HE. The wider context surrounding the impetus towards flexible delivery mechanisms was explored, including government policies and ICT affordances, which have led to the increasing prevalence of BL within tertiary education. Historical developments within accounting education were outlined, illuminating that the digital revolution is not only facilitating flexible new ways of learning and teaching, but is also instigating demands for contemporary approaches to accounting education, due to changing work roles for accounting graduates working within a global knowledge society. Following a depiction of the researcher's motivation and interest in the area, the research questions, which will provide a clear focus for the study, were outlined.

The chapter concludes with a summary of the thesis structure, and how the research narrative is organised to answer the thesis' primary research question - how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level? The next chapter provides a comprehensive review of the research literature relevant to the study, in order to commence answering the research questions which have been posed.

Chapter 2 Literature Review

If we teach today as we taught yesterday, we rob our children of tomorrow (Dewey and Dewey, 1915).

2.1 Chapter introduction

This chapter provides a review of the extant literature pertaining to the research questions. The importance of the introductory accounting module and the current learning and teaching practices pertaining to the subject are conveyed. While novel learner-centred techniques have been promulgated to address accounting graduate skill deficiencies, a dearth of research in accounting education is seen to be hampering innovations in educational practice.

The literature surrounding the concept of blended learning is examined, together with its implications for learners, instructors and institutions alike. The imperative to provide robust theoretical frameworks to support developments in the area and deal with issues unique to the design of a BL intervention is highlighted. In addition, the literature surrounding the learning experience definition is explored. Finally, while there exists a paucity of research in relation to educational technology use and BL within accounting education, extant research in the area is probed to inform and shape this research in designing a BL intervention suited to an introductory accounting module.

2.2 Accounting education

2.2.1 Introductory Accounting module

The importance of the introductory accounting module at tertiary level has been well documented. The AECC (1990, 1992) attributed the greatest significance to the ‘first course in accounting’, delineating its impact in engendering accurate perceptions of the role of accounting in the modern-day business world, informing and influencing students in making future career choices, and equipping them with the necessary skills, capabilities and attitudes for success in the profession (AECC, 1990, 1992; Chen, Jones and McIntyre, 2008; Williams, 2011; Abbott and Palatnik, 2018). Subsequently, the Pathways Commission acknowledged the role of the first

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course in accounting in attracting high-calibre entrants into the profession (Behn *et al.*, 2012). The recently published “Pathways Vision Model: THIS is accounting!” (American Accounting Association, 2020) visually represents what people should understand from their first exposure to accounting (see Figure 2.1).

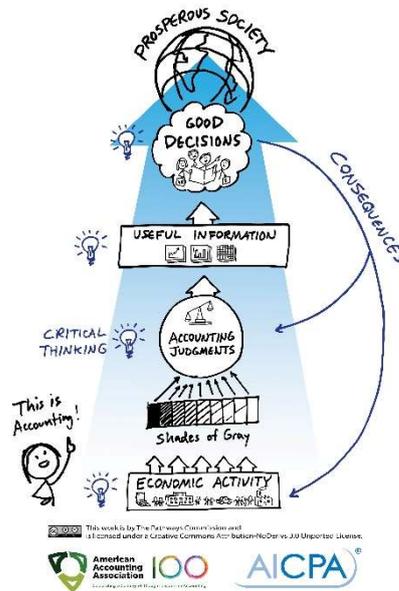


Figure 2.1 Pathways Vision Model: THIS is accounting! (AAA, 2020)
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However, the inherent complexity of the subject has resulted in many students perceiving the introductory accounting course as demanding, with students frequently experiencing difficulties when introduced to foundational threshold concepts (Jones and Fields, 2001; Lucas and Mladenovic, 2007; Bloemhof and Christensen Hughes, 2013). Large quantities of material to be assimilated, coupled with the complex nature of material to be processed, can lead to high levels of cognitive load for introductory accounting students (Blayney, Kalyuga and Sweller, 2010). While learners may grasp specific principles and concepts, they may do so without appreciating the interrelations which exist between them (Sithole and Abeysekera, 2017).

Accounting is predominantly taught in a linear fashion, with each subject building on the knowledge acquired in prior subjects. Thus, the quality of experience in the introductory accounting module is of paramount importance, as it establishes a foundation for students in outlining basic concepts which students will build upon

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when embarking on more advanced accounting modules, while concurrently shaping their perceptions of the accounting profession (AECC, 1992; Mintz and Cherry, 1993; Warren and Young, 2012; Brink, 2013; Sithole and Abeysekera, 2017; Abbott and Palatnik, 2018). Furthermore, the student cohort in an introductory accounting class is a heterogeneous one, with students possessing a diversity of accounting knowledge, abilities, and prior experience and exhibiting mixed levels of interest and effort, posing an additional challenge for instructors at that level (Mostyn, 2012; Bloemhof and Christensen Hughes, 2013). This can be compounded by a lack of confidence among some students in their ability to succeed, as evidenced among 25 percent of first-year students in a study conducted within an Irish university (Byrne and Flood, 2005).

Negative attitudes towards accounting are commonplace among introductory accounting students (Warren and Young, 2012), with many of these negative perceptions induced, or reinforced, by introductory accounting modules (Mladenovic, 2000; Stivers and Onifade, 2014). Research has shown that many students exhibit evidence of diminished perceptions following completion of the introductory module, which emphasises the need to be selective when assigning instructors to such courses to ensure an ample supply of graduates to the profession (AECC, 1992; Cohen and Hanno, 1993; Geiger and Ogilby, 2000; Malgwi, 2006). Despite the fact that innovative and novel instructional designs may challenge negative perceptions of the subject (Sithole and Abeysekera, 2017), a US survey identified that part-time instructors are frequently assigned to introductory accounting modules, resulting in the likelihood of a reduced commitment to innovative teaching practices due to job security issues (Duchac and Amoruso, 2012).

2.2.2 Learning and teaching in accounting

The challenge posed by the complexity of accounting modules, particularly for novice or low-aptitude learners (Sargent, Borthick and Lederberg, 2011; Osgerby, 2013; Camp, Earley and Morse, 2015; Grabinski, Kedzior and Krasodomska, 2015) can result in a tendency among students to memorise calculations and formats, creating difficulties for them at later stages in applying core concepts as they

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progress to advanced modules (Gabbin, 2002; Lubbe, 2016). Furthermore, the rules-based approach to teaching accounting leads students to unreservedly accept accounting as an objective measurement and reporting system, prompting a failure to question the logic or justification of specific accounting practices (Flood, 2014).

Students entering third-level are frequently ill-prepared, reflected in the many criticisms of the prescribed nature of the leaving certificate (LC) exam with its emphasis on a final ‘high-stakes’ written examination, which many argue encourages rote learning and detracts from the development of transferable skills and learner autonomy which are necessary for tertiary education (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2015b; McCoy *et al.*, 2016; Burns *et al.*, 2018; O’Leary and Scully, 2018; Marcus-Quinn, Hourigan and McCoy, 2019). The Department of Education and Skills acknowledges the issue of rote learning at senior-cycle of secondary education, attributing it to “problematic predictability” in the LC examination due to syllabi which have been in place for an extended period of time (Department of Education and Skills, 2013). Rote learning, causing poor conceptual understanding, has been specifically associated with the LC accounting subject (Clarke and Hession, 2004; Byrne and Willis, 2008) and is highlighted as a cause for concern in reports from the Chief Examiner of LC Accounting, who places an onus upon teachers to provide students with opportunities to learn for understanding (State Examinations Commission, 2011, 2018).

Many authors have been critical of the traditional approach to accounting education, with its focus on content coverage of technical material which has potential to become outdated. This, in turn, leads to memorisation and rote learning among learners, thwarting their ability to learn real-world skills (Albrecht and Sack, 2000; Muldoon, Pawsey and Palm, 2007; Carmona, 2013). Lucas (1998) stresses the need for students to learn through understanding rather than replication, so that they would be able to explain and understand the theories underpinning an accounting phenomenon, such as a balance sheet, rather than simply reproduce it mechanically. Students should be taught the fundamental concepts underlying accounting rather than fixed accounting rules and procedures (Bloemhof and Christensen Hughes, 2013; Ellington, 2017), with educators required to remain cognisant of the role

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played by accountants in shaping social reality by “develop[ing] curricula beyond mere technical menus” (Chabrak and Craig, 2013, p. 102). Accounting education must encompass “learning experiences that ask students to think beyond the mechanics of the accounting handbook”, to prepare them for future roles in the complex, evolving business world (Bloemhof and Christensen Hughes, 2013, p. 13). Such learning experiences would inspire a commitment towards continuous, lifelong learning, the importance of which has been consistently emphasised throughout the accounting professional and education literature (AAA (Bedford Committee), 1986; AECC, 1990; Kavanagh and Drennan, 2008; Behn *et al.*, 2012; Ravenscroft, Waymire and West, 2012; Grabinski, Kedzior and Krasodomska, 2015; AICPA, 2018; Murphy and Hassall, 2020).

Sustained criticism of the deficiencies in accounting education have been accompanied by demands for innovation in pedagogical practices to prepare students to work in the information-rich society which has evolved due to technological advancements (Albrecht and Sack, 2001; Gabbin, 2002; Lucas, 2002; Howieson, 2003; Flood, 2014; Abbott and Palatnik, 2018; Fogarty, 2019). Additionally, the Pathways Commission 2012 report (Behn *et al.*, 2012) requested the identification and use of a “signature pedagogy” for accounting educators, defined by Shulman (2005, p. 52) as “the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions”. However, new innovations have been hampered by a dearth of research in the area (Weil, De Silva and Ward, 2014; Wygal and Stout, 2015; Sithole and Abeysekera, 2017). Extant accounting education research has been criticised for the use of experiments which are not based on theory (Apostolou *et al.*, 2013), the absence of action research (Curtis, 2017), and the disconnect which exists between research and practice in accounting (Behn *et al.*, 2012; Rebele and St. Pierre, 2015), with an appeal expressed for deployment of longitudinal studies to provide reliable evidence on the effectiveness of instructional approaches (Watson *et al.*, 2007).

In 1987, the American Association of Higher Education (AAHE) and the Johnson Foundation identified seven principles of good practice in undergraduate education (Chickering and Gamson, 1987), recommending that student motivation and performance be augmented through:

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1. Encouraging student-faculty contact
2. Encouraging cooperation among students
3. Encouraging active learning
4. Giving prompt feedback
5. Emphasising time on task
6. Communicating high expectations
7. Respecting diverse talents and ways of learning

Subsequently, Bradford and Peck (1997) advocated use of the seven principles among accounting instructors to adapt their teaching style to achieve the educational outcomes recommended by the AECC at that time. Since then, many researchers have proffered the use of active learning techniques to cultivate higher-order learning skills, foster independent learning and develop communication and lifelong learning skills (Bonk and Smith, 1998; Hurt, 2007; Healy and McCutcheon, 2008; Joshi and Chugh, 2009; Young and Lee Warren, 2011; Warren and Young, 2012; Dunn, Hooks and Kohlbeck, 2016; Abbott and Palatnik, 2018; Fogarty, 2019). The learner-centred approaches proposed, which are based on constructivist learning principles, are designed to encourage autonomy and replace a traditional style of teaching which relies on information memorisation. However, there is evidence to suggest that active learning environments are not commonly adopted among accounting educators (Adler and Milne, 1997; Adler, Milne and Stringer, 2000; Healy and McCutcheon, 2008; Behn *et al.*, 2012; O'Connell *et al.*, 2015) possibly due to the fact that accounting students, many of whom are reticent in nature, prefer to play a passive role in the learning process (Healy and McCutcheon, 2008; Taplin, Kerr and Brown, 2017).

While it has been acknowledged that active learning approaches may be difficult to actualise with large class groups, they can act to enhance student-lecturer relations. However, when implementing such strategies the lecturer must take care to provide an appropriate level of support to encourage student engagement without stifling their efforts to become autonomous learners (Gracia and Jenkins, 2002; Hahn, Fairchild and Dowis, 2013; Lento, 2017). Careful planning with thoughtful incorporation into study programmes is required to ensure success in achieving

engagement and independent learning within the accounting classroom (Healy and McCutcheon, 2008; Gallagher, 2015).

2.2.3 Accounting graduate skill requirements

Graduate attributes nurtured during higher education to prepare students as future decision-makers, employees and global citizens have been the subject of much educational research (Barrie, 2004; Braun, 2004). Entwistle, Christensen Hughes and Mighty (2010, p. 5) note that:

higher education should ... be concentrating on helping students to develop skills, attitudes, knowledge and understanding that will be of maximum value beyond academe; not just an induction into the world of work in a specific profession, but also an effective preparation for life in the 21st century.

This has been mirrored in the accounting professional and education literature where the need to facilitate learners in “learning how to learn” and develop the interpersonal, communication, and intellectual skills required of accounting graduates has been emphasised (AECC, 1990; Lindquist, 1995; Bradford and Peck, 1997; Becker, 2013; PriceWaterhouseCoopers, 2015; Boyce *et al.*, 2019). The acceleration of change, encompassing advancements in technology and emergence of global markets, has seen the accountant’s role evolving into a ‘knowledge professional’ who plays a key advisory role in adding value to the company and driving the business forward. As already discussed, this has resulted in calls for change in the way accountants are educated, to provide them with the skills necessary to function in the new global marketplace (Hunton, 2002; Byrne and Flood, 2003; Jackling and De Lange, 2009; Tempone *et al.*, 2012; Flood, 2014).

Generic skills are referred to using interchangeable terms including, but not limited to, “key competencies”, “soft skills”, or “transferable skills” (Tempone *et al.*, 2012). Research studies have identified a diverse range of generic skills identified as important by accounting graduate employers including analytical/problem solving skills, a level of business awareness or real life experience, oral and written communication skills, ethical awareness, teamwork, time management, leadership potential and interpersonal skills (Gabric and McFadden, 2001; Kavanagh and Drennan, 2008; Jackling and De Lange, 2009; Pan and Perera, 2012; Tempone *et al.*, 2012).

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In recognition of the fact that these skills are essential to today's accounting professionals, they are reflected in the AICPA pre-certification core competency framework which delineates the skills-based competencies which students need when entering the accounting profession, with higher order skills being emphasised in the recently updated certified public accountant (CPA) examination and included within the *CPA Evolution initiative* transformation proposals (AICPA, 2017, 2018; Freeman, 2018; Tysiac, 2019; National Association of State Boards of Accountancy, 2020). However, studies of accounting graduates reveal a general perception that their undergraduate programmes did not facilitate them in acquiring the requisite soft skills demanded by employers, indicative of the need for a greater emphasis on these skills in accounting programmes in order to prepare students for the workplace (Jackling and De Lange, 2009; Webb and Chaffer, 2016).

Communication proficiency is one of the most highly researched generic skills among accounting students and graduates. Academics and practitioners worldwide concur that both written and oral communication skills are essential for success in the accountancy profession (Albrecht and Sack, 2000; Crawford, Helliard and Monk, 2011; Gray and Murray, 2011; Tempone *et al.*, 2012; Hagel, 2015). There is also strong agreement that accounting graduates are deficient in these vital skills (Gray and Murray, 2011; Chen, 2013) along with a tendency among students to underestimate the importance of such skills in their careers, leading to a potential unpreparedness for the workplace (Ameen, Jackson and Malgwi, 2010; Gray and Murray, 2011; Lin, Krishnan and Grace, 2013). Communication literature suggests that poor communication skills can be caused by the presence of communication apprehension (CA), defined by McCroskey (1977, p. 78) as "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons". In a review of literature, Simons and Riley (2014) identified consistent findings from research across several countries illustrating that accounting students having higher levels of communication apprehension (CA) relative to those in other disciplines, with a potential identified for higher CA levels among students from socio-economically disadvantaged backgrounds (Coetzee, Schmulian and Kotze, 2014). One possible explanation offered is that students may choose accounting careers based on the mistaken belief that accounting deals only with numbers and that oral communication is less important (Ameen, Jackson and

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Malgwi, 2010). Furthermore, criticism has been levelled at the low priority attached to oral communication within accounting programmes in UK and Irish HE (Webb and Chaffer, 2016).

Technological knowledge, in particular that of Microsoft Excel, has been identified as another priority skill requirement for financial and management accounting positions by employers and academics alike (Sprakman *et al.*, 2015; Rackliffe and Ragland, 2016; Tysiac, 2019). Accounting students taught with technology reported positively on their satisfaction levels and demonstrated enhanced self-confidence with technology, with evidence of equivalent or higher performance levels relative to traditional teaching approaches (DeBerg and Chapman, 2012; Lusher, Huber and Valencia, 2012). Digital skills have been emphasised for all learners in national government policy within the *National Skills Strategy 2025* (Department of Education and Skills, 2016a) and in a study report by the Expert Group on Future Skills Needs (2018). Yet the recent INDEx survey, which explored the digital experiences of students and staff who teach in Irish HE, revealed that fewer than half of tertiary students believed that their course prepared them adequately for the digital workplace. Nevertheless, there was a higher level of agreement regarding digital workplace readiness among students in the technological relative to the university sector (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020a). Accounting educators worldwide have called for integration of technology and Microsoft (MS) Excel use across accounting curricula to increase graduate employability (Lafond, McAleer and Wentzel, 2016; Rackliffe and Ragland, 2016; Al-Htaybat, von Alberti-Alhtaybat and Alhatabat, 2018; Kotb *et al.*, 2019); however, this has been impeded by a lack of professional body accreditation for information technology (IT) related content, crowded syllabi and issues relating to faculty competence (Kotb *et al.*, 2019).

Earlier predictions that employers may recruit non-accounting graduates if accounting programmes fail to equip graduates with the skills and attributes demanded by employers (Frederickson and Pratt, 1995; Tinker and Koutsoumadi, 1997; Albrecht and Sack, 2000) are beginning to be fulfilled, with a recent shift towards generic job descriptions when advertising accounting and finance roles, coupled with the Big 4 accountancy firms stating no preference for accounting

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graduates when recruiting (Douglas and Gammie, 2019; Cooper, 2020). These developments are suggestive of a belief that non-accounting graduates possess greater transferable skill levels, a situation which could threaten the legitimacy of accounting degrees in the future.

The need for transferable skills is not unique to accounting graduates, with the European Commission and the Irish government recognising the importance of preparing every learner for employment and active citizenship in a changing world (Department of Education and Skills, 2016a; European Commission, 2016; Expert Group on Future Skills Needs, 2018). The *National Skills Strategy 2025*, which aims to support the development of a highly-skilled, well-educated, and adaptable workforce, has placed a strong emphasis on the development of transversal skills within all stages of education and training in Ireland (Department of Education and Skills, 2016a). However, it has been suggested within the accounting education literature that learning experiences in higher education are not wholly responsible for generic skill development due to many skills being nurtured outside of the tertiary education setting (Lucas *et al.*, 2004; Chaffer and Webb, 2017), a view supported by Rebele and St. Pierre (2019) who question the capability of accounting educators to develop soft skills within accounting programmes. Nevertheless, many favour the integration of skills development within learning and assessment activities across the curriculum to foster the desired learner skills (Lucas *et al.*, 2004; Larson and Miller, 2011).

Equipping the global accounting profession with future-focused skills, capabilities and ethical behaviours to work in a dynamic changing environment is stated as a recent key strategic objective by the International Federation of Accountants (International Federation of Accountants, 2018; International Accounting Education Standards Board, 2019). However, the provision of broad and flexibly-skilled graduates will demand change within accounting education which “may require disruption in approaches to curriculum and the methods of teaching, learning, and assessment” (Boyce *et al.*, 2019, p. 297). Innovative teaching approaches are necessary to stimulate a sense of inquiry and creativity among students, expose them to diverse perspectives, and instil within them the skills necessary for success in the accounting profession (Howieson, 2003; Flood, 2014). While it is evident that

research is still needed into how accounting education may best foster broad competencies among its learners (Apostolou *et al.*, 2013), accounting educators must strive to rise to the challenge of adapting their teaching practices to foster the requisite transferable, technological and higher order skill-sets.

2.3 Blended learning

2.3.1 Definition of blended learning

While “blended learning” is the most prevalent term within the research literature (Spring and Graham, 2016), it is used interchangeably with various labels including “hybrid learning”, “mixed-mode instruction”, “technology-mediated instruction” and “web-enhanced instruction” (Picciano, 2009; Moskal, Dziuban and Hartman, 2013). Driscoll (2002, p. 1) asserts that “blended learning means different things to different people”, which is evidenced by the considerable ambiguity that exists around its definition (Sharpe *et al.*, 2006; Graham, 2013; Moskal, Dziuban and Hartman, 2013; Dziuban *et al.*, 2018). The term has been associated with the blending of a variety of things, including blending instructional media and methods (Oliver and Trigwell, 2005; Graham, 2006; Sharpe *et al.*, 2006). However, the most common definition involves a mix of physical and virtual environments as reflected in Graham's (2006, p. 5) definition in the *Handbook of Blended Learning*: “blended learning systems combine face-to-face instruction with computer-mediated instruction”.

Some researchers stipulate that BL should improve pedagogical quality (Vaughan, 2007) with Garrison and Kanuka (2004, p. 96) defining BL as “the *thoughtful* integration of classroom face-to-face learning experiences with online learning experiences” (emphasis added). Rather than merely enhancing classroom experience, this involves an optimal convergence of the strengths of the f2f and online elements, working in harmony with the educational aims and context to transform the learning experience (Garrison and Kanuka, 2004; Garrison and Vaughan, 2008). In a similar vein, the definition proposed by Bliuc *et al.* (2012, p. 238) views BL as “the systematic integration of learning in face-to-face and online situations within the same course in order to support the development of student understanding” .

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Striving to provide students with an enhanced and holistic learning experience which promotes deeper understanding, the f2f and online components within the blend must be seamlessly integrated, precluding the mere addition of technology onto an existing f2f course (Garrison and Kanuka, 2004; Stacey and Gerbic, 2008; Picciano, 2009; Bliuc *et al.*, 2010; Gedik, Kiraz and Ozden, 2013; Lam, 2016); thus, some definitions of BL include a reduction in f2f contact hours or “seat time” (Bonk, Kim and Zeng, 2006; Vaughan, 2007). Participants in a Sloan Foundation workshop on blended learning defined BL as “courses that integrate online with traditional face-to-face class activities in a planned pedagogically valuable manner; and where a portion (institutionally defined) of face-to-face time is replaced by online activity” (Picciano, 2009, p. 10). While there is no set ratio of f2f to online delivery hours, several authors have specified a minimum online delivery threshold for learning environments to be considered as blended, with Allen, Seaman and Garrett (2007) categorising blended learning environments as having 30-79% online delivery. Bleed (2001, p. 18), recognising the value of social experiences in higher education learning, advocates a hybrid model with “half bricks and half clicks” involving 50 percent virtual instruction and 50 percent f2f instruction, a split which was favoured by students in a study by Orhan (2008).

2.3.2 Blended learning continuum

Laumakis, Graham and Dziuban (2009, p. 76) recognise blended learning as a “boundary object”, or construct that “brings constituencies together but find[s] each cohort defining the object differently” reflected in the fact that it is used by many learning communities, but in slightly different ways. Some researchers refer to BL as existing on a continuum between f2f and online teaching, varying from significant to small elements of e-learning representing “strong” and “weak” blends (Littlejohn and Pegler, 2007). On the other hand, some writers contend that merely supplementing a f2f course with online learning is not considered as blended learning (Vaughan, 2007; Montgomery *et al.*, 2015). This divergence of opinion is portrayed by Graham, Woodfield and Harrison (2013) who identify a spectrum of course delivery modalities between traditional f2f and completely online (see Figure 2.2).

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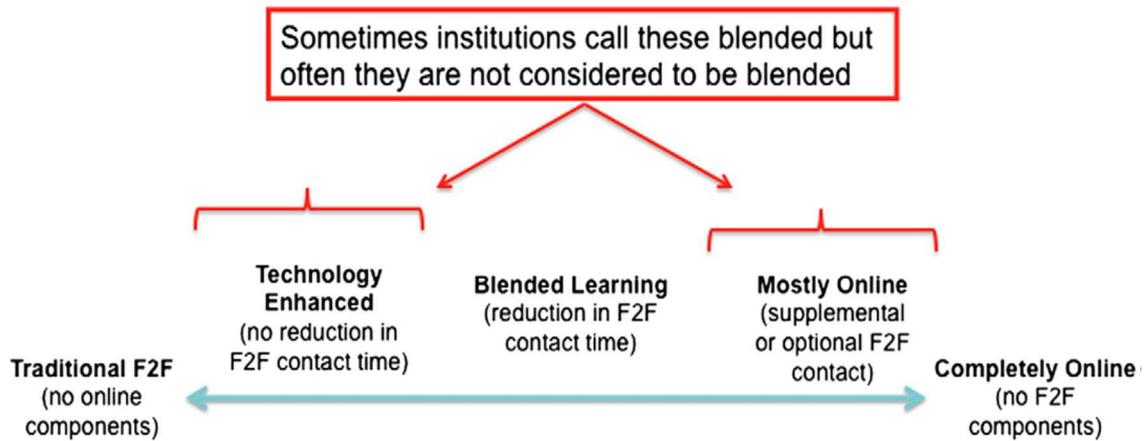


Figure 2.2 *Spectrum of course-delivery modalities in higher education (Graham, Woodfield and Harrison, 2013, p. 5)* [Reprinted with permission]

While a lack of consensus on a definition presents a challenge when researching BL (Oliver and Trigwell, 2005; Picciano, 2009; Laumakis, Graham and Dziuban, 2019), it can also be considered a strength, in that it allows tutors and institutions to negotiate a meaning to render a design suitable for their own context (Sharpe *et al.*, 2006; Heinze, 2008; Moskal, Dziuban and Hartman, 2013).

2.3.3 Blended learning design and implementation

Sharpe *et al.* (2006) determine that effective BL implementations are characterised by active learning designs which maintain f2f contact and respond to the affordances and constraints of the local institutional context. Most higher education institutions deploy learning management systems (LMS) or virtual learning environments (VLEs) such as Blackboard and Moodle to deliver online learning material to students (Caravias, 2018). LMS facilitate BL by affording students the opportunity to learn outside of the classroom using both synchronous and asynchronous communication technologies (Singh, 2003). Synchronous communication involves instructors and students exchanging information in real time, usually from different locations using tools such as web conferencing and live chats. Asynchronous communication takes place at different times and locations, using discussion boards for instance, offering advantages to students of being able to work at their own pace and reflect on the comments of others (Cheung and Hew, 2011).

In accordance with the multiple and diverse definitions associated with BL, it is evident from the literature that significant variations exist within BL designs and

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implementations. In a review of UK blended e-learning literature and practice, Sharpe *et al.* (2006) identifies the presence of three types of “blended e-learning” as follows:

1. Supplementary model – f2f teaching with lecture notes placed on the VLE, following transmissive rather than constructivist or collaborative pedagogical styles.
2. Transformative model – radical course design, which involves extensive technology in addition to VLE use, whereby learners are actively involved in construction of knowledge rather than just recipients of knowledge.
3. A holistic model of technology to support learning – learners use a variety of technologies (mobile phones, instant messaging) in order to learn at any place and time.

Commonalities to the above are evident in the following three categories of blends described by Graham (2006):

1. Enabling blends, which provide flexibility to learners in terms of increased access and convenience.
2. Enhancing blends, which improve but do not radically change teaching style, for example, through the provision of supplementary resources online.
3. Transforming blends, where pedagogy is transformed through the use of technology to enable learners to actively construct knowledge.

In a similar vein, Alammery, Sheard and Carbone (2014) distinguish between low-impact, medium-impact and high-impact blends which range from adding extra online activities to a f2f course to building a blended module through total course redesign.

Notwithstanding these variations, there exists a strong preference for blends which utilise technology innovatively to achieve an intentional redesign of the learning environment for an improved learning experience (Garrison and Kanuka, 2004; Twigg, 2005; Garrison and Vaughan, 2008; Stein and Graham, 2014).

Blended learning inherently is about rethinking and redesigning the teaching and learning relationship (Garrison and Kanuka, 2004, p. 100).

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Despite the overwhelming support in the literature for widespread BL use, instructors face challenges in devising effective BL solutions. Poorly designed blended learning environments result from, adding online activities onto an existing course design resulting in “a class and a half”, or replicating onsite with online activities. Furthermore, using technology in an unfocused manner, simply because it is available, can inhibit student learning (Aycock, Garnham and Kaleta, 2002; Stein and Graham, 2014). BL research must investigate relative human and technological strengths so that they are blended optimally for maximum and effective learning, achieving synergies between pedagogies and innovative technological approaches (Graham, 2013; Siemens *et al.*, 2015). It has been suggested that innovative blended course design can be best achieved through an iterative design, utilising rapid prototyping and reflective practice (Beattie, 2014; Stein and Graham, 2014).

2.3.4 Models of blended learning

Much debate has transpired surrounding the use of frameworks and models to inform BL research and practice. Although originally designed to guide online learning research and practice, Garrison and Vaughan (2008, p. xii) have posited the *Community of Inquiry* framework with its core elements of social, cognitive and teaching presence, as a “roadmap for the integration of f2f and online learning activities”. Picciano (2009) proposes a *Blending with Purpose* model which posits that BL should seamlessly integrate multiple modalities, driven by pedagogical objectives, to meet the needs of a wide spectrum of students. Pedagogical objectives which may be supported include content delivery, social/emotional support, dialectic/questioning activities, reflective opportunities, collaborative learning, and learning evaluation/assessment; these are presented within the model with their concomitant technology (see Figure 2.3). However, other objectives may be added, and the pedagogical objectives of individual programmes will determine the activities, technologies, and approaches to be used.

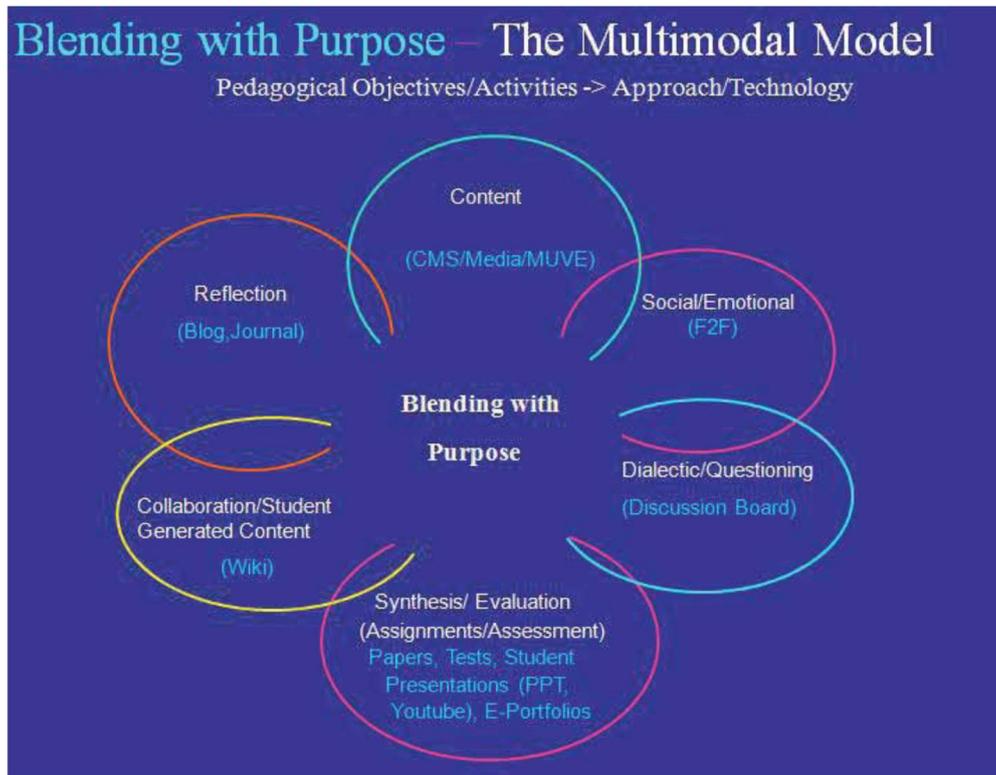


Figure 2.3 *Blending with purpose: The multimodal model (Picciano, 2009, p. 15)*
 [Reprinted with permission]

Other frameworks built upon by researchers include Moore's Transactional Distance Theory, Wenger's Communities of Practice, and Mezirow's Transformational Learning Theory (Drysdale *et al.*, 2013).

The various definitions and models proposed for use in BL design can pose a challenge for teachers when faced with designing BL modules (Alammary, Sheard and Carbone, 2014) as currently, technological modes of delivery are largely informed by online learning research and practice (Siemens *et al.*, 2015).

Blended learning needs theoretical frameworks that deal directly with blended learning and help practitioners in making decisions about the blends that they choose (Drysdale *et al.*, 2013, p. 98).

There exists a lacuna in the literature of theoretically-grounded BL research, as the majority of extant research lacks cohesion, using theory in a limited fragmented manner to describe local implementations, without contributing substantively to new theory development. Thus, there have been strong calls for the development of theoretical frameworks to deal with the unique issues which pertain to blended learning environment (BLE) design as it evolves from a grassroots practice to an

emerging research field (Graham, 2006, 2013; Halverson *et al.*, 2012, 2014; Drysdale *et al.*, 2013). Graham (2013) advocates for the development of “design-based instructional theories” to assist instructors in developing BLEs which are tailored to suit their specific requirements. Empirical research which is linked with theory development will help move the BL domain beyond “localised challenges” and towards the “coherent development of theory” (Graham, 2013, p. 340).

2.3.5 Research considerations in blended learning

While two decades ago, there existed limited research concerning the practice of blended learning in higher education (Procter, 2003; Singh, 2003), recent years have seen a growing research interest in the area, particularly within higher education contexts (Garrison and Vaughan, 2008; Heinze, 2008; Norberg, Dziuban and Moskal, 2011; Halverson *et al.*, 2012; Drysdale *et al.*, 2013; Graham, 2013) where it is referred to by some as the “new normal” in programme delivery (Watson, 2008; Norberg, Dziuban and Moskal, 2011, p. 207).

While there is evidence of theme similarity within BL research worldwide (Spring and Graham, 2016), research is predominantly US-based, with literature dominated by American books and publications (Norberg and Jahnke, 2014) and earlier evidence of a paucity of UK research (Jones, 2006). In a review of the most highly cited scholarship in BL research, Halverson *et al.* (2014) noted the fragmented nature of BL research, typically focusing on “a single case of blended learning within a single setting within a single country” rather than taking a regional or international view. The majority of BL research focuses on academic performance rather than broader learner outcomes such as student motivation or engagement (Drysdale *et al.*, 2013; Halverson *et al.*, 2014; Siemens *et al.*, 2015). Research on engagement in BLEs can be progressed through development of clear and coherent theoretical frameworks to guide research and practice in the area (Halverson *et al.*, 2014). The need for more explicit research on the design of BLEs (Boelens, De Wever and Voet, 2017) together with research on BL strategies and design features suitable for particular contexts, disciplines, and learner types has been identified (Halverson *et al.*, 2012; Graham, 2013; Graham, Woodfield and Harrison, 2013). BL research can be content-specific also, as research has shown that “design principles that have

empirical support when applied to some kinds of learning content prove ineffective with other content” (Means *et al.*, 2013, p. 38). Brown (2016) criticises the absence of scholarship addressing BL academic practice, calling for “artefact biographies, multi-sited ethnographies of course level instruction, and longitudinal studies of changes in instructional practices with digital tools over time” (p. 7).

Bliuc, Goodyear and Ellis (2007) insist on a comprehensive research approach to BL, deploying mixed methods in search of more than one type of evidence. In an Irish context, the National Forum for the Enhancement of Teaching and Learning in Higher Education (2015a) highlight the imperative of facilitating and encouraging high impact scholarship in digital pedagogy within its *Digital Roadmap for Enhancement in a Digital World*. Oliver and Trigwell (2005) argue that blended learning discussions in the past have rarely focused on learning from the learner’s perspective, concentrating instead on teaching and pedagogical implications, joining in the demands for research which explores the learning experiences of the student (Garrison and Kanuka, 2004; Oliver and Trigwell, 2005; Bliuc, Goodyear and Ellis, 2007).

2.3.6 Implications of blended learning

Blended learning has wide-ranging implications, particularly for learners, but also for lecturers and at institutional level.

2.3.6.1 Influences on learners

As discussed in chapter one, the American Association for Higher Education (AAHE) put forward *Seven principles for good practice in undergraduate education* which were distributed worldwide and subsequently updated for use with technology (Chickering and Gamson, 1987; Chickering and Ehrmann, 1996). Lin (2008) identified that BL can incorporate the seven principles through promoting interaction between students/lecturers, enhancing cooperation among students, promoting active learning, providing prompt feedback, increasing time on task, setting high expectations and recognising diversity in learning. A review of the literature reveals many other impacts upon learners, as detailed below.

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2.3.6.1.1 *Access and convenience*

Traditionally, blended learning has been used to provide flexible learning environments, responding to students' lifestyles by offering learning accessibility to those with outside commitments wishing to progress their education. Students are offered the convenience of distance education without totally sacrificing the social interaction and opportunities to build relationships within the f2f classroom (Singh, 2003; Graham, 2006, 2013; Sharpe *et al.*, 2006; Vaughan, 2007; De George-Walker and Keeffe, 2010). The online availability of learning materials offers learners the autonomy to work at their own pace, increasing learner engagement while also facilitating ease of revision (Dziuban, Moskal and Hartman, 2005; Wong and Tatnall, 2009; De George-Walker and Keeffe, 2010; Duhaney, 2012). Furthermore, increased opportunities for self-directed learning in the blended model have been associated with the development of project and time management skills among learners, as well as fostering lifelong learning habits (Kenney and Newcombe, 2011; Stein and Graham, 2014). Results of the INDEx survey recently published by the National Forum for the Enhancement of Teaching and Learning in Higher Education (2020a) reveal that a majority of Irish students agree that digital technology use in education leads to greater levels of understanding, enjoyment, and independence allowing them to fit learning into their lives more easily.

However, some students struggle to take responsibility for their own learning and meet the demands of blended learning; thus, there is a need for support in development of self-regulated learning skills among learners which are essential for lifelong learning (Young, 2002; Kenney and Newcombe, 2011; Siemens *et al.*, 2015). Furthermore, flexible modes of delivery, based on an individual interacting with multimedia, while increasing convenience, may actually inhibit learning due to the isolated nature of the learning experience. Consequently, careful learning environment design is required, with the need for instructional designers to incorporate scaffolding to support learners (Herrington and Oliver, 2000; Chen, Chen and Chen, 2015). A systematic review of BL research studies by Boelens, De Wever and Voet (2017) revealed that learner control over realisation of the blend featured in only a small number of studies, perhaps due to the absence of self-regulation and self-direction skills among learners.

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2.3.6.1.2 *Learning achievement*

In addition to increased accessibility, BL also offers an opportunity to add pedagogical value, which is highly conducive to student learning. BL enables improved pedagogical practices, facilitating a move away from transmissive teaching towards interactive learning strategies, congruent with constructivist and situated learning principles (Graham, 2006; Sharpe *et al.*, 2006; Catalano, 2014). Learning is extended outside of classroom boundaries through the availability of out-of-class online learning activities, individualised learning paths and online collaborative interaction opportunities, which can lead to improved learning outcomes (Bonk, Kim and Zeng, 2006; Sharpe *et al.*, 2006; Norberg, Dziuban and Moskal, 2011; McKenzie *et al.*, 2013; Stein and Graham, 2014) while cultivating a more reflective student community (Lin, 2008; Moskal, Dziuban and Hartman, 2013).

US survey findings reveal strong perceptions among HEI academic leaders of the superior performance of BL relative to f2f instruction in relation to learning outcome achievement (Allen *et al.*, 2016). A meta-analysis conducted by the US Department of Education (Means *et al.*, 2013) examining the effectiveness of wholly online and blended learning compared to traditional f2f learning, concluded that students studying on online and BL programmes achieved higher learning outcomes relative to those participating in f2f instruction only. These results were mirrored in a more recent meta-analysis when student performance in BL and f2f settings was compared, with evidence also of a more pronounced effect of BL on student performance in STEM disciplines relative to non-STEM disciplines (Vo, Zhu and Diep, 2017). A synthesis of findings from meta-analyses and systematic literature reviews on BL revealed that student academic achievement was higher for students on BL courses compared to those taught using fully f2f or online learning modes; yet results are cautioned by the presence of inconsistencies between studies in BLE definitions applied and academic outcomes being measured (Siemens *et al.*, 2015).

Despite an assertion by Taplin, Kerr and Brown (2017, p. 147) that “there is limited evidence about whether a BLE enhances student learning more than a traditional face-to-face mode”, various studies have demonstrated improved student learning outcomes for students on BL programmes relative to traditional f2f teaching, with some institutions demonstrating reduced drop-out rates (Singh, 2003; Twigg, 2005;

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Vaughan, 2007; López-Pérez, Pérez-López and Rodríguez-Ariza, 2011; Means *et al.*, 2013; Moskal, Dziuban and Hartman, 2013). Although, a number of empirical studies have revealed no differences in learning outcomes between BL and traditional f2f approaches, conclusions drawn indicate that use of BL can offer benefits in terms of convenience and flexibility without adversely affecting educational quality (Arbaugh *et al.*, 2009; Kocoglu, Ozek and Kesli, 2011; Bowen *et al.*, 2013).

2.3.6.1.3 *Learner-centred: supporting diversity*

Despite Garrison and Kanuka's (2004, p. 104) assertion that “there is growing evidence and a sentiment that sitting in a large lecture hall three times a week is not intellectually stimulating or perhaps worth the commute to campus”, the lecture is still used as the predominant teaching strategy in higher education (Grabinski, Kedzior and Krasodomska, 2015; Freeman, 2018; Jones and Sharma, 2019). The ineffectiveness of the traditional lecture approach in promoting higher-order learning experiences and outcomes demanded by a changing knowledge society has been recognised (Anderson, 2001; Twigg, 2005; Garrison and Vaughan, 2008), with Twigg (2005, p. 21) advocating instead for a blended approach which involves learners engaging actively with web-based learning resources:

The lecture method treats all students as if they were the same, as if they bring to the course the same academic preparation, the same learning style, the same motivation to learn, the same interest in the subject, and the same ability to learn.

Despite its inadequacies, however, students and staff accustomed to the didactic lecture method can exhibit difficulties in adapting to new BL strategies (Maarop and Embi, 2016).

While distance education has been criticised for providing vast amounts of information which students must process independently (Waddoups and Howell, 2002), BL has been posited as contributing to increased active learning and learner-centredness within programmes, inducing an enhanced learner experience (Garrison and Kanuka, 2004) and stronger sense of community among students (Rovai and Jordan, 2004). This is supported by reviews of the research literature, which indicate

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an overall positive disposition to BL approaches among students (Drysdale *et al.*, 2013; Halverson *et al.*, 2014).

Blended learning has been associated with supporting students with diverse needs (Twigg, 2005; Sharpe *et al.*, 2006; Boelens, Voet and De Wever, 2018; Jones and Sharma, 2019), as the multiple formats used to present material within a BL design address the fact that students learn in different ways (Young, 2002). Student performance in first year of college has a major impact on student success and retention, with the majority of dropouts occurring between the first and second year (Twigg, 2005). Twigg (2005) asserts that course redesign which incorporates technology use respects diversity among students, offering potential to raise educational attainment among “underserved students” such as those of low-income, by facilitating them in progressing through the first critical year of college and mastering the requisite skills and knowledge for course success. O’Keefe, Rienks and Smith (2014) argue for “student-centred” blends offering learner choice over tasks and activities. The National Forum for the Enhancement of Teaching and Learning in Higher Education (2016) asserts that flexible course provision may improve student retention by enabling students to achieve a “workable balance” between family and study commitments.

2.3.6.1.4 Authentic learning and assessment

There exists scope to incorporate authentic features in learning and assessment practices within a BL approach. Bliuc *et al.* (2012) affirm the suitability of BL for use in vocational education through its ability to incorporate work-place based activities into the learning environment design. BLEs offer opportunities to incorporate authentic real-world content, increase the variety and frequency of assessments, and provide fast automated feedback bestowing benefits on both students and lecturers (Driscoll, 2002; Kenney and Newcombe, 2011; Moskal, Dziuban and Hartman, 2013; Stein and Graham, 2014). Use of scoring rubrics, in conjunction with assessments, can communicate performance expectations in advance, allowing greater clarity and transparency around assessment grading (Kenney and Newcombe, 2011). Online discussion forums allow peer collaborative opportunities which can also provide evidence of learning for assessment purposes, as well as facilitating learning community formation (Stein and Graham, 2014).

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However, it is conceded that scant attention has been given to the area of assessment in the BL research literature (Siemens *et al.*, 2015).

2.3.6.1.5 *Learner challenges*

The introduction of BL is not without its challenges, leading to changed role expectations for students, demanding active engagement rather than passive learning behaviours (Norberg, Dziuban and Moskal, 2011). The renowned theory of transactional distance, put forward by Michael G. Moore in the 1970s, attributes the self-directedness and autonomy of the learner as a critical factor when engaging in distance education (Moore, 1997). Time management, revealed within an Irish study as the most fundamental challenge facing students when transitioning from second level to tertiary education (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2015b), can further constrain learners on blended programmes, when striving to complete online activities in between f2f classes (Vaughan, 2007). Many students struggle in adapting to an active learning style, in particular with taking responsibility for their own learning, having been accustomed to a passive learning approach (Aycock, Garnham and Kaleta, 2002; Vaughan, 2007; Chen, Chen and Chen, 2015). Time and assistance must be provided to enable students to develop the requisite skills in progressing to become autonomous learners (Aycock, Garnham and Kaleta, 2002; Lin, 2008; Kenney and Newcombe, 2011; Quality and Qualifications Ireland, 2018).

Technology related problems can present a challenge for learners also, with a certain level of technological skill required to partake in a BL course (Vaughan, 2007). Student access to technology and Internet connectivity will affect student engagement with online materials, factors which must be taken into account in BLE design (Gyamfi and Gyaase, 2015). A study on the use of BL within introductory accounting in an Irish university emphasised the pertinence of accessibility of suitable technical support for students to ensure BL success (Concannon, Flynn and Campbell, 2005).

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2.3.6.2 *Implications for lecturers*

Blended learning offers flexibility to instructors in achieving programme learning objectives (Aycock, Garnham and Kaleta, 2002) while also instigating continuous improvement in teaching practices through use of new technologies and learning and teaching strategies (Vaughan, 2007). Prinsloo and van Rooyen (2007, p. 58) assert that “the success of a blended learning approach will depend on carefully planned and optimally facilitated spaces for active learning”, which in turn depend on the skills and competencies of instructors in deployment of technology in pedagogically effective ways. However, many lecturers may be constrained by a lack of requisite teaching and technology skills in fostering online communities, managing online discussions, and dealing with students’ technical problems (Aycock, Garnham and Kaleta, 2002; Maarop and Embi, 2016).

Optimal BL implementation and resource sharing can be achieved through provision of opportunities for lecturers to work collaboratively with colleagues (Littlejohn and Pegler, 2007; Kenney and Newcombe, 2011; Gedik, Kiraz and Ozden, 2013). Norberg and Jahnke (2014, p. 262) identify a discrepancy between European institutions and their US counterparts whereby lecturers in the US are supported by experts in the field of learning technology, whereas many European instructors are largely responsible for digitising their own courses with little formal technical support. While the associated benefits of creating digital resources independently have been noted (Littlejohn and Pegler, 2007), a UK study recommends close collaboration between academic subject specialists and instructional designers (Jones and Northrop, 2006), something which is endorsed within Irish statutory quality assurance guidelines for BL providers to ensure learner-centred, subject-led course delivery (Quality and Qualifications Ireland, 2018). Furthermore, Bliuc *et al.* (2012) contend that, in order to achieve meaningful student learning, teachers must be guided towards working as reflective practitioners to develop learner-centred BLEs, rather than simply focusing on the practicalities associated with BL.

Within the rich BLE, the lecturer must embrace a new role as facilitator rather than transmitter of knowledge and information, a fundamental change which requires considerable adjustment for students and lecturers alike (Gerbic, 2011; McKenzie *et al.*, 2013). Coaching and mentoring instructional skills will be required as the

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lecturer provides the necessary scaffolding to ensure student success (Bonk, Kim and Zeng, 2006; Stacey and Gerbic, 2008; De George-Walker and Keeffe, 2010; Norberg, Dziuban and Moskal, 2011).

While it has been argued that re-designing learning experiences using technology to offer out-of-class learning activities can free up lecturer time to target students who may be having difficulties (Twiggs, 2002), the additional demands placed on lecturers due to the increased time commitment involved in planning, designing and developing a blended module have been highly emphasised (Vaughan, 2007; Wong and Tatnall, 2009; Kenney and Newcombe, 2011; Gedik, Kiraz and Ozden, 2013; Graham, 2013). Although the recent INDEx survey revealed significant progress with regard to digital technology engagement among the Irish HE community, academic staff identified a need for institutional support in terms of offering more time to develop digital teaching and learning (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020a).

Negative perceptions held by members of academic staff relating to innovation, workload, levels of institutional and technology support and quality assurance can affect BL adoption (Graham and Jones, 2011; Tshabalala, Ndeya-Ndereya and van der Merwe, 2014; Watty, McKay and Ngo, 2016). Consequently, there is an imperative for professional development and institutional support to address apprehensions and assist instructors in embracing its potential (Garrison and Kanuka, 2004; Kenney and Newcombe, 2011; Gedik, Kiraz and Ozden, 2013).

Research has shown that lecturers revealed positive experiences when teaching on BL programmes, reporting increased frequency and quality of interactions with students (Vaughan, 2007; Dziuban *et al.*, 2011). This may be attributable to online community formation facilitating the emergence of rich interactions in the f2f setting (Aycock, Garnham and Kaleta, 2002). However, it has been acknowledged that this area is under-researched (Drysedale *et al.*, 2013) and that research on instructor roles in achieving BL outcomes could add valuable insights and understanding, which may act to maximise BL benefits (Halverson *et al.*, 2014).

2.3.6.3 *Institutional factors*

Moskal, Dziuban and Hartman (2013) assert that successful BL implementation requires alignment with the institution's mission and goals, consideration of the local context, along with a continuous long-term effort, as there is no "one size fits all" approach. There is universal agreement that institutional commitment is required to deal with the complex challenges posed by strategic policy planning, scheduling and provision of robust and reliable infrastructure and investment of resources to harness the technology in enabling and sustaining a blended approach (Garrison and Kanuka, 2004; Jones and Northrop, 2006; Graham, Woodfield and Harrison, 2013; Porter *et al.*, 2014; Chen, Chen and Chen, 2015; Montgomery *et al.*, 2015; Williams, Horner and Allen, 2019). Quality assurance statutory guidelines, recently published by Quality and Qualifications Ireland (2018, p. 8), caution BL providers on the importance of having "a strategy and plan, an appropriate investment of time, money and other resources to develop capacity and resources to deliver high quality BL that will offer learners a consistent, enjoyable and effective learning experience". A willingness to assist students and staff, through the provision of training, technical, and other relevant supports, is important in achieving BL success (Garrison and Kanuka, 2004; Arbaugh *et al.*, 2009; Gedik, Kiraz and Ozden, 2013; Moskal, Dziuban and Hartman, 2013; Lam, 2016).

While there is limited extant research on the cost-effectiveness of BL (Halverson *et al.*, 2014), many claim that BL offers cost-effective educational opportunities through its ability to provide programme access to an increasing student population using a reduced physical infrastructure (Young, 2002; Garrison and Kanuka, 2004; Twigg, 2005; Graham, 2006; Sharpe *et al.*, 2006). US universities partaking in a course redesign project which incorporated technology-based instruction to replace traditional methods reported significant cost savings (Twigg, 2005). In contrast, Means *et al.* (2013) contend that, as BL courses do not remove the need for a full-time instructor, they do not yield the cost savings associated with wholly online courses. In addition, Littlejohn and Pegler (2007) point out the difficulty of achieving an accurate estimate of the cost of e-learning and any cost savings involved, quoting a UK study by Bacsich *et al.* (1999) which found that accurate e-learning activity cost data are rarely collected. The authors dispute the ability of BL to reduce institutional

costs particularly when transitioning to BL, asserting that cost savings are more likely to be associated with corporate training rather than colleges and universities.

2.4 Learning experience

According to Dewey (1916, p. 76), education is

that reconstruction or reorganization of experience, which adds to the meaning of experience, and which increases ability to direct the course of subsequent experiences.

As this research study aims to create a BL design which will enhance the learning experience of introductory accounting students, this section expands the ‘learning experience’ definition applied within the research.

It is claimed that the growing use of the term learning experience “reflects larger pedagogical and technological shifts that have occurred in the design and delivery of education to students, and it most likely represents an attempt to update conceptions of how, when, and where learning does and can take place” (EdGlossary, 2013).

This has been coupled with the recent emergence of ‘learning experience design’ espoused by Floor, (2018) as more progressive and user-centred than instructional design. Students can learn in different ways now than in the past, due to the use of new technologies which have multiplied and diversified modes of interaction with educators and peers (EdGlossary, 2013; Bouilheres *et al.*, 2020).

The definition of learning experience applicable to this research, adapted from that proffered by the UNESCO International Bureau of Education (2013) and outlined in the previous chapter, is as follows: *an organised learning interaction or activity which transforms learner perceptions, facilitates conceptual understanding, yields emotional qualities, and nurtures the acquisition of knowledge, skills and attitudes.* The UNESCO International Bureau of Education (2013) further elaborates on its definition stating that “in educational settings learning experiences are ideally challenging, interesting, rich, engaging, meaningful, and appropriate to learner needs. Previous learning experiences are considered to be key factors predicting further learning.”

Bunselmeyer *et al.* (2020) describe the learner experience as “a learner journey ... not a discrete, disconnected learning event”, emphasising the need to provide

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learning content which is relevant and embed it in context to offer learners a meaningful learning experience. Learning tasks should involve higher-order thinking and include practice, application and reflection, as well as opportunities to collaborate with others (Bunselmeyer *et al.*, 2020; Patsko, 2020). Learner-centred learning experiences are widely emphasised where student needs are met by learning through doing, rather than learning through instruction, thereby supporting learners to “learn for themselves” (Ryan, 2017). The use of a variety of learning activities acts to increase engagement (Interaction Design Foundation, 2020) while according to Bress (2016), providing clear learning goals and learning tasks of an appropriate level of difficulty can contribute to a positive learning experience.

Learning occurs in a social context, thus a “learning experience, while in one sense unique to the individual, results from the unfolding interaction and co-creation over time of all the participants and their environment” (Parrish, Wilson and Dunlap, 2011, p. 17). Consequently, creating a sense of belonging and a connection with others within the class group impacts on the learning experience of class members (Parrish, Wilson and Dunlap, 2011; Patsko, 2020). Providing learning spaces that facilitate communication and collaboration will act to encourage peer support and skill-sharing and promote a sense of belonging (Patsko, 2020).

Transformative learning experiences can only take place if cognisance is taken of students’ prior knowledge while also maintaining relevance to their present and future learning needs (Parrish, Wilson and Dunlap, 2011; Bress, 2016; Patsko, 2020). Allowing learners to understand the relevance of the learning to their own lives and giving them a degree of control in achieving their learning goals will increase their sense of autonomy and intrinsic motivation (Patsko, 2020).

A study by Šteh and Kalin (2012) into students’ views on important learning experiences, revealed that students valued learning experiences which allowed them to learn actively and connect theory and practice, for instance using theoretical knowledge in real-life situations. Other characteristics of learning experiences which were deemed important by students included those which enabled them to develop requisite skills for their future profession. Students also relished learning experiences which offered them opportunities to learn from others and view content

from alternative perspectives to allow in-depth consideration and the potential to transform their conceptions.

2.5 Digital technologies in accounting education

Undoubtedly, advances in technology provide new and innovative means of potentially improving the course performance of students on accounting programmes. This section examines the research literature pertaining to the deployment of digital technologies within accounting education, followed by an analysis of the limited research which has been undertaken in relation to BL in accounting.

2.5.1 Educational technology in accounting education

The limited number of extant studies examining the infusion of technology in accounting classrooms and programmes generally reveal positive effects associated with the use of various digital tools. Recent studies into use of innovative technologies within accounting courses, including web-based tutorials, virtual reality simulations and online learning materials have revealed enhanced performance and positive student attitudes (Hornik and Thornburg, 2010; Morris *et al.*, 2015; Spiceland, Spiceland and Schaeffer III, 2015; Coetzee, Schmulian and Coetzee, 2018).

Research investigating online assessment use shows evidence of enhanced student learning (Brink, 2013; Einig, 2013; Wooten, 2016; Massoudi *et al.*, 2017) with students responding positively to the opportunity to improve studying habits and monitor and improve their performance, while also facilitating tutors in pinpointing and offering support to students who may be struggling (Concannon, Flynn and Campbell, 2005; Marriott and Lau, 2008; Wooten, 2016; Helfaya, 2019).

Increased student engagement, confidence and satisfaction in accounting have been associated with use of student response systems, or 'clickers' in accounting modules (Carnaghan *et al.*, 2011; Premuroso, Tong and Beed, 2011; Chui, Martin and Pike, 2013; Eng, Lea and Cai, 2014). However, effects on learning performance are mixed with most studies indicating modest or no effect on final exam performance

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(Carnaghan and Webb, 2007; Carnaghan *et al.*, 2011; Chui, Martin and Pike, 2013) apart from a study by Eng, Lea and Cai (2013) which reveals a higher learning achievement, attributed by the authors to the instant feedback which facilitates the lecturer in easily pinpointing student misunderstandings.

Asynchronous discussion board use in accounting has been linked with higher exam performance (Perera and Richardson, 2010) and positive perceptions, particularly for non-native speaking and mature students (Rainsbury and Malcolm, 2003). However, MBA students enrolled on a BL introductory accounting module perceived limited improvements in conceptual understanding as result of compulsory discussion forum participation (Jones and Chen, 2008).

Online video tutorials which “bring solutions to life” (Lento, 2017, p. 154) and stimulate learning outside of the classroom, allowing “open-space to be created in the classroom” for higher order learning (Cottrell and Robison, 2003, p. 263) have been associated with enhanced performance and motivation, higher course grades as well as improving retention and pass-rates among low-achieving students (Sargent, Borthick and Lederberg, 2011; Theuri, Greer and Turner, 2012; D’Aquila, Wang and Mattia, 2019).

2.5.2 Blended learning in accounting

The extant evaluative literature on the use of blended learning in accounting is limited (Smith, 2012; Grabinski, Kedzior and Krasodomska, 2015), dominated mainly by comparative studies that contrast different delivery modes, examining their relationship to students’ performance. Studies comparing blended and traditional f2f teaching approaches in accounting education reveal conflicting results which vary between superior BL performance (Dowling, Godfrey and Gyles, 2003; Du, 2011; McCarthy, Kusaila and Grasso, 2019), similar performance (Keller *et al.*, 2009; Fortin *et al.*, 2019) and superior traditional f2f teaching performance (Pittman and Edmond, 2016). However, according to Fortin *et al.* (2019), many comparative study results should be regarded as inconclusive, arguing that they are confounded by variations in course material available between groups studied and BL definitions deployed. This view is echoed by Nortvig, Petersen and Balle (2018) who argue that

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differing comparative study findings are due to the context-dependent nature of such studies.

Amid the conflicting evidence, however, there exists forceful agreement among students on the importance of f2f meetings in bridging the gap between traditional and wholly online courses and providing interaction, learning effectiveness, and instructional clarity and guidance (Vamosi, Pierce and Slotkin, 2004; Concannon, Flynn and Campbell, 2005; Chen and Jones, 2007; Wong, 2012; Osgerby, 2013; O’Keefe, Rienks and Smith, 2014; Weil, De Silva and Ward, 2014; Lento, 2017; Fortin *et al.*, 2019). A preference for f2f contact is also evident among employers who perceive traditional education more favourably than online education when assessing a candidate’s suitability for employment in the accounting field, due to concerns around course quality, rigour, and students’ lack of interpersonal experiences (Tabatabaei *et al.*, 2014; Kohlmeyer, Seese and Sincich, 2015; Grossman and Johnson, 2016, 2017; Mauldin *et al.*, 2018); however, f2f contact within BL courses has led to greater levels of acceptability for BL qualifications (Grossman and Johnson, 2016).

While assertions have been made that the views of students in relation to technology use are not well-documented in the literature (de Lange, Suwardy and Mavondo, 2003), a few studies have sought to examine student attitudes in relation to BL use. Studies of students’ perceptions of BL approaches in accounting subjects have reported positively towards engagement, participation and motivation levels (Abraham, 2007; Weil, De Silva and Ward, 2014; Oordt and Mulder, 2016), knowledge, understanding and skill development (Chen and Jones, 2007; Osgerby, 2013; Grabinski, Kedzior and Krasodomska, 2015), instructor availability (Jones and Chen, 2008) along with evidence of students taking more responsibility for their own learning (Abraham, 2007). O’Keefe, Rienks and Smith (2014) advocate a learner-centred approach to BL in accounting, which gives offers learners a means of directing their own learning, by granting them choice and flexibility in navigating the BLE.

The absence of theoretical frameworks noted in BL research (Graham, 2006, 2013; Halverson *et al.*, 2012; Drysdale *et al.*, 2013) is evident within the accounting field also, with only one study seeking to furnish BL design guidelines appertaining to a

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theoretical framework within introductory accounting education. The Australian-based study by Muldoon, Pawsey and Palm (2007) explores the use of BL with introductory accounting students. Following a pilot study, the authors pinpoint learner control, collaborative knowledge construction, in-context knowledge application, and access to expert performances and learning support as critical elements of a BL model to be tested and analysed in the next research phase. However, it appears that the research did not progress beyond the the pilot phase of the study, therefore a sound theoretical framework for application within analogous contexts is not provided.

Similarly, there exists limited research in relation to educational technology and BL use within an Irish accounting education context. The researcher identified a single Irish study which investigated the experiences of first-year undergraduate students studying on an introductory accounting course following a blended format, where weekly lectures and tutorials were supplemented with online learning materials, activities and assessments. A majority of students within the large cohort in the University of Limerick study reported positively on the e-learning aspects of the course, attaching specific value to the peer and tutor support elements. Authors of the research concluded that e-learning, when pedagogically well-planned, can improve teaching quality within accounting (Concannon, Flynn and Campbell, 2005).

2.5.3 Paucity of research

The potential for educational technology to add value in accounting education has been recognised for some time now (Bonk and Smith, 1998; Bryant and Hunton, 2000; Pathways Commission, 2014); however, there still exists a paucity of research into educational technology use in accounting, despite its importance to accounting education practice (Bryant and Hunton, 2000; Watson *et al.*, 2007; Marriott and Lau, 2008; Rebele and St. Pierre, 2015).

Research into the effects of educational technology on the subjective learning experiences of students is notably sparse in prominent accounting education journals, with the majority of papers depicting learning outcome effects based on exam performance. This may have been influenced by the value placed by eminent

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accounting researchers, such as Apostolou, Dorminey and Hassell (2020, p. 20), on research which views educational experiences as experimental treatments which “identify and isolate variables of interest” and uses objective pre- and post-test measures, despite their acknowledgement of the difficulties of “viewing the classroom as a laboratory” (Apostolou *et al.*, 2015). Lucas (2000) presents a divergent view, disputing the value of examination marks as an adequate measure of learning outcomes, alleging that many students pass accounting courses due to their ability to recall formulae, despite exhibiting conceptual misunderstandings. Bryant and Hunton (2000) offer field-based, “naturalistic research” as an alternative approach, which allows researchers to explore interactions between learners, technology, and their environment to improve and enhance teaching methods.

Evolving delivery platforms, emerging mobile technologies, the changing HE infrastructure, and the need to respond to an increasingly technologically savvy population (Apostolou *et al.*, 2016, 2018) have led to a consistent appeal for research to identify the most effective uses of educational technology in accounting (Bryant and Hunton, 2000; Watson *et al.*, 2007; Apostolou *et al.*, 2010, 2013, 2015, 2016, 2017a; Pathways Commission, 2014).

The main research issues related to educational technology has remained basically unchanged for the past two decades. How can technology be integrated in accounting to improve the educational experience for faculty and students? ... Research studies are needed to identify technologies that have the potential to improve accounting education and to examine how such technologies are being used, or can be used in accounting education (Apostolou *et al.*, 2017a, p. 22).

2.6 Chapter summary

The exhaustive review of the extant literature on accounting education, blended learning, and digital technology use within accounting education, has acted to provide direction for the study, facilitating the researcher in formulating a BL definition suited to the introductory accounting education context.

The characterisation of blended learning within this study, extends the definition postulated by Garrison and Kanuka (2004) to formulate a definition suitable for use within introductory accounting education. The BL approach adopted is defined as follows: *the thoughtful integration of classroom f2f learning experiences and online*

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learning experiences, to achieve synergies between innovative pedagogical and technological approaches, and is aimed at providing an enhanced learner experience within introductory accounting education. The BL approach adopted falls into the category of transforming blends (Graham, 2006), with a 50 percent split between online and f2f learning (Bleed, 2001; Orhan, 2008).

As a result of the literature review, a number of key issues have come to light which must be addressed within the BL design intervention in order to enhance the learning experience of introductory accounting students. These salient, interrelated themes, which have emanated from the literature review, are as follows:

- Accounting pedagogical practices must promote authenticity and ensure teaching for understanding due to the complexity of the learning material;
- Learning systems must be flexible to accommodate increasing student diversity, while also providing scaffolding to attain learner autonomy;
- Active, participatory learning systems which encourage interaction, collaboration and engagement are essential to promote a positive learning experience and engender transferable, digital and higher-order skills in preparation for future work roles in a globalised accounting workplace;
- Technology deployed must be learner-centred and, most importantly, accessible to all.

The literature review highlights the need to connect theory with practice when engaging in accounting education research (Behn *et al.*, 2012; Rebele and St. Pierre, 2015) and the potential of longitudinal studies to reliably assess the effectiveness of novel accounting instructional approaches (Watson *et al.*, 2007; Brown, 2016). The absence of theoretically-grounded BL research (Graham, 2006, 2013; Halverson *et al.*, 2012, 2014; Drysdale *et al.*, 2013) leaves a void which may be filled by the development of “design-based instructional theories”, to assist instructors in developing BLEs which are customised to meet their specific requirements (Graham, 2013). These methodological requirements point to the imperative for an interventionist, design methodology which will build theory, while impacting on practice. Consequently, the next chapter justifies the choice of design-based research as an appropriate methodology to address the thesis’ central research question.

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The relational character of the learning process – learning something, building on one's previous experiences of the content and its context, relating it to the current context, linking it to some possible future context – makes teaching a highly complex process. The complexity means that teachers have to be experimental, iterative, reflective, acting like scientists, or engineers. Teaching is a bit like building a bridge when you only know about your side of the bank; you don't know about the terrain on the opposite bank, or how far away it is, or how deep the river is. If engineers have to be experimental, how much more so must teachers be (Laurillard, 2008a, p.23).

3.1 Chapter introduction

This chapter describes the design-based research (DBR) methodology that was adopted in this study to answer the thesis' research question, 'how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?' The chapter begins by outlining the researcher's epistemological, ontological and axiological stance before depicting the rationale for choosing a methodology and methods predicated on a pragmatic design-based research paradigm. The emergence and characteristics of DBR are explained, as well as the challenges of the approach, including strategies for addressing these constraints.

The mixed methods research design which is deployed in this study is described along with a summary of the methods used to ensure the quality and trustworthiness of the research. Methods used for data collection and data analysis are elucidated in detail. Finally, the chapter concludes with a discussion of the specific ethical considerations for this study.

3.2 Epistemological, ontological and axiological influences

The purpose of this research is to explore how blended learning can be designed so as to enhance the learning experience of introductory accounting students. In this section, I detail the epistemological, ontological and axiological influences within the study.

Epistemology is concerned with knowing and learning about the world and focuses on issues including how we can learn about reality and what forms the basis of our

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knowledge. Ontology is concerned with what there is to be known about the world and seeks to answer the question – what is the nature of reality? (Cohen, Manion and Morrison, 2011). A pragmatist epistemology aligns with the beliefs of the researcher as it is underpinned by the idea that knowledge is always based on experience, with one's perceptions of the world being influenced by one's social experiences. Thus each person's knowledge is unique as it is created by that person's individual experiences (Kaushik and Walsh, 2019), but also socially shared, as our experiences are inescapably social (Morgan, 2014). The researcher holds the ontological viewpoint that the world is created by our conceptions of it, therefore our understanding of the world is limited by our interpretations of our experiences.

With an epistemological basis in Deweyan pragmatism (Barab and Squire, 2004; Bell, Hoadley and Linn, 2004), the DBR methodology chosen for this study supports multiple ontologies (diSessa and Cobb, 2004). Dewey (1954) advocates for an inquiry in which individuals and communities are able to identify the issues that matter most to them, define those issues, and pursue them in ways that are the most meaningful to them. Pragmatism is based on the proposition that researchers should use the philosophical and methodological approach that works best for the particular research problem that is being investigated, with the choice of research methods being driven by 'what works' to answer the research question at hand (Tashakkori and Teddlie, 1998; Weaver, 2018). This approach fits with this research study, where the researcher aims to develop a workable design solution suitable for the implementation of blending learning in the introductory accounting classroom.

Axiology concerns the place of values in the research process and recognises that values influence the research process (Bryman, 2016). An important axiological foundation that influenced the research approach was a focus on engaging in a socially responsible form of research. The researcher felt that it was important that the research would lead to practical and useful outcomes which would be of genuine benefit to research participants and the wider accounting education community, which was a primary consideration when choosing DBR as a suitable methodology, as will be discussed later in this chapter.

3.3 Methodological requirements, selection and rationale

The principal research question being addressed in this study is: ‘how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?’ The open-ended nature of this question presents a challenge for the researcher in trying to better understand the practical design, the ‘how to’ of developing a BL intervention to augment the learning experience for first-year college students studying accounting. Hence, the focus of this research and its contribution was to *design practice*.

3.3.1 Complex classroom setting

The methodology adopted in this study must be capable of addressing the ‘wicked’ problems faced by the educator in the complexity of the ‘messy’ higher educational context when dealing with first-year students embarking on a Level 8 accounting programme with varying levels of prior knowledge and experiences. The BL design must be sufficiently robust to survive the everyday challenges encountered in educational practice.

The researcher was determined to adopt a research approach which addressed the complexity of educational practice. Action research was considered as a possible methodology due to its concern with practitioners studying their own contexts to improve practices (Creswell, 2014); however, DBR extends action research due to its goal of advancing theoretical knowledge in the form of design principles which others may apply (Amiel and Reeves, 2008; Anderson and Shattuck, 2012) and has established itself as an accepted methodology for use in educational settings (Sandoval, 2014). Considering the paucity of research on BL use in the accounting discipline as revealed in chapter two, the researcher believed a DBR approach was most suited to the study as it would provide a vital and necessary advancement of theoretical knowledge in the accounting education field.

Design-based research is premised on the notion that we can learn important things about the nature and conditions of learning by attempting to engineer and sustain educational innovation in everyday settings (Bell, 2004, p. 243).

3.3.2 Adoptable and adaptable

In conjunction with providing a practical BL design for accounting in the local educational context, the selected methodology would be required to provide a set of guidelines for use by other accounting educators to facilitate the use of BL in their own educational settings, as currently guidelines such as these do not exist.

DBR studies provide an ‘artifact’ which will outlast the study and can be adopted and adapted for use by others, to provide efficient and effective solutions for teachers and learners which can be easily implemented in practice. This typically takes the form of a conceptual framework comprising a set of guidelines to assist others in the adoption and adaptation of the model for use in cognate settings (Kelly, 2004). Guidelines such as these, coupled with the fact that DBR uses real settings when designing and researching new innovations, increase the likelihood that the BL model developed within this study will be adapted and adopted.

3.3.3 Broad and flexible educational perspective

A flexible research framework would be required in this study to allow the BL design emerge and evolve throughout the course of the study, as the final outcome would not be evident at the outset. Furthermore, a broad perspective on the measurement of ‘learning’ would need to be taken to incorporate the wide-ranging learning effects embraced by first-year college students. The use of ‘shallow measures’ of learning has been recognised as one of the reasons that educational research has failed to have a meaningful impact on policy and practice (Collins, Joseph and Bielaczyc, 2004; Groundwater-Smith and Irwin, 2011) spurring Reimann (2011) to demand a more inclusive perspective in educational decision making:

we must make it possible to record and rapidly analyse classroom interactions, so that eventually teachers’ pedagogical practices and students’ learning practices (‘lead indicators’ in management parlance), not just achievement data (‘lag indicators’), enter into decision making at all the levels where educational decisions are made (p. 47).

The overarching research question being addressed in this study is: ‘how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?’ In exploring the issues, the researcher was keen to go

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beyond narrow measures of learning and gain a broad comprehensive view of the students' learning experiences within the BL innovation. DBR involves the researcher working closely with study participants using a multiplicity of data to gain insights into students' learning experiences when encountering an innovative intervention within an educational setting. DBR is viewed as a flexible methodology drawing on multiple theoretical perspectives and research paradigms in support of an *emergent design* (The Design-Based Research Collective, 2003; Barab and Squire, 2004; Hall, 2004; Reimann, 2011), enabling the researcher to obtain a comprehensive understanding and analysis of the multiple dependent variables within the learning environment, while adopting a broad inclusive perspective on learning.

3.3.4 Link theory and practice

The methodological approach adopted would have to align practice and theory closely. It would have to be well-informed, from an ontological and theoretical perspective, but also responsive to the local intricacies and issues affecting a first-year accounting group. The method would have to adapt as the trajectory of the research unfolded, but it would still need to provide sound direction and guidance. A methodological approach that would closely align practice with theory would help to ensure the success of the research endeavour. As described in chapter two, criticisms have been levelled at the disconnect which exists between accounting education research and practice (Behn *et al.*, 2012; Rebele and St. Pierre, 2015) with an acknowledgement by accounting researchers of the imperative of research which impacts on practice:

Research in general makes us into more enquiring individuals, more reflective practitioners, and assists our teaching by making us better scholars. But research does not, in itself, make things any better for our students unless it can be woven into our teaching practice so as to generate similar impacts upon our students (Wilson *et al.*, 2008, p. 109).

DBR links practice and theory due to its focus on creatively solving educational problems while also providing guiding design principles for use by others in solving educational problems in cognate contexts (Edelson, 2002; The Design-Based Research Collective, 2003; Amiel and Reeves, 2008; Reeves, McKenney and Herrington, 2011; Anderson and Shattuck, 2012).

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Design-based research, by grounding itself in the needs, constraints, and interactions of local practice, can provide a lens for understanding how theoretical claims about teaching and learning can be transformed into effective learning in educational settings (The Design-Based Research Collective, 2003, p. 8).

Experimental educational research, despite its causal links and contribution to theory, often does not influence educational practices due to its detachment from practical learning environments (Gravemeijer and Cobb, 2013; Plomp, 2013; McKenney, 2017); whereas DBR conducted in real classroom settings offers more promise in producing research and theory relevant to classroom practices, which will be easier to implement and sustain in the long-term (Reimann, 2011; Walker, 2011; Reeves and McKenney, 2012).

3.3.5 Socially responsible research

Research in the field of educational technology has been heavily criticised for its customary focus on establishing the educational efficacy of a new technology with a view to finding a problem which the technology might address, while overlooking the aims or eventual consequences of its use (Collins, 1992; Wang and Hannafin, 2005; Amiel and Reeves, 2008; Reeves, McKenney and Herrington, 2011).

Consequently, the new technology typically achieves minimal impact, often “crash[ing] on the hard rocks of the classroom” (Herrington *et al.*, 2007, p. 4097). Cognisant of the fact that citizens in society would be better served by technology solutions which are problem-focused and collectively designed resulting in improved educational practices for teachers and learners alike (Wang and Hannafin, 2005; McKenney and Reeves, 2013; Hogan, Hall and Harney, 2017), the researcher sought to move beyond traditional educational practices and adopt a methodology that engaged and resulted in practical, beneficial action, in alignment with her own axiological preferences as discussed earlier.

In DBR the researcher, informed by key stakeholders’ perspectives, strives to develop a technological solution to an educational problem, rather than attempting to adapt an educational environment to suit a new technology (Herrington *et al.*, 2007; Reeves, McKenney and Herrington, 2011). Thus, DBR was chosen by the researcher as a more socially responsible research approach based on its attempts to give agency to, and generate genuinely useful outcomes for, the research

participants, while also producing useful knowledge for the wider accounting education community.

3.3.6 Practical impact

Educational research has been heavily criticised for its lack of practical impact in classrooms, as the scientific knowledge it generates is often an insufficient representation of the phenomena it alleges to address, due to experiments conducted in controlled laboratories which are divorced from real-life classroom settings (Brown, 1992; Sandoval and Bell, 2004). The methodology adopted in this study would need to be capable of producing a BL intervention which could be implemented to improve the learning experience for students studying introductory accounting.

DBR was chosen as a methodology due to its pragmatic focus and ability to explore and deploy technological innovations to effect meaningful change for research participants and other stakeholders within education (Collins, 1992; Amiel and Reeves, 2008; Reeves and McKenney, 2012).

Design-based research suggests a pragmatic philosophical underpinning, one in which the value of a theory lies in its ability to produce changes in the world (Barab and Squire, 2004, p. 6).

It is anticipated that the resultant designed intervention and theoretical knowledge can have a real impact on teaching practices and student learning in accounting.

3.3.7 Summary of rationale

As outlined, the DBR approach was seen as the methodology most fitting to address the methodological requirements of the study. The DBR approach is based on solving a practical educational problem by drawing on prior theoretical knowledge to develop and implement an innovative intervention in a complex, real-life educational setting. Hence, it is suited to the development of a BL intervention to enhance the learning experience of students studying introductory accounting. The iterative nature of the DBR approach will allow the researcher to progressively test and refine the BL design through a series of successive implementations. Furthermore, the alignment of theory and practice through DBR will enable the establishment of new

design principles which can be used by other accounting educators as a guide in the development of similar learning environments in their own contexts.

3.4 Design-based research

3.4.1 Origins of design-based research

Ann Brown (1992) and Alan Collins (1992) assigned the term *design experiments* to a novel research approach which studied learning in context through the design and development of innovative learning environments and instructional strategies based on theoretical principles derived from previous research. The approach evolved from criticisms levied at traditional educational research for its lack of impact on educational policy and practice due to being conducted in artificial laboratory settings with a focus on isolating single variables to establish causal effects (Gravemeijer and Cobb, 2013; Plomp, 2013; McKenney, 2017).

The direct societal impact of education in shaping the future of society demands innovative research methods which are impactful and capable of building new realities (Hogan, Hall and Harney, 2017; Wegerif, 2017). DBR meets these demands, as it introduces a synergy between practice and research in everyday classroom settings (Wang and Hannafin, 2005) where learning environment design and learning theory development are interweaved while the researcher engages in innovative interventions in classrooms (Kelly, 2003). Thus DBR studies, rooted in complex multivariate real-world settings leading to the development of usable knowledge, have the potential to realise meaningful educational change by improving the relevance and robustness of educational research (McKenney and Reeves, 2019).

DBR, despite its recent emergence as a research methodology, has seen an increase in popularity particularly in higher education settings and projects involving educational technologies, due to its advancement of theoretically robust practical solutions (Reeves and McKenney, 2012; Plomp, 2013; Hall, Connolly and Flanagan, 2020).

3.4.2 *Characteristics of design-based research*

Wang and Hannafin, (2005, p. 6) define DBR as:

a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories.

In keeping with this definition, Hall, Connolly and Flanagan (2020) enumerate five key aspects of DBR describing it as, interventional, innovative, iterative, principled and participatory. These hallmarks are elaborated on as follows:

1. **Interventional**, which involves intervening to change or enhance a learning experience within a real educational context (McKenney and Reeves, 2019). DBR studies are conducted in real-life settings in the midst of the “blooming, buzzing confusion” of the classroom (Brown, 1992, p. 141). The design is prefaced by an assessment of the context informed by literature, theory and practice and is frequently practitioner-led with a focus on solving a particular problem or creating an improvement in practice (Edelson, 2002; Shavelson *et al.*, 2003; Herrington *et al.*, 2007; Anderson and Shattuck, 2012; Reeves and McKenney, 2012).
2. **Innovative**, where understandings around learning and teaching are augmented while the researcher engages in innovative interventions in classrooms (Kelly, 2003; The Design-Based Research Collective, 2003). Design studies are described by Cobb *et al.* (2003, p. 10) as “test-beds for innovation” with the design team “engineering” forms of learning while developing innovative and useful designs which have the potential for direct and wide-ranging educational improvements (Edelson, 2002; Sandoval, 2014). DBR is especially germane for interventions involving technological innovations (The Design-Based Research Collective, 2003; Kennedy-Clark, 2013).
3. **Iterative**, involving a “set of connected cycles, which each internally involve conceptualisation, design, implementation and evaluation. DBR is accretive in that each cycle aims to consolidate, augment and extend the previous cycles” (Hall, Connolly and Flanagan, 2020), allowing the researcher to attain an intuitive understanding of what works in order to identify the salient

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features of the design. The iterative process allows also for revision of the design by means of “progressive refinement ... [which] involves putting a first version of a design into the world to see how it works. Then, the design is constantly revised based on experience, until all the bugs are worked out” (Collins, Joseph and Bielaczyc, 2004, p. 18) In addition, design revisions are coupled with simultaneous revision of data collection procedures (Cobb *et al.*, 2003). Thus, iterative cycles taking place over an extended time period facilitate a more detailed study (Mishra and Koehler, 2006) leading to insightful understandings and the realisation of more useful and scalable outcomes (Shavelson *et al.*, 2003; Amiel and Reeves, 2008; Reimann, 2011).

4. Principled – the design process is principled in that it is guided and informed by theory at all stages. DBR allows the researcher to utilise multiple learning theories to create a new, tailored, multi-dimensional learning framework which addresses the multiple dependent variables present in the learning context while supporting the emergent design, ensuring a meaningful educational impact (Reeves, McKenney and Herrington, 2011; Hall, Connolly and Flanagan, 2020). “Designs evolve from and lead to the development of practical design principles” which are reflective of the local context, providing a conceptual model which informs adjustments in the context and the intervention, leading to improved theoretical understandings of teaching and learning (Anderson and Shattuck, 2012, p. 17). Initial draft guidelines used to shape a prototype innovation are honed throughout the design process, with input from both students and teachers, to produce a refined set of design principles (Edelson, 2002; Herrington and Reeves, 2011). Richly-described design principles allow teachers and designers to adopt previously-researched ideas to improve student engagement and learning outcomes in their own contexts and are considered a fundamental strength of DBR distinguishing it from other research types, such as action or evaluation research (The Design-Based Research Collective, 2003; Reeves, McKenney and Herrington, 2011; Anderson and Shattuck, 2012; Kennedy-Clark, 2015). However, while design heuristics provide guidance to others, their development in a specific context does not provide a guarantee of success in other contexts (Plomp, 2013).

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5. Participatory – practitioners and researchers collaborate in producing meaningful change in practical learning contexts while working closely with study participants (Cobb *et al.*, 2003; Shavelson *et al.*, 2003; Barab and Squire, 2004; Wang and Hannafin, 2005; Reimann, 2011). Practitioners are consulted in the early stages of the research to gain an astute understanding of the problem from a practical as well as an academic perspective, paving the way for an optimised solution which is teacher-driven while in harmony with the context. Collaboration with practitioners provides insightful understandings which, in conjunction with a review the literature, can be used to develop draft design principles to inform the design of the prototype intervention resulting in nuanced and innovative educational solutions that promote real educational change in diverse learning settings (Wang and Hannafin, 2005; Herrington and Reeves, 2011; Reeves, McKenney and Herrington, 2011; Reimann, 2011; Hogan, Hall and Harney, 2017). This participatory process provides practitioners with a voice in the design process while offering researchers a unique opportunity to “listen to the data” by partaking in a design which is grounded in context (Hoadley, 2002; Joseph, 2004; Amiel and Reeves, 2008).

3.4.2.1 Linking theory and practice

In DBR, theory is closely linked to practice through the production of dual outcomes, whereby a practical product which addresses a local problem is created coupled with advancements in learning theories (Cobb *et al.*, 2003; The Design-Based Research Collective, 2003; Collins, Joseph and Bielaczyc, 2004; Wang and Hannafin, 2005; Mishra and Koehler, 2006; Reeves, McKenney and Herrington, 2011; Reimann, 2011; Reeves and McKenney, 2012; Sandoval, 2014; McKenney and Reeves, 2019).

Design-based research requires more than simply showing a particular design works but demands that the researcher (move beyond a particular design exemplar to) generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field (Barab and Squire, 2004, p. 6).

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Thus, theoretical understandings which are of value to others are generated while a learning environment/tool is being simultaneously implemented within a real-life learning setting (McKenney and Reeves, 2013).

Early in the design process the researcher/designer, following engagement with prior literature and situational analysis of the problem, partakes in “rapid prototyping” where an embryonic version of the design is executed in practice (Joseph, 2004). The initial prototype model is seen as “malleable clay” (Hoadley and Pea, 2002) which must be tested in a real-world context and shaped based on reflection on the various iterations. Throughout the entire design process, the “theories must do real design work in generating, selecting and validating design alternatives at the level at which they are consequential for learning” (diSessa and Cobb, 2004, p. 80).

diSessa and Cobb (2004, p. 99) describe the theory building involved in a design study as an “ontological innovation” which informs pedagogical and design decisions by providing a guiding lens for making sense of what is happening in the complex educational setting. Design experiments are “crucibles for the generation and testing of theory” as they provide theories to explain how the design works and how it may be adapted in other settings (Cobb *et al.*, 2003, p. 9). Lessons learned in designing solutions are used to develop useful theories in the form of design frameworks which are generalizable to other cognate contexts. Design guidelines contained within the design framework describe the characteristics of the design solution in order to achieve a specific set of goals in a particular context, which can be subsequently shared with others interested in implementing similar designs in other contexts while also allowing advancement in understanding of learning (Edelson, 2002).

Despite relying heavily on theory, DBR is grounded in practice, with the concomitant conceptual tools developed in the educational context in which they are designed to be used. This results in effective interventions which can have a direct practical impact (The Design-Based Research Collective, 2003; diSessa and Cobb, 2004). Hence, theory and practice are strongly intertwined in DBR studies.

In design research, scientific knowledge is grounded in practical wisdom while simultaneously providing heuristics and practical theories that can strengthen the practical wisdom of teachers. In this respect, we would argue that design research has

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the potential to bridge the gap between theory and practice (Gravemeijer and Cobb, 2013, p. 104).

3.4.2.2 *Real-world setting*

DBR is grounded in real-life settings rather than artificial laboratory settings with research embedded in practical activities which are representative of the complexity of the setting (Wang and Hannafin, 2005; McKenney and Reeves, 2019). According to Kafai (2005), during DBR the classroom becomes a “living laboratory” where educational interventions are implemented and researched in a local context. Design investigations are multivariate and multi-faceted, due to the ‘synergistic’ nature of classroom life whereby it is difficult to change or study one aspect of the system without affecting the others (Brown, 1992).

They remain open to the vicissitudes of the actors, their behaviors and the complexity of the current context. In other words, the raw material of design studies is inescapably contingent: one action begets the next, and so on, often in unpredictable (and perhaps unrepeatable) ways (Kelly, 2004, p. 125).

The goal of design research is to generate new, useful theories aimed at solving important problems. This is attained through a holistic approach using rich, detailed accounts grounded in real-life experiences involving many dependent variables and could not be achieved using traditional empirical studies which focus on single variables using statistical sampling (Edelson, 2002; Collins, Joseph and Bielaczyc, 2004; Plomp, 2013). Experimental control is difficult to achieve in real-life classrooms where there are multiple dependent variables at play in producing learning outcomes, such as learners’ prior experiences and skill levels (Entwistle, Christensen Hughes and Mighty, 2010). Thus, design-based research addresses the complexity of educational environments by designing elements of a “learning ecology” and studying how they work together to support learning (Cobb *et al.*, 2003).

Design research seeks analytical generalization, in the form of obtaining a greater understanding of learning ecologies with a view to supporting others in using design products to obtain learning benefits in other settings, rather than focusing on isolated variables to achieve a statistical generalization (Herrington *et al.*, 2007; Gravemeijer and Cobb, 2013; Plomp, 2013). DBR advances theory which is grounded in naturalistic contexts providing a form of “petite generalization” which illustrates the

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relevance of the intervention's findings to other contexts (Barab and Squire, 2004, p. 5); however, this generalization is a tentative one, in that "results are shared without the expectation that universality will hold" (Hoadley, 2004, p. 204). Design research aims for "ecological validity" rather than precise replication, in that the depiction of the results should provide a frame of reference for adaptation in other contexts. This is achieved through use of the empirically grounded theory, one of the twin outcomes of DBR (Gravemeijer and Cobb, 2013, p. 103). Therefore, the design is developed to serve local needs while also advancing theoretical knowledge about learning.

3.4.2.3 Narrative

DBR requires comprehensively documenting the design process, including details of each design decision, for retrospective analysis purposes and to provide evidence in support of research claims (Joseph, 2004). Hoadley (2002) alludes to the problem of replicability with design-based research studies as it may not be possible to reproduce the exact conditions of the original experiment. Thus the design narrative plays an important role in describing the tools, activities, practices, and context over the course of the design, thereby reinforcing the design and providing subsequent clarification for those wishing to make sense of the design.

Narrative is a structure for conveying a series of related events, a plot. Narrative may omit details, but important agents, events, causes, and results are relayed. A design narrative describes the history and evolution of a design over time. It may not be as complete as, for instance, videotapes of the entire design process and all uses of the design artifacts, but it does communicate compactly and effectively how a design came into being. By relating the design's changes over time, a design narrative can help make explicit some of the implicit knowledge the designer or designer-researcher used to understand and implement the intervention (Hoadley, 2002, p. 454).

3.4.3 Challenges of design based research

3.4.3.1 Complexity of real-world setting

DBR researchers are challenged by the fact that interventions take place in 'messy' real-world settings involving multiple decisions over the longitudinal study, resulting in difficulties in characterising the design and achieving experimental control (Barab and Squire, 2004; Collins, Joseph and Bielaczyc, 2004; Plomp, 2013). Nonetheless, situating the DBR study in a real-life setting can augment the external

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validity of resultant design principles (Wang and Hannafin, 2005). Although conducting a DBR study using iterative cycles is considered demanding (Anderson and Shattuck, 2012), the Design-Based Research Collective (2003) allege that the repetitive analyses which takes place over the multiple iterative cycles are crucial in enhancing the reliability and validity of DBR study findings.

Narration of the longitudinal research design can pose a further challenge, particularly in ensuring that the design process is documented systematically and comprehensively to provide a rich account of the problem analysis, solution and design procedure and also facilitate the retrospective analysis which forms an integral part of the process (Edelson, 2002; Barab and Squire, 2004; Reimann, 2011). Nonetheless, documentation of the research is essential and it is imperative that the researcher tracks and documents her starting point, failures, interventions, and possible effects on outcomes to promote understanding, ensure a successful design and increase the validity of the research while also facilitating replication by other researchers (Collins, 1992; Cobb *et al.*, 2003; Collins, Joseph and Bielaczyc, 2004; Hoadley, 2004; Gravemeijer and Cobb, 2013).

3.4.3.2 Close involvement of researcher

The intimate involvement of the researcher as designer of the intervention in DBR research projects can pose a challenge (Plomp, 2013). Anderson and Shattuck (2012, p. 18) contend that “a certain wisdom is needed to walk this narrow line between objectivity and bias” due to the requirement for the researcher to remain detached while also displaying enthusiasm in actively supporting the newly-designed intervention, performing a dual role of “advocate and critic” (The Design-Based Research Collective, 2003, p. 7). Researchers/designers should also be aware of a possible Hawthorne effect due to their working closely and continually with participants in the research setting (Brown, 1992; Wang and Hannafin, 2005). In addressing these concerns, the Design-Based Research Collective (2003, p. 7) assert that triangulation through the use of multiple data types and sources along with documentation of enactment cycles provides “critical evidence to establish warrants for claims about why outcomes occurred”. In addition, adoption of practices employed by qualitative researchers can ensure the credibility and trustworthiness of

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research claims (Barab and Squire, 2004). Strategies such as these were employed by the researcher in this study and will be outlined later.

It must be acknowledged that while the researcher's close connection to the research setting can pose a challenge, it acts also to enhance validity through the researcher's unique inside knowledge, collaborative relationship with participants, and familiar rather than obtrusive presence in the learning environment (Wang and Hannafin, 2005; Anderson and Shattuck, 2012). Furthermore, the multiple roles played by the researcher as designer/implementer ensure the resultant theory outputs have a potentially greater practical impact (Hoadley, 2004).

3.4.3.3 Extensive datasets

Objectivity, validity and scalability of the research is increased due to the multiple data collection methods and sources used in a DBR study (Wang and Hannafin, 2005). However, use of multiple methods coupled with a detailed documentation of the design process culminates in the collection of extensive amounts of data over the course of a DBR study (Cobb *et al.*, 2003; Shavelson *et al.*, 2003; Collins, Joseph and Bielaczyc, 2004). Reimann (2011) refers to the "data deluge" associated with this overload of data, some of which will be discarded with a possible negative effect on research quality (Wang and Hannafin, 2005). In order to avoid a Bartlett effect, where researchers in selecting data for analysis from a large dataset may influence the outcome of the study, data culling decisions must be fully and systematically documented (Brown, 1992; Walker, 2011). This can be offset through the use of 'critical friends' coupled with a precise conceptual framework to aid and inform decision-making (Plomp, 2013), both of which were employed within the current study.

3.5 Mixed methods research design

DBR studies typically involve mixed methods designs using quantitative and qualitative techniques through the deployment of a variety of data collection tools (Brown, 1992; Collins, 1992; The Design-Based Research Collective, 2003; Collins, Joseph and Bielaczyc, 2004; Reeves, McKenney and Herrington, 2011; Anderson and Shattuck, 2012). A convergent parallel mixed methods design approach was employed in this study where both quantitative and qualitative data were

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simultaneously collected and analysed leading to a merging of results, allowing for more detailed explanations and the presentation of multiple perspectives on the design intervention, resulting in an enriched depth and breadth of understanding (Jick, 1979; Creswell, 2014).

Onwuegbuzie and Johnson (2006, p. 60) portray mixed methods research as “combining complementary strengths and non-overlapping weaknesses of quantitative and qualitative research methods” leading to a more complete understanding of research problems, and having the potential to forge a path towards educational quality accountability. However, Teddlie and Tashakkori (2010) assert that mixed methods research goes beyond combining quantitative and qualitative methods to cancel out respective weaknesses of one another, but rather the researcher “knowledgeably (and often intuitively) selects the best techniques available to answer questions that frequently evolve as the study unfolds” (p. 8). Within this study, the researcher creatively combined data collection tools which she felt were best placed to answer the research questions at hand in order to leverage insights from both qualitative and quantitative data. Due to the copious ways of conducting a mixed methods study, the researcher engaged in careful planning while taking an open, inventive approach to developing and implementing her mixed methods design (Greene, Caracelli and Graham, 1989).

In addition to following a mixed methods approach in the research design and data collection phases, data merging must occur in a parallel mixed methods design to allow for integrative analysis and interpretation (Creswell, 2015). Figure 3.1 illustrates how a convergent mixed methods design was employed in this study in data collection, analysis and interpretation of results. Through the use of various data sources, the researcher was able to view the research problem from multiple angles and perspectives. Additionally, relationships, opinions and online learning resource usage established from quantitative data were combined with in-depth personal perspectives of individuals from group interviews and student learning journals to provide a more complete understanding of participants’ learning experiences.

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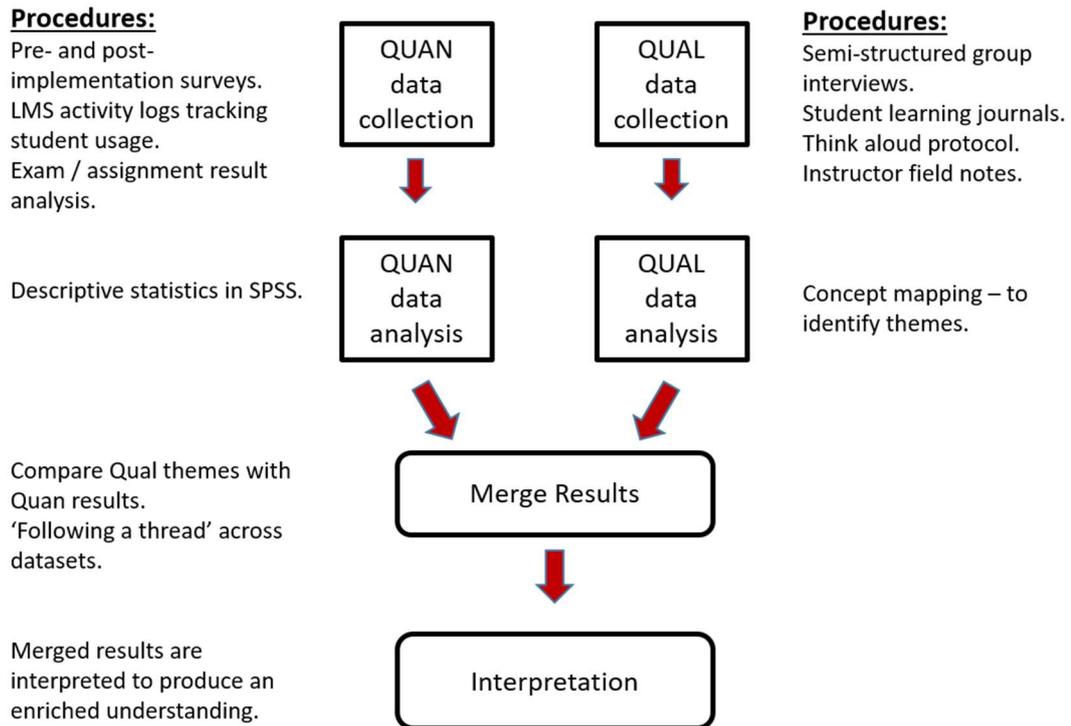


Figure 3.1 *Convergent mixed methods design (adapted from Creswell, 2015)*

3.5.1 Triangulation

“Design-based research typically triangulates multiple sources and kinds of data to connect intended and unintended outcomes to processes of enactment” (The Design-Based Research Collective, 2003, p. 7) allowing the researcher to view the situation from multiple vantage points. Data triangulation was employed in this study through the use of different data sources, with the BL design being studied over time on a longitudinal basis with three separate introductory accounting groups. Furthermore, the adoption of multiple methods, including group interviews and survey questionnaires among others, provided a ‘between-methods’ form of methodological triangulation (Lincoln and Guba, 1985; Flick, 2014) which assisted in validating results and provided an enriched understanding of the phenomena under study (Morse, 2018). Triangulation is “one strategy that can help speak specifically to concerns associated with the multiple, sometimes blurred roles taken on by design researchers” (McKenney, Nieveen and van den Akker, 2006, p. 134).

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While the complexity of data sources and methods in this study provided triangulation through convergence of results, moreover, divergent findings provided a valuable contribution by offering greater insights into the intricacies of the phenomena under exploration (Jick, 1979; Teddlie and Tashakkori, 2010).

3.5.2 Purposive sampling

Herrington *et al.* (2007) identify that participants in a DBR study in education typically are students in the researcher's class and that "the choice of participants always relate to the purpose or goals of the study, and are usually individuals who reflect the characteristics or are influenced by the issues being considered by the investigation" (p. 4094). Hence, purposeful sampling described by Maxwell (2008, p. 235) as "a strategy in which particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices" was seen as fitting the aims of the study in designing a BL intervention to be used in teaching introductory accounting. The power of purposeful sampling lies in "selecting information-rich cases whose study will illuminate the questions under study" (Patton, 2015, p. 264) allowing the researcher to gain in-depth information on the issues being explored.

The design cycles were conducted with the Bachelor of Arts in Accounting Year 1 (BAA1) and Bachelor of Arts in Accounting and Law Year 1 (BALAW1) groups who were studying introductory financial accounting together as one group with the researcher as lecturer. Each cycle involved a new group of first year students as participants.

3.5.3 Criteria for quality research

The researcher employed strategies advanced by Lincoln and Guba (1985) to ensure trustworthiness in this research project.

3.5.3.1 Credibility

Credibility is a measure of how believable the findings are and is an important factor in determining if the researcher's claims are trustworthy and congruent with reality.

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The following techniques, recommended by Lincoln and Guba (1985) were employed in this project to ensure credibility of findings:

1. Prolonged engagement: This is a distinct feature and key strength of DBR (Gravemeijer and Cobb, 2013) and was evident in the longitudinal nature of this study conducted over three academic years allowing the researcher time to develop accurate understandings of the participants, their contexts and the phenomena under study.
2. Persistent observation: Throughout the prolonged engagement of the DBR study, the researcher, by virtue of her position as lecturer, continually interacted with students both f2f and online allowing the identification of, and detailed focus on, the characteristics relevant to the design problem.
3. Triangulation: As described earlier, the use of multiple data sources and methods throughout the study yielded greater researcher insights into the problem complexities, ensuring a comprehensive understanding of the phenomena under study.
4. Peer debriefing: Conversations with peers who are experts outside the study's context is widely-accepted as a method to establish credibility (Lincoln and Guba, 1985; McKenney, Nieveen and van den Akker, 2006; Foulger, 2010). This is particularly valuable in DBR studies when the researcher is playing dual roles of researcher/designer and practitioner. (Cobb *et al.*, 2003; Gravemeijer and Cobb, 2013). In this study, the researcher employed a number of experts when piloting research instruments and had regular conversations with a 'critical friend' employed within the same workplace but outside of the faculty where the study was located, to probe issues relating to methodology, researcher bias and emerging conclusions (Kennedy-Clark, 2013). Data under discussion were stripped of any identifying elements, so that discussions took place without fear of any ethical breaches. Regular debriefing sessions of a similar nature also took place with the researchers' joint supervisors. These sessions also urged the researcher to evaluate the principles guiding the research project to ensure that they were based on sound values rather than any personal agendas (Amiel and Reeves, 2008).

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5. Negative case analysis: The researcher engaged in negative case analysis throughout the project by actively seeking out disconfirming as well as confirming evidence (Lincoln and Guba, 1985). Reporting on data which disconfirmed her expectations as well as insights stemming from only one participant helped the researcher to faithfully represent the diverse views of participants (McKenney, Nieveen and van den Akker, 2006), providing enriched researcher understandings while cultivating research credibility.

3.5.3.2 Transferability

Design research seeks generalization in the form of obtaining a greater understanding of learning ecologies with a view to supporting others in using design products to obtain learning benefits in other settings (Gravemeijer and Cobb, 2013). Thus, responsibility rests on the researcher to ensure that sufficient information about the context of the study is presented to enable others to make a transfer to their own settings (Lincoln and Guba, 1985). With this in mind and in keeping with DBR protocol, the researcher provided detailed narratives which included thick descriptions of the phenomena under investigation, including the research setting, participants, culture and learning environment to enable others to make judgements about transferability to their own settings.

3.5.3.3 Dependability

The issue of dependability or reliability, referring to the idea that repeating the research process within the same context, using the same methods and participants will yield the same results, is difficult to achieve in design research due to the dynamic nature of the factors at play when the interventions “go live” (McKenney and Reeves, 2019). Shenton (2004) advocates reporting the study in detail, providing a “prototype model” to enable future researchers to repeat the work, if not necessarily to gain the same results. This DBR study seeks to add dependability by providing a prototype design model in the form of a detailed narrative of the research process, implementation and findings coupled with refined design guidelines or heuristics to assist researchers in transferring the design to their own contexts.

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3.5.3.4 *Confirmability*

Confirmability refers to the extent to which the findings are representative of participants' views and experiences, and not the researcher's biases and perspectives (Lincoln and Guba, 1985). The use of triangulation in this study played a role in offsetting any possible researcher bias along with regular peer debriefing sessions which encouraged the researcher to acknowledge her own predispositions throughout the study. Furthermore, confirmability was enhanced by the reflection which is integral to the DBR methodology employed in this study where "we allow our most fundamental assumptions and, indeed, our very selves, to be included in the dynamic self-reflective and self-reforming iterative design-based research process" (Wegerif, 2017, p. 33). Finally, the detailed descriptions of all stages of the research, including procedures followed and decisions taken, provide the reader with an audit trail to re-trace the research trajectory thereby enhancing confirmability (Lincoln and Guba, 1985; Shenton, 2004).

3.6 Data collection

A wide variety of data collection tools were utilised to allow the researcher to study the learning environment using many different lenses (Collins, Joseph and Bielaczyc, 2004). Table 3.1 overleaf depicts the multiplicity of data collection tools deployed as part of the mixed methods research design over the three iterative cycles.

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Table 3.1 Data collection tools deployed

Academic year	Participants	Data collection tools
2017 – 2018 (design cycle 1)	28 eligible student participants (1 ineligible u18)	<p>Quantitative:</p> <p>Pre-implementation survey – 28 participants</p> <p>Post-implementation survey – 25 participants</p> <p>Moodle usage logs – 28 participants</p> <p>Exam/assessment result analysis – 28 participants</p> <p>Qualitative:</p> <p>Think aloud protocol – 1 participant</p> <p>Instructor field notes</p> <p>Student learning journals – 25 participants</p> <p>Discussion forum postings – 19 participants</p> <p>Group interview – 8 participants</p>
2018 – 2019 (design cycle 2)	24 eligible student participants (2 ineligible u18)	<p>Quantitative:</p> <p>Pre-implementation survey – 24 participants</p> <p>Post-implementation survey – 21 participants</p> <p>Moodle usage logs – 24 participants</p> <p>Exam/assessment result analysis – 24 participants</p> <p>Qualitative:</p> <p>Think aloud protocol – 1 participant</p> <p>Instructor field notes</p> <p>Student learning journals – 24 participants</p> <p>Discussion forum postings – 22 participants</p> <p>Group interview – 7 participants</p>
2019 – 2020 (design cycle 3)	16 eligible student participants (3 ineligible u18)	<p>Quantitative:</p> <p>Pre-implementation survey – 16 participants</p> <p>Post-implementation survey – 15 participants</p> <p>Moodle usage logs – 16 participants</p> <p>Exam/assessment result analysis – 16 participants</p> <p>Qualitative:</p> <p>Instructor field notes</p> <p>Student learning journals – 16 participants</p> <p>Discussion forum postings – 15 participants</p> <p>Group interview – 7 participants</p>

3.6.1 Group interviews

Patton (2015) advocates using interviews to elicit the feelings, thoughts and intentions of participants in order to gain an in-depth perspective on a phenomenon of interest. At the conclusion of each design cycle, a one-hour group interview was conducted with a small number of consenting participants in order to probe complex issues to gain a thorough understanding of participants' opinions and experiences of the BL design as well as learn more about participants' answers to questionnaire responses (Morgan, 1996; Mertens, 2015; Denscombe, 2017). Participants were sought on a voluntary basis in cycles one and two and on a random basis in cycle three. Having been provided with participant information sheets in advance (Appendix 2), additional consent forms were signed by the students stating their written agreement to participate in the group interview exercise (Appendix 3).

Group interviews allow a variety of experiences and opinions to emerge, illuminating congruent and contrasting sentiments among participants (Cohen, Manion and Morrison, 2011; Denscombe, 2017). In addition, group interactions can stimulate respondents, providing a low cost method of obtaining rich data (Flick, 2014). Group members were advised, at the start of the session, of the issues around anonymity, confidentiality and trust within the group (Denscombe, 2017).

Interviews were conducted in a semi-structured format following an interview guide with an evolving set of questions which offered flexibility to allow the interviewee to elaborate on ideas and points of interest and elucidate the topic areas (Mertens, 2015; Patton, 2015; Bryman, 2016). The design of the group interview schedule stemmed from the aims of the study, coupled with a review of the literature and the researcher's professional experience, with questions constructed in an open-ended fashion to enable rich, detailed data to be collected (Appendix 8). A semi-structured interview format offered advantages over an unstructured format as it allowed the researcher to focus the conversation on issues deemed important to the research project (Brinkmann, 2018). In order to maximise the productivity of the interview in terms of gaining rich data, the researcher remained attentive, used probing questions where necessary, remained non-judgemental and ensured that all participants were given an opportunity to respond to questions (Patton, 2015; Denscombe, 2017).

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As the researcher was an ‘insider’ in the BL process and well-known to participants, it was felt that this would be advantageous, as participants would feel a greater rapport and be more comfortable in disclosing information (Mertens, 2015). In addition, the researcher’s familiarity with the BL process would enable her to lead the questioning so as to maximise the information gleaned from participants. Nonetheless, the researcher was cognisant of the fact that interview participants may provide the perspective that they believed the researcher wished to hear. Hence, at the commencement of the interview, the researcher stressed the paramount importance of participants reporting honestly on their feelings on the BL design, sharing both negative and positive views which they may have, to ensure an improved design going forward. Notwithstanding, as group dynamics may inhibit free expression among group members (Cohen, Manion and Morrison, 2011) the researcher was conscious of the need to triangulate with other data collection methods.

As advocated by Patton (2015), each interview was recorded using a digital recorder with the prior consent of interviewees, allowing the researcher to remain attentive to the interviewees while also leading to greater accuracy of data collection. Each interview lasted for approximately 60 minutes and at the conclusion of each interview the students were thanked for their time. The researcher opted to personally transcribe all interviews which offered great benefits in terms of bringing her closer to the data, facilitating a greater awareness of participants’ perceptions and opinions and stimulating the smooth identification of key themes. Interviews were anonymised at the point of transcription and digital recording was immediately destroyed after transcription.

3.6.2 Think aloud protocol

A think aloud protocol was carried out in the first two design cycles to test the usability of the two online multimedia resources being deployed as the primary learning activities within the BL model. One resource was tested using a think aloud protocol in each design cycle (one and two), which informed changes to the resource for subsequent design iterations. During each cycle, one student volunteer consented to participate in the process, having been given a participant information sheet (Appendix 2) which outlined what was required of her during the process and

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signing a consent form giving her informed consent (Appendix 3). In particular, each participant was asked to verbalise her thoughts as she worked her way through the resource, while also identifying elements that she found easy or difficult and items she liked or disliked. The participant was informed that she would be recorded while being observed using the multimedia resource and a copy of the transcript of the recording would be made available afterwards if she required one. Young (2005) claims the think aloud protocol can be used to support and enhance other educational research methods while offering “the opportunity for student voice to be heard, a voice often neglected in research” (p. 19). However, it was acknowledged that problems may be encountered in gaining depth in the data produced which emphasises the importance of using this method in conjunction with other data collection methods.

The researcher took notes during each think aloud protocol, which was also recorded using a digital recorder. Recordings were personally transcribed by the researcher afterwards and transcripts were read thoroughly a number of times to identify necessary changes to the multimedia resources. Required changes were implemented, resulting in the resources being re-published for subsequent design iterations.

3.6.3 Instructor field notes

DBR proponents recommend that designers use narrative field notes to document research methods, understandings, as well as deviations, to provide a meticulous account of the research endeavour and findings which may aid subsequent interpretations (Hoadley, 2002; Wang and Hannafin, 2005).

The researcher collected first-hand information on the design implementation throughout the study by recording descriptive and reflective notes based on happenings in the f2f class setting and on observations of student interactions in the online environment. Recorded observations included contextual observations such as participant interactions, perceived student attitudes as well as the researcher’s insights into student participation levels in f2f and online learning activities. As the researcher was an active participant in f2f class and online activities, she acted as a participant observer rather than a peripheral outsider in students’ natural learning

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environment which facilitated the collection of rich data (Creswell, 2014; Denscombe, 2017). When recording observations of context, interactions and activities, the researcher ensured to also note “what does not occur” (Patton, 2015, p. 379) so that the researcher could investigate potential design changes to promote positive change. Instructor field notes were typed into MS Word documents and were continually reviewed during each cycle to inform design changes for subsequent iterations.

3.6.4 VLE activity logs

Learning analytics were used to identify participants’ levels of interaction and engagement with online learning and assessment activities. The National Forum for the Enhancement of Teaching and Learning in Higher Education (2017b) defines learning analytics as “the use of student data to understand and enhance teaching and learning with a view to optimising student success” (p. 3).

Online learning and assessment resources were made available to students on the Moodle VLE platform. Tracking of online student activity was facilitated by Moodle activity logs which allowed the researcher to unobtrusively establish online activity usage patterns, in terms of resources accessed and pattern of access; however, the researcher was somewhat restricted by the fact that the logs failed to provide information on the length of time spent viewing the resources. Activity logs were downloaded in MS Excel format for analysis purposes at the end of each semester. The number of accesses on resources were recorded based on individual student usage rather than interpreting summary statistics, which were also available via Moodle, to allow the vivid detail of individual actions to be examined. Timing of resource use was also examined to establish if resources were being utilised for learning or revision purposes (Sarsfield and Conway, 2018).

However, the researcher was aware that VLE tracking statistics portray a partial picture only of student learning (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2017b) prompting a need to take account of other factors, including individual student characteristics, which may have influenced online resource usage patterns. Consequently, learning analytics data were considered in conjunction with data collected using other methods to build an

informative picture of students' interaction and engagement with online learning and assessment activities.

3.6.5 Student learning journals

Student learning journals or 'student logs' were employed in this study, in juxtaposition with other data collection tools, to capture a rich picture of the learners' experiences of the BL design.

During the BL implementation, students were encouraged to externalise their thoughts, feelings, opinions, and perceptions using learning journals available on the financial accounting Moodle page. Students were provided with an open-ended journal format and encouraged to write from a personal and reflective perspective. In cycle one, the researcher requested that participants simply record what they liked and disliked about the BL process, along with any changes that they would recommend for the design going forward. In order to augment the level of feedback in subsequent cycles, the researcher briefed participants by including more specific instructions in the form of a checklist to stimulate more elaborate responses and delve deeper into participants' direct experiences of the process (Corti, 1993).

Diary recording followed an event-based design (Bolger, Davis and Rafaeli, 2003), with participants recording their feelings about the BL process soon after they experienced each element of the process in a free-text rather than structured format. Recording information close to the time that the event occurs can unearth a greater level of detail while the event remains fresh in the individual's mind, enhancing data reliability (Conrath, Higgins and McClean, 1983; Corti, 1993). However, the diary method can be viewed as tedious by participants and be hampered by their commitment to complete the task (Toms and Duff, 2002; Bryman, 2016). With this in mind, the researcher allowed participants an opportunity to complete the diary at the commencement of f2f computer lab classes and also gave an option of completing a pen-and-paper version.

3.6.6 Students' assessment materials

Based on recommendations by Brown (1992) and Joseph (2004), students' end-of-semester exam results, online assessment results and ratio analysis continuous

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assessment assignments were retained as evidence of student work to be used in data analysis. End-of-semester exam results by question allowed comparisons to be drawn between students' performance on questions/topics taught using a blended versus a traditional approach. Transcripts of participants' posting to class discussion forums were also collected and saved as Word documents for analysis.

3.6.6.1 Rubric

Popham (1997, p. 72) defines a rubric as “a scoring guide used to evaluate the quality of students' constructed responses” comprising three distinctive features: evaluative criteria, quality definitions, and a scoring strategy. A grading rubric was developed in cycle one based on Bloom's taxonomy of educational objectives (Krathwohl, 2002) and influenced by other rubrics sourced from the literature and online (Northeast Regional Honors Council, 2013; Carnegie Mellon University, 2017) to overcome the challenge presented by the subjective nature of scoring performance on the ratio analysis continuous assessment assignment (Mertens, 2015). The researcher was aware that careful rubric design is essential to ensuring positive outcomes in teaching, learning and assessment (De Silva, 2014) so decided to use a rubric which was “analytic, topic-specific, and complemented with exemplars” in order to maximise reliability (Jonsson and Svingby, 2007). The rubric was subsequently amended to reflect design changes in successive cycles, including the inclusion of a metacognitive awareness element from cycle two onwards (Anderson, 2002). In addition to facilitating the evaluation of students' assignments, the rubric also enabled student sub-scores for higher level cognitive skills, quality of discussion forum posts and metacognitive awareness to be established for data analysis purposes (see Appendix 9 for rubric deployed in design cycles two and three).

3.6.7 Questionnaires

Survey research, which obtains information on the beliefs, attitudes, behaviours or characteristics of a population under study (Creswell, 2014), was conducted during each cycle using pre- and post-implementation questionnaires.

When designing a survey instrument it is advised to check the literature for existing instruments which may be adapted for use in the study (Creswell, 2014; Mertens,

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2015; Bryman, 2016) as this can expedite the data collection process, while also enhancing reliability and validity (The Design-Based Research Collective, 2003). Accordingly, both questionnaires were designed using questions taken from previously validated survey instruments supplemented by additional questions inspired by the literature and the researcher's professional experience.

In advance of questionnaire distribution, both questionnaire instruments were piloted with a number of critical friends as the researcher was aware that question wording may bias participant responses (Mertens, 2015) and that piloting would ensure "that the research instrument as a whole functions well" (Bryman, 2016, p. 260). Both questionnaires were adapted and amended as the study progressed through the three iterations.

The surveys were administered using the Kwiksurveys website which allowed for a low cost, attractive survey format, coupled with immediacy of response and automated data retrieval (Bryman, 2016; Denscombe, 2017) with participants gaining access using a link within the Moodle VLE. The researcher remained sensitive to the needs of non-native English speakers by allowing respondents an opportunity to complete the questionnaire during regularly scheduled class time, if they so wished, affording them an opportunity to ask questions (Mertens, 2015) to ensure data validity and also minimise the likelihood of missing data. Good response rates were achieved due to the "salience" of the topic to the learners and the use of reminder emails to follow up any non-responses (Denscombe, 2017).

Students were given a choice of participating or not participating in the questionnaire, their voluntary informed consent was sought, and they were assured of anonymity and confidentiality.

3.6.7.1 Pre-implementation questionnaire design

Pre-intervention data were collected via a questionnaire administered in advance of the BL process, to act as benchmarks against which the post-intervention data would be compared. Questions posed related to age, gender, college commute, other time commitments, IT skill level, prior level of education, prior accounting knowledge, previous experience of online learning, any anxieties in relation to the course and future career plans, if known. This survey was adapted in cycles two and three to

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include a question on students' teamwork preferences along with the addition of a self-report measure of oral communication apprehension (OCA) to establish participants' levels of OCA at the commencement of the programme (see Appendix 6). The instrument used was the Personal Report on Communication Apprehension (PRCA-24) taken from McCroskey *et al.* (1985). Ethical approval for the inclusion of the PRCA-24 instrument was obtained from both AIT and National University of Ireland Galway (NUIG) research ethics committees (Appendix 5).

3.6.7.2 *Post-implementation questionnaire design*

A post-intervention questionnaire was developed by the researcher to capture participants' thoughts and feelings on their involvement in the BL process (Appendix 7). This questionnaire was administered to the students at the end of the academic year after they had encountered the BL design over two semesters.

The post-intervention questionnaire was a comprehensive one where participants were asked to:

1. Rate the various elements of the BL design and give their opinion on specific aspects of the BL design, including multimedia resources, online quizzes and discussion forums.
2. Identify their level of access to IT equipment, internet, Moodle and their level of IT skill and MS Excel competence having completed the course.
3. Give their views on the BL process, in relation to:
 - flexibility of the process
 - effect on interaction with the lecturer and classmates
 - impact on student learning
 - level of participation and engagement in learning activities
 - use of technology while accessing online resources
 - experience of f2f teaching

The majority of the questions consisted of statements which were based on a 5 point Likert scale of *Strongly Disagree* to *Strongly Agree*. Each statement was followed by a comment box allowing participants to comment further on the particular statement, should they wish to do so. The questions in the final section of the survey

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were open-ended, asking students for their opinion on what they liked and disliked most about the BL design along with any recommendations they had to improve it.

Questions on learning relied on student self-reports. Rovai (2002b) identifies self-reports as a superior measure of student learning when compared to course grades, which can be affected by students' diverse prior knowledge, attendance and work submitted late.

Many of the items in the post-implementation questionnaire were taken from validated instruments. Three established instruments used in this study had also been successfully used in a DBR study which investigated the use of digital storytelling for reflection in initial teacher education (Thompson Long, 2014), namely the User Engagement Scale, the Intrinsic Motivation Inventory (IMI) and the Internet Self-efficacy Scale.

Some of the questions relating to the multimedia resource looked at engagement and were based on *The User Engagement Scale*, created by O'Brien and Toms (2008) underpinned by flow, play, aesthetics and information interaction theories. This instrument was designed to evaluate engagement with technology and can be used "to guide the design of digital media or to evaluate user experience with computer-mediated systems" (O'Brien, Cairns and Hall, 2018, p. 29). An example of a statement that tests for user engagement is: *I blocked out things around me when I was using this resource.*

The questionnaire contained six items relating to motivation towards using the online resource which were based on the *Intrinsic Motivation Inventory (IMI)* developed by the Center for Self-Determination Theory linked to the University of Rochester, New York. This instrument "... is a multidimensional measurement device intended to assess participants' subjective experience related to a target activity in laboratory experiments" (Center for Self-Determination Theory, 2018). The instrument is available at <https://selfdeterminationtheory.org/intrinsic-motivation-inventory/> and can be administered as a shorter version with question items modified slightly to fit specific activities without affecting reliability. The IMI question items adopted were taken from the following three sub-scales: interest/enjoyment, pressure/tension and

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value/usefulness. An example of a statement taken from the IMI scale was: *This resource was fun to use.*

Four of the questions relating to technology use were based on an instrument created and validated by Torkzadeh and van Dyke (2001), which deals with internet self-efficacy. “Self-efficacy is the belief of the capabilities of what one can do in a specific domain” (Wang, Shannon and Ross, 2013, p. 304). Students with higher levels of self-efficacy exhibit greater persistence when engaging in tasks, leading to more mastery experiences which in turn enhance self-efficacy. Whereas those with lower self-efficacy levels experience less success due to giving up more easily, which further reinforces their low self-efficacy (Torkzadeh and van Dyke, 2001). As the internet self-efficacy construct was designed to measure the individual’s self-perception and self-competency in interacting with the Internet, statements were re-phrased to suit the current study, for example: *The use of blended learning has increased my confidence in using technology.*

Question items relating to learners’ experiences of f2f instruction and their perceptions regarding the instructor’s technological, pedagogical and content knowledge (TPACK) in using technology for teaching purposes were adapted from a questionnaire developed by Jang and Tsai (2012) based on the TPACK model to explore teachers’ use of interactive whiteboards. Mishra and Koehler’s (2006) framework for teacher knowledge of technology integration called Technological Pedagogical Content Knowledge (TPACK) argues that the central construct of TPACK is not a simple combination of knowledge about content, pedagogy and technology, but rather an integration of the components to form a transformative knowledge that has the potential to maximize the effectiveness of educational technology in the classroom. These question items were subsequently amended in cycle two based on the addition of ‘clicker’ technology as a design change. An example of a statement adapted from the TPACK questionnaire is: *The teaching approaches used made me stay interested in the content of the accounting subject.*

The questionnaire was amended in cycles two and three to include questions on the increased level of collaborative activities introduced in that cycle, including f2f group work and discussion forum activities (see Appendix 7). Additionally, Rovai’s *Classroom Community Scale*, applicable in both online and traditional classroom

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settings, was inserted to measure the sense of community among learners, specifically their levels of connectedness and learning (Rovai, 2002a). Important elements of a sense of community have been identified as: “mutual interdependence among members, connectedness, trust, interactivity, and shared values and goals” (Rovai, 2002b, p. 321) with strong feelings of community contributing to increased group co-operation, advanced motivation to learn, and greater persistence leading to lower levels of school drop-outs (Rovai, 2002b).

A number of questions relating to participants’ views on the BL process, for example in relation to the flexibility of the process and the effects on interactions with lecturer and classmates, were adapted from a study by Almalki (2011) on BL in higher education in Saudi Arabia. Other questions and statements on the questionnaire were developed based on the literature on BL and educational technology use.

3.7 Data analysis

Analysis of data was conducted concurrently, iteratively and retrospectively throughout the design process to deepen understanding of the research context and improve the design, while simultaneously generating theory (Wang and Hannafin, 2005). The researcher engaged in a continual practice of familiarising herself with the data through perusing student learning journals, listening to recorded group interviews, and taking and reading of field notes. The researcher gained new insights from the extended iterative process of listening and re-listening while transcribing verbal data and repeated reading and re-reading of written data transcripts.

3.7.1 Questionnaire data analysis

Quantitative data obtained from the pre-and post-implementation surveys were downloaded from the KwikSurveys website in MS Excel format. Data were anonymised by assigning unique identifier codes to each student’s response and results for both surveys were subsequently merged into a single Excel file. Open-ended answers and additional student comments were extracted for qualitative analysis. Quantitative data were then cleaned in Excel, with variable names inserted as column headings, before being imported into SPSS. Within SPSS, labels and

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possible values were entered for each variable. The data file was screened for errors in advance of data analysis.

The researcher used a codebook to record names assigned to variables in SPSS along with numerical codes assigned to possible responses (Pallant, 2016). Data analysis took place using descriptive statistical analysis through use of frequency tables to obtain mean and standard deviation values. Some variables were modified to enable further analysis and cross-tabulations were run on certain variables to examine relationships between them.

3.7.1.1 Modified variables

A number of variables were modified in order to delve deeper and fully explore the data obtained. One such example was the computation of a level of engagement score for each participant based on responses to 10 items taken from the User Engagement Scale which were included in the post-implementation survey. Items adopted pertained to four different subscales – aesthetics, focused attention, perceived usability and reward factor – and were assessed on a five point Likert scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), with two of the items requiring reverse scoring due to being negatively worded. The SPSS Transform/Compute variable command was used, firstly to obtain a mean score for each sub-scale, and secondly to sum the sub-scale means to obtain a total engagement score for each participant as recommended by O’Brien, Cairns and Hall (2018). Total engagement scores ranged from 4 – 20. This total score was then recoded as a high, medium or low level of engagement for each questionnaire participant, as shown in Table 3.2.

Table 3.2 Coding for levels of engagement

Level of engagement	Score
High level of engagement	14.67 – 20.00
Medium level of engagement	9.34 – 14.66
Low level of engagement	4.00 – 9.33

Transformation also took place on other items in a similar manner to determine participants’ level of technological self-efficacy, motivation/enjoyment levels, sense

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of community, perceived flexibility of BL design and oral communication apprehension.

3.7.1.2 Cross-tabulations

Cross-tabulations are used to jointly display the distribution of two or more variables to explore possible interrelationships between the variables. Crosstabs were run on two variables to see if a relationship existed between them in design cycles two and three. The two variables investigated were participants' stated preferences for teamwork/working alone and their indicated levels of enjoyment of f2f group work activities. Due to the nature of the sample size, in-depth statistical analysis was not feasible. However, the crosstab gave the researcher additional insights when exploring participants' experiences of collaborative group work activities.

3.7.2 Exam and assignment result analysis

Marks were awarded to students for performance on the ratio analysis continuous assessment assignment using the criteria and standards specified in the grading rubric which was devised for this task. Grading was performed on the final submitted report along with postings to the discussion forum. The researcher trawled through discussion forum postings, awarding maximum marks for comments which showed evidence of knowledge construction through building on others' ideas and challenging perspectives. Students' marks were recorded in MS Excel, broken down under the various rubric criteria and in total. Marks were imported from Excel into SPSS to analyse students 'higher cognitive skills' score, 'metacognitive' score and scores pertaining to quality of discussion forum posts. Data analysis was performed using descriptive statistical analysis through use of frequency tables to obtain mean and standard deviation values. Similar descriptive statistics were obtained for end-of-semester exam results which were recorded by question and in total in Excel before being imported into SPSS for analysis purposes.

3.7.3 VLE activity log analysis

Engagement with the various online learning and assessment resources embedded within the BL design was established using the course logs facility available within the Moodle LMS (see Figure 3.2). Logs enabled the researcher to ascertain the

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number and timing of hits on each resource; however, the data obtained were restricted as the length of time spent viewing resources was not measured by the logs.

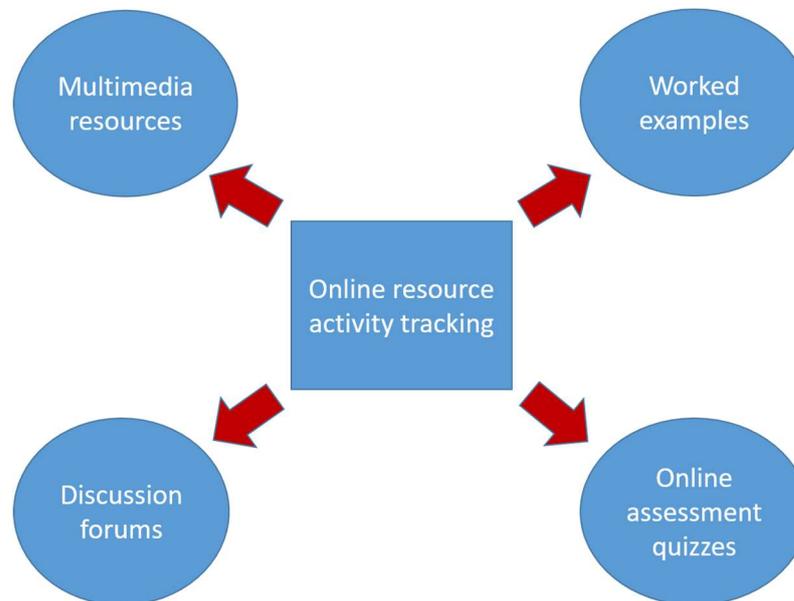


Figure 3.2 Resource usage tracked using VLE activity logs

Activity log data were downloaded in Excel format with subsequent analysis performed by the researcher within Excel. Data were cleaned, anonymised and sorted by participant ID and then by date using the sort function in Excel. Calculations were performed to determine the number of students who accessed the resources, the total number of hits on each resource, the mean hits per student and the viewing period for each resource. Hits which were 15 minutes or less apart were excluded to remove the possibility of double-counting hits which resulted from a resource loading slowly and the student having to regain access. Hits in the one month period prior to the end-of-semester exam were classified by the researcher as accesses for revision purposes. Activity logs pertaining to online Moodle assessment quizzes enabled the researcher to determine the number of attempts on each quiz along with the number of times students reviewed a previous quiz attempt. The discussion forum itself was used to establish the timing and number of posts created by students, while the discussion forum activity logs uncovered the number of times forum posts were viewed by students.

3.7.4 Thematic analysis of group interview data

Data analysis was conducted using both deductive and inductive analyses in order to incorporate differing perspectives within the study. A deductive approach involves the researcher using pre-determined theories to analyse data whereas in an inductive approach the data itself is used to inform the structure of the analysis (Burnard *et al.*, 2008).

The evolving theoretical framework, informed by an on-going literature review and used to guide and focus the design, was also deployed in deductive data analysis. This overcame the problem with the flexibility of thematic analysis whereby it can be difficult to decide which aspects of the data to focus on, and also addressed the issue that a thematic analysis has “limited interpretative power beyond mere description if it is not used within an existing theoretical framework that anchors the analytic claims that are made” (Braun and Clarke, 2006, p. 27). In addition, inductive analysis was utilised enabling the researcher to identify new themes emerging from the data.

The group interview question schedule was designed following an appraisal of the literature and review of student learning journals throughout the year (Appendix 8). Group interviews were recorded and transcribed into MS Word. The researcher engaged in a process of reading and re-reading interview transcripts to identify emerging themes to make sense of the data collected.

Braun and Clarke (2006) describe thematic analysis as a technique for identifying, analysing, and reporting themes within a dataset which can provide a rich, detailed and complex account of the data. Thematic coding was conducted in this study using concept mapping, posited by Metcalfe (2007, p. 149) as a “rational method for emerging appropriate concepts from discussions with stakeholders”. Accordingly, it was chosen for its capability to allow the researcher to conceptualise issues using both analysis and synthesis in order to progress a fitting BL design solution.

Concept mapping can be described as “an inductive means of clustering similar activity statements using the clustering function in network diagramming tools” (Balan, 2012, p. 2). It produces a graphical output showing the connections between idea clusters which help to identify relationships between the underlying

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concepts/themes (Trochim, 1989). Additionally, this method provides a clear audit trail which can be subsequently assessed and critiqued for verification purposes, and is deemed a valid approach for analysis and evaluation purposes (Trochim, 1989; Metcalfe, 2007; Balan *et al.*, 2016).

Statements from group interview transcripts were copied verbatim into an Excel spreadsheet as a list. The researcher then engaged in a linking process to identify statements which were similar to one another. Starting with the first statement, keywords in each statement were identified and used to code the statement against the statements below it on the list which were identical or similar in meaning (see Figure 3.3).

	A	B	C	D	E
1	No	Person	Pg	Statement	Coding
7	6	2018-18	1	I thought the multimedia resource were useful because you could like watch them as many times as you wanted and it wasn't like you had to be listening full attention like in class.	8, 9, 19, 50, 164
8	7	2018-18	1	You could do it yourself at home and you were still learning to the best of your ability, kind of thing.	19, 121, 127
9	8	2018-24	1	multimedia online resource was very good. If I didn't understand something I could play it as many times as I needed	9, 50 164, 165
10	9	2018-24	1	I could always play it on my convenient times like so let's say in the evening I had like a half an hour so I could play it or before sleep and just watch it over and over again to get it into my head	50, 165
11	10	2018-24	1	I wouldn't have got the chance at the lecture because the lecture is only once and that's it.	165, 166
12	11	2018-22	2	It was quicker to revise, like, because if you knew it already, you could kind of skip the bits that you were happy with	12, 46, 59, 97
13	12	2018-12	2	I liked that for ratios, because I knew most of them anyway so it was kind of just like revision for me.	46, 59, 181
14	13	2018-12	2	I feel in a class you kind of just know it all so you're kind of just sitting there.	14, 124, 125, 172, 174
15	14	2018-14	2	You zone out	124, 125, 172
16	15	2018-18	2	I thought the forums were kind of good for understanding why you actually had to do the ratios as well	31, 32, 34, 36, 37, 51, 100, 180

Figure 3.3 Linking key statements, group interview data 2018-19

Coding data were then entered into an interaction matrix (Metcalfe, 2007) on an Excel spreadsheet, by entering a “1” into the cell that was the intersection between each of the comments that were coded as similar to one another, as shown in Figure 3.4.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		1	2	3	4	5	6	7	8	9	10	11	12	13
2	1													
3	2													
4	3		1											
5	4													
6	5													
7	6													
8	7					1								
9	8						1							
10	9					1	1		1					
11	10													
12	11													
13	12											1		
14	13					1								
15	14					1								1
16	15													
17	16													
18	17			1										
19	18			1										
20	19						1	1						
21	20													
22	21					1								

Figure 3.4 Interaction matrix, group interview data 2018-19

The Excel matrix was then imported into UCINET6 social network analysis software (Borgatti, Everett and Freeman, 2002) which, through use of a clustering algorithm called “spring embeddedness”, produced a visual output map comprising a set of clusters of data items, with each cluster representing a *pragmatic concept*. The researcher used the NetDraw network visualisation tool to produce a three dimensional concept map with each statement included in the analysis represented by a node on the map and the links between each statement depicted by lines, providing a rich illustration of the analysed statements. The concept map was analysed using Girvan-Newman sub-group statistical analysis (Girvan and Newman, 2002) which measured the “between-ness” of the clusters within the map and suggested the optimal number of clusters within the data. The researcher selected the number of clusters generated by the software; however, she also had the flexibility to examine data elements to explore relationships which may indicate the need to merge two clusters. Figure 3.5 illustrates how the 182 qualitative statements extracted from the cycle two group interview data were grouped into 16 clusters to form a concept map.

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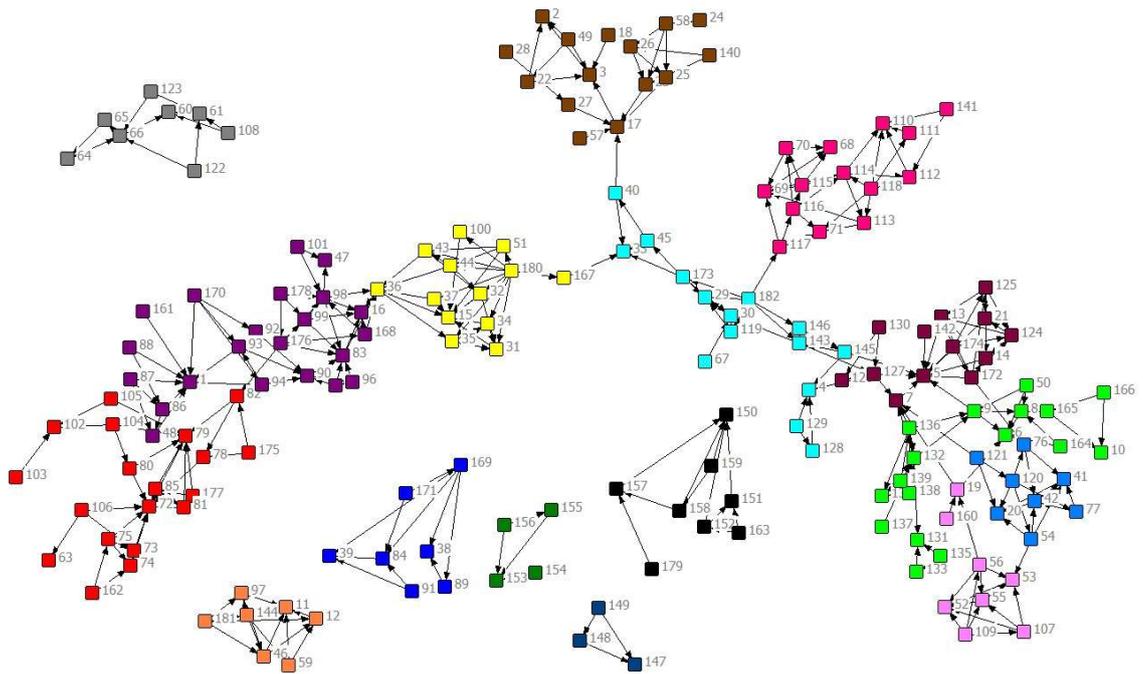


Figure 3.5 *Thematic concept map, group interview data 2018-19*

Each cluster was colour-coded by the researcher who then returned to the Excel spreadsheet where the statements that made up the raw data were sorted into the groups or pragmatic concepts as shown in the cluster maps. Visual inspection of the resultant collections of statements allowed the researcher to check the consistency of statements in each cluster to ensure that they all referred to the same conceptual idea. This process also revealed data which may have been mis-coded and allowed the researcher to reflect on any isolates which needed to be coded into one of the clusters. These changes required adjustments to the Excel matrix which had to be re-imported into UNICET6 in order to re-draw the cluster map. Once the researcher was satisfied that all statements had been coded to the correct cluster, she gave each cluster of statements a collective name known as a concept that was drawn from the elements in each cluster (see Figure 3.6).

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	A	B	C	D	E	F	G	H	I
1	ID	Person	Pg	Statement	Cluster	Interpretation	Count	Colour	
112	20	2018-18	3	It's kind of explained to you more and then you have different ways that you can actually learn, using the blended learning and that, it makes it easier whereas in other classes you don't have anything like that	9	Different ways of learning	8	blue	
113	41	2018-24	5	I think when we went through the questions and we see the different answers and you went through each answer separately, like 'why yes, why not' and how that could be affected then and that kind of thing, even the wrong answers like	9				
114	42	2018-18	6	they were useful to know why the other answers were wrong, like why you wouldn't choose those	9				
115	54	2018-22	8	You'd be more happy to sit down and do a question in financial accounting than you would in other subjects because you've done it in different ways, like you've learned in all the different ways.	9				
116	76	2018-18	12	That was good for the ratios as well when we had to discuss the interesting parts in it, the plus and the minus, what was good about it and what was bad about the ratios	9				
117	77	2018-08	12	It encourages a lot more like 'backup work' (working on ratio exercises)	9				
118	120	2018-12	20	I think just because there was different ways of learning, it was different than just going to a lecture and listening .. It kind of encouraged you to do it as well	9				
119	121	2018-12	20	you had to go home and do it at your own pace, at your time so it was kind of a different way of learning.	9				
120	60	2018-22	9	You'd be quicker to ask questions because it's like we don't see you and if we do have a question we need to ask you to understand it.	10	Interaction with lecturer	9	grey	

Figure 3.6 Clusters of statements assigned to concept names, group interview data 2018-19

These concepts were then mapped to emergent themes in the literature and theoretical framework. Figure 3.7 illustrates the clusters being subsequently linked to the six themes within the PACE-IT framework. Re-visiting the cluster map once concepts and themes were assigned provided the researcher with an overall view on how particular themes were inter-connected and their impact on each other. The concept map also provided the researcher with an opportunity to display the data, rather than merely describe it, an important consideration in qualitative research (Bansal and Corley, 2012).

Cluster	Concept	Count	Colour	Theme
3	own pace/time	17	bright green	Autonomy
2	Self-directed learning	13	maroon	Autonomy
8	Scaffolding (learn from others)	22	purple	Collaboration
13	Discussion forum - comments	7	royal blue	Collaboration
9	Different ways of learning	8	blue	Engagement
6	Motivation / engagement	15	cyan	Engagement
11	Scaffolding (solutions)	14	cerise pink	Interaction
12	Interaction with classmates (group work)	19	red	Interaction
10	Interaction with lecturer	9	grey	Interaction
1	F2F teaching	15	brown	Pedagogy

Figure 3.7 Concept 'clusters' linked to PACE-IT themes, group interview data 2018-19

3.7.5 Learning journals, instructor field notes and qualitative survey comments

In cycle one student learning journals (learning logs) simply asked students to state their likes, dislikes and recommendations for change to the BL design. During analysis, student statements were coded and resultant codes were expressed quantitatively in MS Excel in table and graphical form.

In subsequent cycles, more detailed feedback was sought from participants in their journals, resulting in an increased corpus of data. Hard copy transcripts of the student learning journals were read and re-read in a constant search to identify key statements, following which statements containing similar thoughts and opinions were grouped together and coded under a ‘concept’ heading. As themes emerged during analysis of questionnaire and group interview data, concepts identified in student logs were linked to these themes to aid interpretation of results using the ‘following a thread’ method of data integration (Moran-Ellis *et al.*, 2006), which will be discussed presently.

Hard copy transcripts of instructor field notes were read and re-read to find linkages with themes already established during analysis of other data collection methods, using the ‘following a thread’ approach to data integration, thereby augmenting the research findings from other data collection methods. Participants’ qualitative comments taken from the post-implementation survey were grouped according to thematic emphasis and integrated in a similar fashion, contributing to overall interpretation and understanding.

3.7.6 Data integration - following a thread

The use of multiple methods was particularly valuable as it enabled the researcher to gain an extensive and intensive exploration of the learners’ experiences of the BL design. Overlapping topics covered in both the quantitative and qualitative components of the study served to promote and assist in the data integration phase (Adamson *et al.*, 2009). The researcher used the ‘following a thread’ model advanced by Moran-Ellis *et al.* (2006) to integrate the multiple datasets present in this study in order to “create a constellation of findings which can be used to

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generate a multi-faceted picture of the phenomenon” (p. 54). The importance of data integration in mixed methods studies has been widely emphasised (Greene, Caracelli and Graham, 1989; O’Cathain, Murphy and Nicholl, 2010; Moseholm and Fetters, 2017; Johnson, Grove and Clarke, 2019) and this method was chosen as it allowed the integrity of each dataset to be preserved while generating an analysis which was greater than the sum of the methodological parts (Moran-Ellis *et al.*, 2006; Cronin *et al.*, 2008; O’Cathain, Murphy and Nicholl, 2010). This process involves an initial analysis of each of the multiple datasets, followed by identification of a “promising thread” in one dataset which was followed across all the other datasets. Codes and categories for that concept/theme were identified in the other datasets and were juxtaposed to create a “data repertoire” (Cronin *et al.*, 2008). For example, analysis of students’ responses to survey questions regarding their engagement with the online resources was juxtaposed with data extracted from Moodle activity logs which reflected usage of online resources and data segments reflecting motivation/engagement extracted from the group interviews and student learning journals to create a data repertoire for the theme ‘engagement’. This repertoire was then further analysed and interrogated for evidence of convergences and divergences leading to a more insightful interpretation of the thread. Finally, the findings for each thread were synthesised with other the threads that were similarly picked up and followed. At the end of the analytic and interpretative process the researcher’s theoretical understandings of the BL design was a detailed picture woven from these different threads.

3.8 Ethical considerations

Ethical concerns occupied a central place in the whole research process. Trowler (2011) describes research in the higher education institution where one is employed or studying, as “insider” research. The challenges encountered by practitioner researchers undertaking research projects in their own organisations due to their close proximity to the research participants and in managing the dual role as practitioner and researcher have been well-documented (Zeni, 1998; Hanson, 2013).

We aren’t outsiders peering from the shadows into the classroom, but insiders responsible to the students whose learning we document (Zeni, 1998, p. 10).

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The researcher was cognisant of the multiple responsibilities and sensitivities associated with playing a dual role of lecturer-researcher, in particular the fact that students may feel an obligation to participate because of the hierarchical relationship which exists between lecturer and student. Accordingly, the researcher was keen to make her role as researcher explicit and re-assure students that non-participation was acceptable, ensuring that students did not feel under duress to participate, while also remaining open and honest at all times with participants. For this reason, initial information on the research project was presented to students in a class outside of their financial accounting class to ensure students perceived a boundary between the role of researcher and lecturer and to allow students feel comfortable with declining to participate, if they wished to do so. Furthermore, due to the longitudinal nature of this research, it was essential that the researcher continued to adopt a reflexive stance towards power relations throughout the entire study.

Iphofen (2011), as cited in Brooks, te Riele and Maguire (2014), posit that everyone has the potential to become vulnerable and “what matters is that both researchers and reviewers anticipate the potential for its emergence and make available procedures for dealing with it”. The researcher recognised that first year students who are newly embarking on college courses may be viewed as a ‘vulnerable’ population. Bearing this in mind, the researcher was aware of the need to be reflexive and constantly reflect on her role in the research process while asking questions of herself on how to conduct the research in an ethically good way. Joint supervision sessions with supervisors were a further element in the reflexive process.

The researcher in this study believes she was well placed to perform the research due to her extensive professional experience as well as having shared the experience of being a first year financial accounting student herself in the past. While the researcher’s position as ‘insider’ empowered her to offer a thick description of students’ experiences due to the presence of a good working relationship with students, she took care not to exploit this relationship in building “false friendships” to capture rich data sets (Brooks, te Riele and Maguire, 2014). The researcher noted a need to take a reflexive stance and exhibit sensitivity towards the participants involved in the research process by always treating them fairly, with empathy and

respect. To this end, the researcher incorporated reflexivity in her field note taking throughout the three design iterations.

3.8.1 Ethical approval

Permission had been given by the Dean of Faculty in relation to carrying out this research project with students registered on the Bachelor of Arts in Accounting and Bachelor of Arts in Accounting and Law programmes. The researcher was guided by BERA's (British Educational Research Association) Ethical Guidelines for Educational Research (2018) which recommend the pursuit of ethical practices towards all parties directly or indirectly involved in the research process. In addition, permission was obtained from AIT and NUIG Research Ethics Committees (RECs) at the commencement of the 2017-2018 academic year to ensure the study was consistent with ethical standards (Appendix 4). Furthermore, amendments to survey questions in cycle two which were submitted to AIT and NUIG RECs for ethical approval at the commencement of the cycle were subsequently ratified (Appendix 5). As parental consent would be demanded by ethics committees for any child participant, it was decided to restrict this study to participants aged over 18, due to the difficulty of gaining access to parents of college students and the fact that the majority of students in first-year groups are generally aged 18 or above.

3.8.2 Informed consent

The aims and methods of the study were explained to the students at each point of the study. At the commencement of each academic year, a meeting was arranged with students where the rationale behind the study was explained. The BL process, the level of participation required of them, data collection procedures and how and to whom the research would be reported was explained and distributed to them in the form of hardcopy participant information sheets so that they fully understood what was involved in the study (Appendix 2). While all students were required to participate in the BL process as part of the financial accounting module, every student had the choice of whether or not they wanted to be involved in the research part of the process. Students were assured that their choice to participate or not in the research would in no way affect their grade in the module, and were therefore under no pressure to participate. Students provided informed consent by signing

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consent forms to indicate that they were fully informed from the outset of the type of research involved and any implications arising from their participation (Bryman, 2016). It was clearly outlined to students that participation was voluntary and that they may withdraw from the research at any time without explanation or fear of adverse consequences. No participant to date has requested to be withdrawn from the study. Additional consent was sought from students participating in the think aloud protocol and group interviews throughout the study and further codified in signed consent forms (see Appendix 3 for consent forms deployed during the study).

3.8.3 Confidentiality, anonymity and data protection

The researcher was aware of her duty of care to students and their right to privacy, explaining at the commencement of each cycle that their anonymity would be protected and their data would be treated with confidentiality. In order to protect the identity of all who participated in this study, all respondents were assigned a participant ID code corresponding with the academic year during which the research took place. Data collected, including that taken from discussion forums and student assignments, were anonymised using the assigned codes and all data were secured in a safe place. Hard copies of transcripts were kept in a secure locked cabinet and electronic data were stored securely on the researcher's personal computer with use of password protection and data encryption as per BERA (2018) guidelines.

3.9 Chapter summary

This chapter has described the researcher's epistemological, ontological and axiological stance, as well as the rationale in selecting the DBR methodology to interrogate the research question posed. The origins, characteristics and challenges associated with the DBR methodology have been delineated. The convergent mixed methods design which was selected as appropriate for use with the DBR methodology has been expounded along with strategies deployed to ensure research quality and trustworthiness. Detailed accounts of the data collection methods and data analysis approaches applied in the study have been provided along with an explication of relevant ethical considerations. The following chapter will outline the orienting theoretical framework which was used to guide the design of the BL model in this study.

Chapter 4 Theoretical Framework

The purpose of theories is to help us sort out our world, make sense of it, guide how we behave in it, and predict what might happen next (LeCompte and Preissle, 1993, cited in Herrington and Oliver, 2000, p. 25).

4.1 Chapter introduction

In design-based research, theory is linked to practice whereby a practical product which addresses a local problem is created coupled with advancements in theoretical understandings (Cobb *et al.*, 2003; The Design-Based Research Collective, 2003; Collins, Joseph and Bielaczyc, 2004; Wang and Hannafin, 2005; Reeves, McKenney and Herrington, 2011; Reimann, 2011; Reeves and McKenney, 2012; Sandoval, 2014; McKenney and Reeves, 2019). This study aims to design a BL intervention which will have a practical impact within an introductory accounting classroom.

diSessa and Cobb (2004) stress the value of theories within DBR in the way that they “delineate classes of phenomena that are worthy of inquiry and specify how to look and what to see in order to understand them” (p. 79) providing a guiding lens which shapes that way we see and understand phenomena. The BL design implemented within this study is rooted in an evolving theoretical framework, the PACE-IT framework, which informs the implementation of a BL approach in introductory accounting education. This chapter portrays the six theoretical concepts underpinning the PACE-IT framework which have evolved over the course of this study, namely pedagogy, autonomy, collaboration, engagement, interaction and technology

The theories influencing the framework will be elaborated upon presently under each concept heading. While it is endeavoured to depict each concept theme individually, it must be recognised that the themes intertwine due to the existence of overlapping elements, which adds to the robustness of the model. The model portrayed within this chapter emerged, and was refined, over three BL design iterations.

4.2 Pedagogy

The idea is grasped, probed, and comprehended by a teacher, who then must turn it about in his or her mind, seeing many sides of it. Then the idea is shaped or tailored until it can in turn be grasped by students. This grasping, however, is not a passive act. Just as the teacher's comprehension requires a vigorous interaction with the ideas, so students will be expected to encounter ideas actively as well. Indeed, our exemplary teachers present ideas in order to provoke the constructive processes of their students and not to incur student dependence on teachers or to stimulate the flatteries of imitation (Shulman, 1987, p. 13)

When selecting a pedagogical approach, clear focus must be placed on the needs of the learner for whom the learning environment is being designed. According to Hattie (2012), "visible learning" occurs when student learning is visible to teachers so that they may continually evaluate the impact of their teaching on student learning. In addition, teaching must be visible to the student so that students may become their own teachers, ultimately as lifelong learners. Learners and teachers must work together towards learning goals which are challenging and explicit (Hattie, 2012). As Perkins (1991, p. 21) eloquently noted:

The larger lesson is that any pedagogy – but especially constructivism, given its commitments – does well to include a vision of how students experience it. They, after all, are the ones that have to try to walk in the shoes we theorists, teachers, and designers cobble together for them.

The responsibility to consider learners' capacities, needs and past experiences when organising stimulating learning activities, which will engage learners and ensure future positive experiences for them, lies firmly on the shoulders of the educator (Dewey, 1938).

4.2.1 *Constructivism*

In the 1970s the constructivist philosophy gained popularity through various pedagogical practices, many of which are still in use today. Constructivist teaching methods are based on constructivist learning theory which was influenced by theorists such as Jean Piaget, Lev Vygotsky and John Dewey. These philosophers were very influential in the development of progressive, informal education. Constructivist theory posits that learners are not passive recipients of knowledge but are more active in the process, constructing their own knowledge and forming their own understandings in relation to the world around them (Fosnot, 2005). They build

Theoretical Framework

on previous experience in order to make sense of what they are learning, with learning viewed as “meaning-making” (Woo and Reeves, 2007).

In contrast to the behaviourist approach, students are at the centre of the learning process in the constructivist classroom, guiding their own learning which reflects current international beliefs and discourse on the rights of the child. This is enshrined in the United Nations Convention on the Rights of the Child (UNICEF, 1989) which assures children of their right to freedom of thought, to discover things for themselves and to a good quality education which develops their talents and abilities.

Constructivist learning theory is based upon two fundamental assumptions (von Glasersfeld, 1989)

1. Knowledge is actively constructed rather than being passively received.
2. Cognition does not act to discover a current reality; rather, it adapts a proposed theory of reality to the experiential world.

Constructivism, in a nutshell, states that children are the builders of their own cognitive tools, as well as of their external realities. ... Knowledge, to a constructivist, is not a commodity to be transmitted – delivered at one end, encoded, retained, and re-applied at the other – but an experience to be actively built, both individually and collectively (Ackermann, 2004, p. 16).

Constructivist learning environments must be designed to include elements of ‘real world’ settings, allowing learners to actively construct their own meaning as they work collaboratively using conversation surrounding planning, negotiation and problem-solving (Jonassen *et al.*, 1995; Kirschner, 2001). The BL design followed in this research will be designed to build on students’ prior experiences and include real-life tasks both inside and outside of the classroom. Use of digital tools from the workplace will allow students experience features of the real world setting.

Collaborative group work will be facilitated during f2f classes and online collaboration will be enabled through the use of discussion forums to continue the conversation outside of college hours. Discussion forums can encourage critical thinking among students, as they learn from reading responses of others, while also facilitating the comparing and contrasting of ideas, allowing them to form conclusions, with supporting evidence (Thiede, 2012) through:

Theoretical Framework

responding, negotiating internally and socially, arguing against points, adding to evolving ideas, and offering alternative perspectives with one another while solving some authentic tasks (Woo and Reeves, 2007, p. 23).

4.2.2 Conversational Framework

E-learning has been used widely and effectively in higher education to supplement traditional teaching practices. However, digital tools have the potential for greater exploitation, through the use of interactive technologies to actively engage learners in building knowledge for a more enhanced learning experience, rather than simply providing access to notes (Laurillard, 2006, 2007). Laurillard (2002) puts forward the Conversational Framework, which epitomises “learning as shared understanding” (p. 145) through the integration of different technologies to achieve higher learning outcomes. The framework is rooted in Conversation Theory, which is based on the premise that learners should speak about the “how” and “why” of learning, and understanding can be measured by the learner’s ability to “teach back” the topic (Scott, 2001; Heinze, Procter and Scott, 2007). The Conversational Framework for learning is a theoretical framework which delineates what any teaching strategy should encompass (see Figure 4.1) and can be used in the design of learning environments. It illustrates the communication process occurring between the teacher and student in advancing student knowledge, providing for an open and transparent student-teacher relationship (Heinze, Procter and Scott, 2007). It illustrates the two levels in the learning process, discursive (theory) and experiential (practice) levels and the connections that exist between both levels for both teachers and students (Laurillard, 2008b). At the discursive level they interact through communication, whereas the interaction is adaptive at the experiential level with the student engaged in a practical task, while there exists a link between the discursive and experiential levels. The student’s actions at the experiential level are adapted based on the discussion at the discursive level, and additionally, the student reflects at the discursive level on his experiences at the experiential level. In a similar fashion, the teacher adapts the practical task, based on the needs of the student identified at the discursive level, and discussions at the discursive level are informed by the students’ performance at the experiential level. Students are also linked with each other through interactive communication at the discursive level and peer

Theoretical Framework

feedback and output comparisons which take place at the experiential level (Laurillard, 2007).

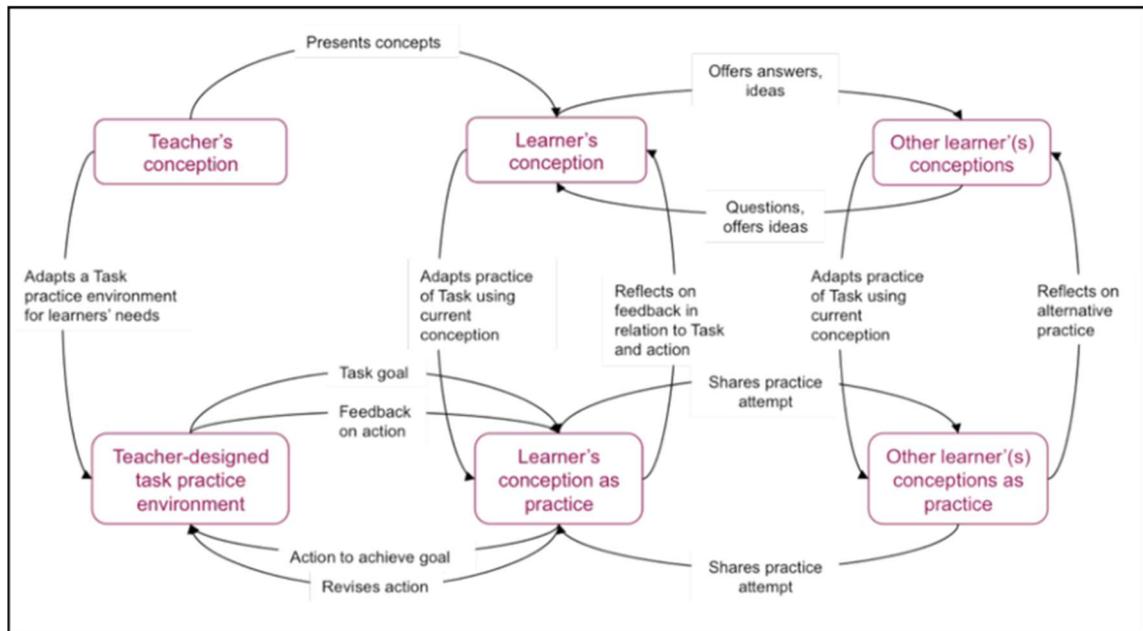


Figure 4.1 The Conversational Framework (Laurillard, 2009, p. 11)
[Reprinted with permission]

The framework, derived from research on student learning, aims to:

optimise the learning process by supporting the student in developing their understanding through reflection and adaptation in relation to a goal-oriented task, with feedback. It requires them to iterate through a cycle of attending, questioning, practising, adapting their actions, using feedback, reflecting, and articulating their ideas (Laurillard and McAndrew, 2003, p. 82).

The Conversational Framework challenges teachers to engage students on both a discursive and experiential level, and can be used “to help the teaching community rethink their teaching – what is the best way to help their students learn through conventional methods, digital methods or, better, a mix of the two?” (Laurillard, 2008b, p. 143). It can be used to judge the ability of a new technology to support learning, to critique a learning design (traditional or digital) and also to design the learning process and applies to all forms of learning including, blended, distance, traditional and digital learning (Laurillard and McAndrew, 2003; Laurillard, 2007, 2008a).

It is designed to help the teacher, working with or without technology, to think through whether they are doing enough to help their students learn what they are trying to teach (Laurillard, 2008b, p. 141).

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It allows for the integration of technology in learning, providing:

an exemplary focus for appreciating the interaction design requirements and contextual possibilities for more effective educational exchange between *teacher-student*, *student-student* and *student-knowledge* (Richards, 2006, p. 247, italics in original)

Academics must be involved in the design of learning environments and prepare themselves to become reflective practitioners in order to move away from a transmissive teaching approach (Laurillard, 2002; Laurillard and McAndrew, 2003).

The technology becomes much more interesting when it is used to give the learner a tool for understanding, not just a fancier form of a book (Laurillard, 2008a, p. 16).

Indeed it is widely recognised that learners reach greater levels of understanding when forced to explain and represent knowledge in various different ways and justify their views to others (Hatano and Inagaki, 1987; Brown, 1988; Harel and Papert, 1990; Blumenfeld *et al.*, 1996), with Harel and Papert (1990, p. 30) asserting that “the best way to learn a subject is to teach it”. The role of conversation in progressing learning has also been recognised:

Learning traditionally gets measured on the assumption that it is a possession of individuals that can be found inside their heads. By the degradation approach, learning is not in heads, but in the relations between people. Learning is in the conditions that bring people together and organize a point of contact that allows for particular pieces of information to take on relevance; without the points of contact, without the systems of relevancies, there is no learning, and there is little memory. Learning does not belong to individual persons, but to the various conversations of which they are a part (McDermott, 1999, p. 16).

Nevertheless, the Conversational Framework has received criticism for being overly prescriptive in relation to interactions thereby restricting practitioners’ styles (Conole and Oliver, 1998). Heinze, Procter and Scott (2007) used the framework as the theory underpinning a BL study, but felt it would need to be amended and enriched to make it more useful, with the need to use assessment as a motivator for sustained interaction in the online learning environment.

Informed by the Conversational Framework the BL design will incorporate learning tasks requiring students to act in the environment to achieve a goal which will motivate them to think about the underlying theory. ‘Intrinsic’ feedback which shows students the result of their action, while making them aware of how they can improve on it, will motivate learners to practise repeatedly. Learners will be

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motivated to reflect on their experiences if they are required to produce some version of their own idea to the teacher at the discursive level, therefore, the design will require students to produce a report assessing a company's financial performance as part of the ratio analysis topic. Peer collaboration must be facilitated within the BL design by allowing students opportunities to share, discuss and reflect on their outputs with peers during f2f classes and outside of the classroom through use of discussion forums, which will be linked to assessment. This emphasis on interactions is aimed at motivating learners to improve their practice and augment their conceptual understandings (Laurillard, 2007).

4.2.3 Cognitive load theory

Recent trends have displayed a shift towards the use of cognitive load theory (CLT) in educational research circles. CLT, which was first developed in the 1980s, employs knowledge of human cognitive architecture to improve instructional design (Sweller, 1994; Sweller, Ayres and Kalyuga, 2011). It is based on the principles of cognitivism, which examines learning through a depiction of the brain structure, its various elements and the way in which it processes sensory input data, distinguishing between working memory which receives and processes sensory input in small 'chunks' for short periods of time (Miller, 1956; Cowan, 2010), and long-term memory which holds large schema for long periods of time. Learning involves a broadening of expertise which involves a change in long-term memory through schema development (Chi, Glaser and Rees, 1982; Kirschner, Sweller and Clark, 2006). Holding significant amounts of complex information in working memory requires effort, which is referred to as 'cognitive load'. Sweller (2010) elaborates on three types of cognitive load:

- Intrinsic load – the cognitive processing imposed by the complex characteristics of the learning material. This depends on the content's complexity, an individual's existing schema level from previous education and his/her natural working memory capability and use. At introductory accounting level, intrinsic load has the potential to be high due to the content type and diverse student abilities and backgrounds (Mostyn, 2012).
- Extraneous load – the unnecessary load imposed on working memory due to the teaching method employed. CLT aims to reduce this load as it hampers

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schema development making learning difficult and inefficient. Reducing extraneous load frees up working memory for processing intrinsic load and forming schema, thereby increasing learning efficiency (Mostyn, 2012).

- Germane load – the effort used by working memory in understanding material and developing schema. It promotes learning so it is a necessary load and includes comprehension, practice, repetition and development of metacognitive awareness (Mostyn, 2012).

While constructivist learning experiences allow active involvement and social interaction among learners, discovery and problem-based learning exert high cognitive demands on learners (Perkins, 1999), which may prove difficult for accounting students who are studying at an introductory accounting level. Designing learning activities so that cognitive load is optimised is one strategy which can be employed to promote effective student learning (Perkins, 1991; Mostyn, 2012).

4.2.3.1 Implications of CLT for multimedia design

Over the past two decades CLT has begun to garner support in the area of multimedia instructional design. Mayer (2002) identifies three cognitive theory assumptions which have implications for design of multimedia instruction (see Figure 4.2):

1. Dual channel assumption – Human cognitive architecture contains a visual-pictorial channel for processing pictures seen by the eyes and an auditory-verbal channel for representing spoken words heard by the ears.
2. Limited capacity assumption – Each channel has a limited capacity for holding and processing knowledge.
3. Active processing assumption – Active processing within the channels (eg selecting and organising words and pictures and integration of both along with relevant prior knowledge) results in meaningful learning. This is more likely to occur when related pictorial and verbal representations are in working memory at the same time.

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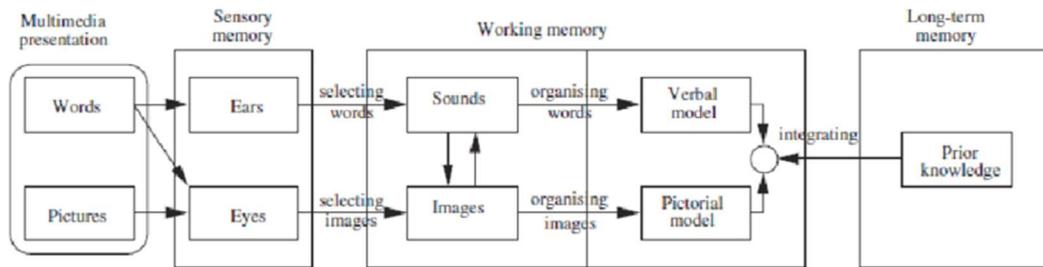


Figure 4.2 Cognitive theory of multimedia learning (Mayer and Moreno, 2003, p. 44)
[Reprinted with permission]

Based on cognitive theory research into multimedia learning, Mayer (2002) proffers eight principles for design of multimedia learning:

1. Multimedia principle –deeper learning occurs when students receive an explanation which connects pictures and words, rather than hearing words alone.
2. Contiguity principle – Presenting words and pictures simultaneously rather than successively promotes deeper learning as there is an increased chance that they will be in working memory at the same time, so the learner can construct mental connections between them.
3. Coherence principle – deeper learning occurs when unnecessary material is excluded from the presentation.
4. Modality principle – more effective learning occurs when words are narrated rather than presented as on-screen text. Use of on-screen text overloads the visual channel, whereas narration is processed by the auditory channel while the pictures are processed in the visual channel. “Off-loading” some of the processing demands from the visual to the verbal channel also avoids split-attention effect, as described by Sweller, van Merriënboer and Paas (1998), where learner’s visual attention is split between viewing animation and reading on-screen text (Mayer and Moreno, 2003).
5. Redundancy principle –The addition of on-screen text alongside an animation causes split-attention effect (Sweller, van Merriënboer and Paas, 1998; Sweller, 2006) placing an additional demand on the visual channel by forcing students to split their attention between the words and the pictures.

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6. Personalisation principle – students learn more effectively when words are presented in a conversational style rather than a formal style.
7. Interactivity principle – Adding user interactivity where the user can view a presentation by segment at their own pace may result in more effective learning.
8. Signaling principle – tentatively proposes that signalling may help guide the learner by focusing attention on key steps or events and how they interrelate.

In addition, cognitive load can be reduced by providing learners with prior training on elements of the material to be learned and use of segmenting, which separates complex learning material with a high intrinsic load into chunks to be absorbed by the learners one step at a time (Mayer and Moreno, 2003).

Consideration of multimedia design principles based on CLT has particular relevance for this BL design as the researcher designs multimedia resources to replace f2f teaching hours. The multimedia resources employed within the study are predicated upon CLT principles, aiming to minimise cognitive load for students through the inclusion of: interactivity so that learners can view at their own pace; narration to accompany videos/pictures; segmentation of learning material into steps; signalling; and the exclusion of unnecessary material. The scheduling of an introductory f2f class on each topic (implemented from cycle two onwards) serves to further reduce cognitive load by acquainting students with the material to be learned in advance of online resource usage.

4.2.3.2 Worked Example Effect

The worked-example effect is based on cognitive load theory and occurs when students who study worked examples perform better on subsequent problems than students who solve problems only (Sweller and Cooper, 1985). Learning through use of worked examples is more effective for novice learners than discovering a solution to a problem. The initial use of worked examples with students can allow students to familiarise themselves with steps to follow when solving specific problems, before being faced with a complete problem to solve on their own (Halabi, Tuovinen and Farley, 2005).

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Learners must be able to recognize a solution to a particular class of problem before they are able to produce the steps leading to it without assistance (Pardjono, 2016, p. 170).

As learners become experts, the worked example effect disappears and then reverses, known as the expertise reversal effect. In this case, studying a worked example becomes a redundant activity (Kirschner, Sweller and Clark, 2006; Reisslein *et al.*, 2006). Presenting solutions as a series of steps, providing more than one worked example per instructional topic, and providing problems for learners to attempt subsequent to using worked examples have all been identified as beneficial for learning (Catrambone and Yuasa, 2006; Gerjets, Scheiter and Catrambone, 2006).

Taking cognisance of the worked example effect, the BL design will incorporate worked examples within the online resources for students to access outside of class (design change in cycle two). Worked examples will also be provided within f2f classes as part of a guided instructional strategy. Additional problem exercises will be available within a question manual which will be provided in hard copy to students with soft copy solutions available on Moodle, providing students with autonomy to progress from guided instruction to independent problem-solving.

4.3 Autonomy

Good teachers, like good parents, have always recognised that their students, or their children, are with them for a very short time. Thus, their students must be equipped with the means to cope when they are no longer around. ... In this sense learner autonomy has always been an implicit goal of all education (McDevitt, 1997, p. 35).

The need to prepare learners for a lifetime of education is well recognised (McDevitt, 1997; Kenyon and Hase, 2001; Blaschke and Hase, 2016; Hase, 2016). Indeed the Accounting Education Change Commission (AECC, 1990) dedicated its first position statement to asserting that accounting graduates should be prepared to become professional accountants by equipping students with lifelong learning skills with an emphasis on intentional learning and learning how to learn. Skills and competencies required for working in a global knowledge economy, coupled with the affordances of new technologies, creates demands for new pedagogical approaches, particularly in supporting lifelong learning (Boud, 1988; Hase and Kenyon, 2000; Ashton and Newman, 2006; Ashton and Elliott, 2007; Laurillard, 2008b; Blaschke, 2012). Our educational system, originally designed to meet the

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needs of the industrial revolution, is not fit to meet the challenges of the 21st century world. It is recognised that a change in pedagogy is required in order to promote learner autonomy, to include shifting teacher-student roles, and the need for teacher scaffolding to enable reflective learning (Higgs, 1988; Smith, 2003). Constructivist teaching and learning approaches, which foster self-directed learning as an essential condition for learner autonomy, must be built into the structure of a programme in order to guide students towards autonomous learning (Cotterall, 1995; Thanasoulas, 2000).

Learner autonomy is an ongoing volatile process responsive to “educational interventions”, rather than a fixed end-state which is reached once and for all. Autonomous learners act as meaning-makers, who cause rather than allow things to happen, achieving benefits for institutions and society as a whole (Candy, 1991; Thanasoulas, 2000). Autonomous learning involves the teacher devolving power to students to make choices around their own learning methods (Boud, 1988; Higgs, 1988) with the level of teacher dependence identified as the main distinction between traditional and autonomous learning approaches (Higgs, 1988). Boud (1988) argues that course structures must ensure that class contact hours are adjusted to allow sufficient time for students to learn independently without experiencing work overload, and the responsibility rests with teachers to initiate the move to learning autonomy in traditional educational institutions. Furthermore, autonomous learning has social implications, seeking to develop students as interdependent learners who interact together freely rather than individuals working in isolation, facilitating a progression from “dependence to independence and interdependence” (Boud, 1988, p. 31).

4.3.1 Andragogy

Pedagogy, regarded as a teaching theory, refers to the art and science of educating children where the pedagogue (teacher) decides on the knowledge or skills to be transmitted to the student along with the means of delivery (McAuliffe *et al.*, 2008). In contrast, andragogy (Knowles, 1984) meaning ‘man-leading’, is a learning theory which is used by educators to describe adult learning, where the immediate context-specific needs of the learner are addressed. Andragogy focuses on the learner participating actively in his own learning, with an emphasis on learner autonomy and

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self-direction, developing learner independence and thereby maximising life choices (Knowles, 1984). Furthermore, its relevance in the facilitation of autonomous learning has been acknowledged (Higgs, 1988).

Knowles' (1984) assumptions of adult learners are:

1. The adult is self-directing and autonomous
2. The adult is characterised by her experience on which she bases her new learning
3. “Readiness to learn” – as he develops his desire to learn is increasingly related to his social development or role in society
4. “Orientation to learning” – the adult learns through problem solving (whereas childhood education is subject-centred). This is linked to the assumption that children’s learning is future oriented whereas adults are motivated to learn to meet their present needs.
5. Motivation to learn – as an individual matures, the motivation to learn becomes internal.

These assumptions, which distinguish adult learners from child learners, demand a different approach to be taken when serving the needs of the adult learner. The focus of andragogy is on facilitating knowledge-acquisition rather than simply knowledge transmission, with learners playing a more active role in the learning process in terms of identifying their needs, planning their learning path and problem solving with relevance to their life experiences (McAuliffe *et al.*, 2008). Based on Knowles’ model, it is considered imperative to let learners know why something is important to learn, show learners how to navigate through information and relate topics to learners’ prior experiences. Furthermore, as learners will only learn when they are motivated to do so, they may need assistance in overcoming their existing beliefs and inhibitions surrounding learning (Conner, 2019).

However, Hartree (1984) questions the assumptions on which Knowles’ theory is based, identifying resemblances between his adult learning theory and the work of Dewey on progressive education, where Dewey relates some of the above assumptions to child learners. In a similar vein, Conner (2020) refers to andragogy as learner-centred education for people of all ages, arguing that many of the

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principles can equally be applied to child learning, critical of the fact that education today remains teacher-focused, despite the emergence of Dewey's learner-focused theory in the last century. While Knowles identifies adult learners as self-directed, learners' prior school experiences in teacher-centred education frequently creates an expectation of instructor guidance resulting in a sense of dependency rather than self-direction (Hartree, 1984). Nonetheless, despite the criticisms and debate surrounding andragogy, its principles are widely applied in adult learning situations (Hartree, 1984; McAuliffe *et al.*, 2008).

The BL design must incorporate andragogical principles in moving away from a teacher-centric approach to one that is more learner-centric where the learner works collaboratively with his teacher and peers in an adult learning environment. The reasons behind the teaching of subject matter must be clearly explained by the instructor to learners with a focus on the context of tasks rather than memorisation. The online environment can be exploited to shift the focus away from memorisation of facts towards higher order levels of thinking (Robinson and Hullinger, 2008). The instructor must have an awareness of the diverse learner backgrounds and experiences within the group in order to facilitate learners in building new learning. Instruction will need to provide a diversity of resources which encourage self-direction and motivate learners to explore and discover knowledge independently, which can be supported through the use of technology (Chickering and Ehrmann, 1996).

4.3.2 Heutagogy

A variety of economic, social, political and technological factors have come together to create a perfect storm of change in higher education. ... People are now lifelong learners, learning their profession throughout life, in chunks and when they need it. Added to that, the explosive advancement of technology in the last decade has made learning readily accessible at any time, everywhere and in any form. The convergence of these factors has left higher education institutions scrambling and institutional, teacher, and learner roles in a state of flux. Heutagogy, also called self-determined learning, offers a teaching and learning framework for navigating the oncoming storm (Blaschke and Hase, 2015, p. 75).

Heutagogy, while rooted in adult learning and teaching and built on constructivist and humanistic principles, extends the andragogical approach placing special emphasis on learner autonomy allowing students to progress to lifelong learners, emphasising the notion of students learning how to learn, while preparing them for

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the pace of innovation and changing structures in the workplace (Hase and Kenyon, 2000; Kenyon and Hase, 2001; Ashton and Newman, 2006; Blaschke, 2012; Msila and Setlhako, 2012; Blaschke and Hase, 2016). There exists a need for flexible learning practices and immediate learning due to our rapidly changing world which renders traditional education methods delivering discipline-based knowledge as unsuitable for the present day environment; therefore, a move beyond pedagogy and andragogy is vital. While andragogy provides a learner-focused education model for learners of all ages, there still exists a teacher-learner dimension; whereas heutagogy has evolved as a self-determined learning approach where responsibility for learning rests with the learner himself and there is open knowledge-sharing, ensuring the holistic development of the learner (Hase and Kenyon, 2000; Kenyon and Hase, 2001; Ashton and Elliott, 2007; Price, 2014), bearing resemblance to Bereiter and Scardamalia's (1989) 'intentional learner' who is capable of diagnosing and taking steps to address his own learning needs (Scardamalia and Bereiter, 1994).

Blaschke and Hase (2016) propose the following principles of heutagogy:

1. Learner-centred and learner-determined – Acknowledging the role of human agency in learning, the learner plays a central part in heutagogic environments taking responsibility for learning and assessment as a self-motivated and autonomous partner. Learning is experiential as learners are provided with resources with which to explore and facilitated in the use of collaborative learning, involving knowledge-sharing and team-based learning approaches. Teachers play a guiding role, in providing personalised formative feedback (Blaschke, 2012; Hase, 2016).
2. Capability – Characteristics of capable learners include: being able to use one's competences in novel situations, learner self-efficacy, communication, creativity, collaboration and positive values. Students develop the ability to be discerning about ideas and content (Hase, 2016).

The world is no place for the inflexible, the unprepared and the ostrich with its head in the sand, and this applies to organisations as well as individuals. Capable people are more likely to be able to deal effectively with the turbulent environment in which they live by possessing an 'all round' capacity centred on self-efficacy; knowing how to learn; creativity; the ability to use competencies in novel as well as familiar situations; and working with others (Kenyon and Hase, 2001, p. 4).

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3. Self-reflection and metacognition – reflection is holistic with the learner reflecting on what is learned along with the way it has been learned, while exhibiting an understanding of how it is learned, cultivating both cognitive and metacognitive skills (Blaschke, 2012).
4. Double-loop learning – learners are psychologically as well as behaviourally engaged. While reflecting on what is learned, they must also reflect on how this new knowledge and path to learning have influenced their values and belief system, developing metacognitive skills (Argyris, 1976).
5. Nonlinear learning and teaching – The path to learning is chosen by the learner rather than the teacher, so that learning is individualised and happens in a nonlinear format.

Blaschke (2012) identifies learner-centeredness, reflective practice and collaborative learning as design elements which are central to the development of a heutagogical learning environment.

4.3.2.1 *Learner-centredness*

Active learning techniques including discussion and peer critiques, have been recognised as one of the *seven principles for good practice in undergraduate education*:

Learning is not a spectator sport. Students do not learn much just by sitting in classes listening to teachers, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves (Chickering and Gamson, 1987, p. 4).

Autonomy can be promoted by designing learner-centred activities which encourage active learner participation and are sufficiently diverse to spark students' interest and motivation (Chan, 2001) resulting in more effective learning (Dickinson, 1995). The traditional pedagogy model where learners are “force fed the wisdom of others” (Hase and Kenyon, 2000, p. 3) is deemed inappropriate for the modern day workplace:

The cascade model of knowledge transfer, in which knowledge trickles down the hierarchical chain, seems increasingly out of place in a world where knowledge is spread laterally, informally and democratically (Price, 2014, p. 112).

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There is a need to move beyond pedagogy and andragogy to become “knowledge brokers” or heutagogues, as large-scale information access obliterates the “sole expert” in our knowledge society (Ashton and Newman, 2006; Blaschke and Hase, 2016). Heutagogy focuses on provision of resources rather than delivery of content; assessment is negotiated and forms part of the learning process rather than a terminal test of achievement, while the curriculum remains flexible. Learners are central to the learning process and the tutor or *learning leader* acts as a partner in the dynamic learning process, relinquishing control as they become co-learner (Blaschke and Hase, 2016; Hase, 2016):

A learning leader needs to be constantly finding out where learners ‘are at’ by asking the right kinds of questions. Not just questions that test knowledge but questions that find out what the learner is thinking, new understandings, new problems, and what is exciting them (Hase, 2016, p. 3).

Heutagogy is viewed by many as a suitable learning approach for use in the 21st century, enabling students to balance their competing life demands while acquiring the necessary skills for today’s global workplace. However, it is acknowledged that support must be provided to students in becoming autonomous as they mature and transition to a heutagogical approach (Boud, 1988; Higgs, 1988; McDevitt, 1997; Hase and Kenyon, 2000; Kenyon and Hase, 2001; Ashton and Newman, 2006; Ashton and Elliott, 2007; Hase, 2016), due to possible resistance from some students in adapting to “the increased degree of freedom they experience” (Hoffman and Ritchie, 1997, p. 100). Considerable teaching skills are required on the part of the learning leader in promoting learner autonomy. This involves remaining sensitive to the needs of learners by transferring responsibility for learning only gradually, as a learner-centred environment can prove uncomfortable for learners at first (Boud, 1988; Higgs, 1988; Cotterall, 1995; Taplin, 2000; Herrington, Oliver and Reeves, 2003; Blaschke and Hase, 2016). Canning (2010) advocates the importance of the initial use of traditional elements of pedagogy which are familiar to students from second-level education before transitioning to an andragogical or heutagogical approach in post-compulsory education, recommending a gradual progression path as illustrated in Figure 4.3.

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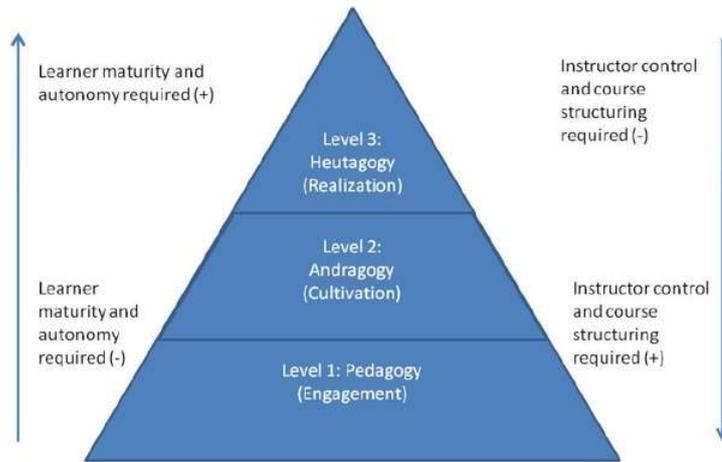


Figure 4.3 Progression from pedagogy to andragogy then to heutagogy (Blaschke, 2012, p. 60)
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At Level 1, students engage with pedagogy while the tutor builds learner confidence by supporting individual learner skills and strategies for knowledge construction. At Level 2, andragogy is cultivated by encouraging students to co-construct knowledge through contributing to discussions, eventually nurturing a desire in students to investigate their own learning thereby realising heutagogy (Canning, 2010; Blaschke, 2012).

Luckin *et al.* (2010) propose the idea of a learning continuum, entitled the *PAH continuum*, where the ‘teacher’ nurtures learning skills in the learner, namely cognition, metacognition and epistemic cognition, as he transitions from pedagogy through andragogy to heutagogy. Interestingly, Luckin *et al.* (2010) associates metacognition with adult education settings using andragogy and assigns heutagogy to research at doctoral level, where the focus is on epistemic cognition.

4.3.2.2 Reflection and metacognition

Wenden (1998) asserts that asking students to introspect (report on their thinking while doing a task) or retrospect (reflect back on their learning) through interviews or questionnaires raises awareness of learners’ strategies, allowing them to become autonomous. Wenden observes “without awareness [learners] will remain trapped in their old patterns of beliefs and behaviors and never be fully autonomous” (Wenden, 1998, p. 90). Therefore, to promote learner autonomy, learners must be encouraged to talk about their learning and the learning process (Higgs, 1988; Cotterall, 1995;

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Wenden, 1998). Brandt (2013, p. 111) views heutagogy as an empowering form of education where “the students’ self-determined studies lead to transformational experiences”. This echoes Mezirow's (1997) transformative learning theory, where autonomy is described as:

the understanding, skills and disposition necessary to become critically reflective of one’s own assumptions and to engage effectively in discourse to validate one’s beliefs through the experiences of others who share universal values (Mezirow, 1997, p. 9).

Transformative learning theory can be applied in adult education to develop socially responsible autonomous thinking which is necessary for modern day citizens and employees in a rapidly changing world. Transformative learning can be achieved through participatory and interactive discourse, peer learning through group work, critical reflection and use of instructional materials centred around problem-solving which reflect learners’ life experiences and are framed in terms of students’ current levels of understanding, while the educator acts as facilitator and co-learner.

The key idea is to help the learners actively engage the concepts presented in the context of their own lives and collectively critically assess the justification of new knowledge. ... They are frequently challenged to identify and examine assumptions, including their own (Mezirow, 1997, p. 10).

Transformative learning is at the heart of adult education as:

the individual become[s] a more autonomous thinker by learning to negotiate his or her own values, meanings, and purposes rather than to uncritically act on those of others (Mezirow, 1997, p. 11).

4.3.2.3 *Collaboration*

The traditional role of the higher education teacher as ‘expert’ in the classroom is replaced by a shared meaning-making approach where the students act as equal partners in communities of practice. Traditional teaching is teacher-dependent where knowledge is viewed as something finite with assessment centred on finding ‘right’ answers, contrasting with heutagogy where students formulate ideas and find their own answers, often collaboratively (Canning and Callan, 2010).

E-learning and the affordances of new technologies facilitate a heutagogical approach supporting lifelong learning, by enabling resource accessibility and social interaction, allowing continuous and collaborative learning in real time, thereby

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promoting learner autonomy (Hase and Kenyon, 2000; Robinson and Hullinger, 2008; Cançer, 2012; Blaschke and Hase, 2016).

Heutagogical approaches have been applied successfully in blended and flexible learning programmes by offering opportunities for self-directed learning and encouraging students to take control of their own knowledge acquisition (Ashton and Newman, 2006; Ashton and Elliott, 2007; Canning, 2010; Canning and Callan, 2010). In this BL design, heutagogy can be achieved by explaining the learning process and offering flexibility to give learners greater control over when and how they learn, to promote autonomous learning and thinking. Collaboration can be achieved in the learning environment through active discussion and knowledge exchange using online forums and f2f group work, with an increasing emphasis on these elements from cycle two onwards.

McAuliffe *et al.* (2008) argue that heutagogy is best suited to vocational education and may be impractical to implement in a credentialing institution due to the necessity to adhere to guidelines provided by internal and external stakeholders prohibiting the implementation of some heutagogical principles surrounding negotiable content and assessment. As curricular content in the financial accounting modules, being taught as part of the BL design, is governed by the requirements of accountancy certification bodies, the researcher's flexibility around learner negotiation of content and assessment is restricted. Nonetheless, the BL design will be influenced by heutagogical principles in order to enable learners to take active rather than passive roles, encouraging learners to work collaboratively and become involved in carving their own learning path. This places them on track to becoming autonomous learners through provision of a diversity of learning resources to promote learner freedom and choice, coupled with a reduction in class contact hours. Furthermore, the researcher is aware that students are moving from a teacher-centric second-level education system, therefore some pedagogical principles will continue to be applied, along with instructor support to facilitate learner transition and adaptation to new learning approaches influenced by andragogical and heutagogical principles. Support will take place in the form of *scaffolding* learners (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976) in regulating their

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own learning in the online environment, by using techniques to promote interaction among students, and monitoring online activities.

Opportunities for reflection must be provided as part of the learning and assessment process in order to promote metacognitive awareness among students. In particular, students will be asked to reflect on what and how they learned, specifically in relation to the ratio analysis topic continuous assessment task, following a cycle two design change.

4.4 Collaboration

No one is an island; no one knows it all; collaborative learning is not just nice, but necessary for survival. This interdependence promotes an atmosphere of joint responsibility, mutual respect, and a sense of personal and group identity (Brown, 1994, p. 10).

Social constructivism, proposed by Vygotsky, attaches significance to the influence of social interaction, shared conversation and culture on learning (Woo and Reeves, 2007), based on his belief that from the day they are born, children learn and develop through their relationships with others. Learner development proceeds from socio-centric to egocentric as they share their experience with others before achieving full mastery themselves (Vygotsky, 1978). Vygotsky attaches significant importance to the role of adults in strengthening the child's self-directed learning. Vygotsky's child knows that "she can learn vicariously by listening to what others say about what interests her", trusting that more experienced experts can tell her things which she may not be able to experience directly by herself (Ackermann, 2004, p. 22).

Indeed, Dewey (1938) viewed teacher guidance as a valuable source of assistance in promoting learning gains for students. The teacher must have an awareness of the needs, abilities, and past experiences of the learners and may offer advice and hints which guide the learners in reaching conclusions and forming collaborative solutions through a "process of social intelligence" (Dewey, 1938, p. 78).

4.4.1 Scaffolding

The term *scaffolding*, having been applied originally by Luria (Luria and Vygotsky, 1930) and Bernstein (1947) in relation to motor development, was later transferred by Wood, Bruner and Ross (1976) to the teaching and learning process, to describe

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how an expert may assist a novice in carrying out a difficult task. This scaffolding may be achieved by initially ‘controlling’ the task elements which are beyond the learner’s competency, allowing him to concentrate on the elements that are within his ability level, eventually facilitating successful completion of the task. It is based on the premise that in order for the learner to solve a problem independently, he must first recognise the solution to that problem type. Furthermore, the authors assert that the scaffolding process can achieve more for the learner than assisted task completion, or being left to complete the task on his own. The tutor plays a crucial role in the scaffolding process in devising the most effective instruction, considering the nature of the task and the characteristics of the learner.

Well executed scaffolding begins by luring the child into actions that produce recognizable-for-him solutions. Once that is achieved, the tutor can interpret discrepancies to the child. Finally, the tutor stands in a confirmatory role until the tutee is checked out to fly on his own (Wood, Bruner and Ross, 1976, p. 96).

Shvarts and Bakker (2019, p. 18) explicate the concept of scaffolding as “a temporary adaptive support that forms a functional system with the learner” where the child and adult adapt iteratively to one another while solving a learning task. Under constructivism, scaffolding can take place through (Soloway *et al.*, 1996):

- Expressing the task as a series of steps, to reduce its complexity, thereby reducing cognitive overload.
- Relating new information to previously acquired information, through use of examples and multiple representations.
- Use of relevant and meaningful tasks, which will motivate the learner to actively engage.
- Encouraging reflection and metacognitive awareness while making the cognitive benefits of the activities explicit for learners.

Findings of a study by Herrington and Oliver (2000, p. 42) suggest that:

students benefit from the opportunity to articulate, reflect, and scaffold with a partner, and that they will seek these opportunities covertly if they are not available by design.

Scaffolding can be deployed in a BLE within an accounting module through the use of CLT in instructional resource design (Sithole, 2019), allowing learners progress at their own pace using “cascaded problem solving” which commences with easy

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questions before progressing to more complex, challenging problems (Holcomb and Michaelsen, 1996, p. 283), provision of a grading rubric to enhance student confidence, understanding and learning outcomes on written assignments (Abraham and Jones, 2016; Schaefer and Stevens, 2016; Curtis, 2017; Miihkinen and Virtanen, 2018) and use of orientation activities before new learning approaches involving educational technology are introduced (Williams, Horner and Allen, 2019).

4.4.2 Zone of proximal development

The concept of the *zone of proximal development* came to the fore since 1978 following the publication of an edited collection of Vygotsky's writings (Vygotsky, 1978). Vygotsky (1978) defines the zone of proximal development (ZPD) as the distance between the child's actual development, as evidenced by his ability to problem-solve independently, and the potential development level he can achieve through problem solving with assistance from an adult or more capable peers, asserting that:

what is in the zone of proximal development today will be the actual developmental level tomorrow – that is, what a child can do with assistance today she will be able to do by herself tomorrow (Vygotsky, 1978, p.87)

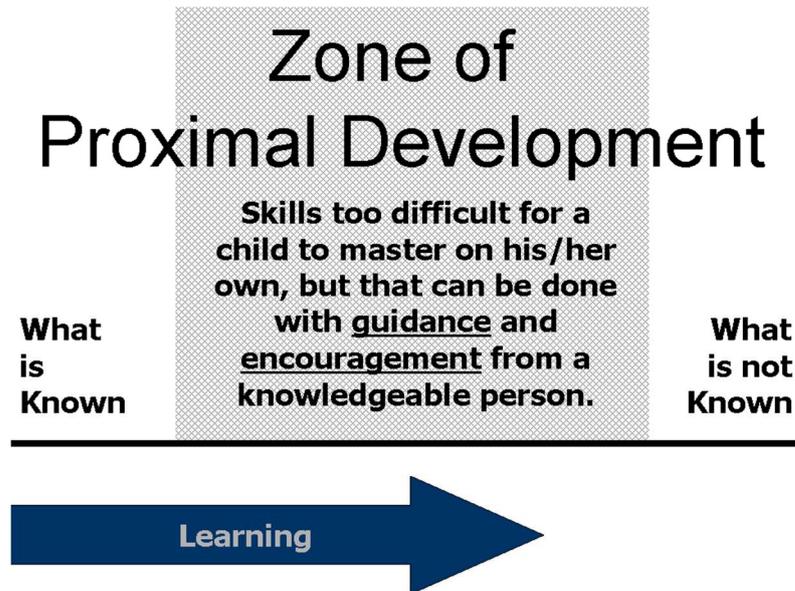
The child's 'actual development level' refers to the developmental level already achieved by the child and corresponds with tasks which the child can complete on his/her own. Vygotsky (1978) argued that 'good learning' is that which aims at developmental levels which children have not yet reached, as the child's capabilities can be extended when he/she imitates others during group activities or with adult assistance. Therefore, in order for learning activities to be effective they should be aimed at the unrealised developmental level of the child, as learning is a necessary precursor of development.

Indeed, can it be doubted that children learn speech from adults; or that, through asking questions and giving answers, children acquire a variety of information; or that, through imitating adults and through being instructed about how to act, children develop an entire repository of skills? Learning and development are interrelated from the child's very first day of life (Vygotsky, 1978, p. 84).

Holton and Clarke (2006) view scaffolding as something that allows "learners to reach places that they would otherwise be unable to reach" (p.129) asserting that the concept was implicit within Vygotsky's writings. The teacher guides and supports

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students' efforts, working within the learner's ZPD to bridge the gap between the student's current performance level and higher performance levels that are just out of reach (see Figure 4.4). However, scaffolding does not provide a simplified learning task, instead it keeps the task constant "while simplifying the learners' role through the graduated intervention of the teacher" (Greenfield, 1984, p. 119) with the main aim of scaffolding being to transfer responsibility for a task from the teacher to the learner (van de Pol *et al.*, 2015).



*Figure 4.4 What is the zone of proximal development? (McLeod, 2019)
[Reprinted under a Creative Commons license]*

The BL intervention for introductory accounting must incorporate scaffolding through the provision of an instructions handout clearly detailing the timing and content of learning and assessment tasks, delivery of content in step-like fashion, use of multiple examples and offering opportunities for learners to work together to obtain scaffolding from their peers. Students must be offered opportunities for reflection in order to build metacognitive awareness.

4.4.3 The role of community

'Community' features strongly in today's educational discourse, with increasing emphasis on changing both teacher and student roles where teachers actively guide students as they discover knowledge and students participate in critical inquiry taking responsibility for and reflecting on their own learning. This is in stark contrast to the didactic teacher and passive learner roles evident in the traditional

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classroom and must be fostered within the learning environment (Brown, 1992; Rogoff, 1994; Brown and Campione, 1995; Pardales and Girod, 2006).

McMillan and Chavis (1986) define community as:

a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together (p. 9).

Advances in communications technologies have determined that “communities are now defined in terms of social relationships rather than in terms of space” (Hiltz and Wellman, 1997, p. 45). Furthermore, by integrating technology with pedagogy, the development of learning communities is enabled and the learning environment can be transformed and extended outside of the conventional f2f classroom (Richards, 2006). The importance of community in developing critical thinking and problem solving skills has also been well documented (Peterson, 1992; Garrison, Anderson and Archer, 2000; Lipman, 2003).

Rovai (2002b, p. 322) applies the notion of community in an educational context, viewing a classroom community “as a social community of learners who share knowledge, values, and goals”. He considers classroom community as containing two elements: “feelings of connectedness among community members and commonality of learning expectations and goals” (Rovai, 2002b, p. 322).

Connectedness refers to the friendship that exists among learners fostering feelings of safety and trust, so that learners feel comfortable seeking help from one another. Learning is accepted as the group goal of the classroom community and is achieved through active knowledge construction (Rovai, 2002a, 2002b).

According to Rovai, (2002a, 2002b) a sense of community can foster interaction in a class group leading to feelings of connectedness among class members resulting in increased motivation, augmented cognitive learning, higher student satisfaction and group co-operation, and improved student retention. He developed a Classroom Community Scale which can be used in both online and traditional teaching settings to understand sense of community in classrooms and determine the support provided to learners from learner-learner and learner-instructor relations. The scale may be used to inform course design and delivery changes to promote classroom community and reduce feelings of isolation (Rovai, 2002a). Sense of classroom community can

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be enhanced in online education by educators' use of interactive teaching approaches embodied in innovative course design and continual facilitation of discussions (Rovai, 2001).

Wegerif (1998, p. 48) notes that:

forming a sense of community where people feel they will be treated sympathetically by their fellows, seems to be a necessary first step for collaborative learning. Without a feeling of community people are on their own, likely to be anxious, defensive and unwilling to take the risks involved in learning.

Kreijns, Kirschner and Jochems (2003, p. 342) attach utmost importance to community in creating a valued learning experience, adapting the formula put forward by Gilroy (2001) as follows:

$$\text{Valued Learning Experience} = F [\text{Pedagogy, Content, Community}]$$

The authors argue that in order to have a valued learning experience, all three variables must exist together, appropriate teaching pedagogy must be employed, suitable content to be learned and a functioning learning community – if one is absent the function equates to zero.

4.4.3.1 Communities of inquiry

Based on previous work by Charles S. Peirce and John Dewey, Lipman (1991) applies the concept of community of inquiry to the educational setting whereby critical thinking can be facilitated to result in deep learning. Lipman (2003, p. 20) construes a classroom as a type of community of inquiry where students and teachers engage in “questioning, reasoning, connecting, deliberating, challenging, and developing problem-solving techniques.” These ideas were expanded and applied in online learning settings to explore how online communication can facilitate higher-order thinking skills through the Community of Inquiry (CoI) model which was developed by Garrison, Anderson and Archer (2000). The CoI model acts to provide a deep and meaningful learning experience using three interdependent elements - social, cognitive and teaching presence, as depicted in Figure 4.5. These three elements are essential to a critical community of inquiry for educational purposes and have a direct impact on the quality of the educational experience and learning outcomes (Garrison, Anderson and Archer, 2000).

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Social presence is “the ability of participants to ... communicate purposefully in a trusting environment and develop inter-personal relationships by way of projecting their individual personalities” (Garrison, 2009, p. 352). Cognitive presence is “the extent to which the participants ... are able to construct meaning through sustained communication” (Garrison, Anderson and Archer, 2000). Teaching presence is “the design, facilitation and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes” (Anderson *et al.*, 2001, p. 5).



Figure 4.5 *The Community of Inquiry model (Garrison, Anderson and Archer, 2000)*
[Reprinted with permission]

While initially the CoI model was applied in online learning contexts, Vaughan and Garrison (2005, 2006b, 2006a) extended the model to a faculty development context using a blended learning format which incorporated both face-to-face and online learning with the aim of moving teaching and learning away from passive lectures towards a more engaged, collaborative approach. Using an *Inquiry Through Blended Learning* (ITBL) program, the authors’ aim was:

to create dynamic and vital communities of inquiry where students take responsibility to construct meaning and confirm understanding through active participation in the inquiry process (Vaughan and Garrison, 2006a, p. 68).

Vaughan and Garrison (2005) identify the “initiation of meaningful learning and achievement of cognitive outcomes (i.e., cognitive presence)” as the purpose of a

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community of inquiry, stressing the importance of both teaching presence, in the form of structure and leadership, and social presence in achieving critical thinking among students. Results from their study reveal that blended learning can enhance social presence, with face-to-face sessions playing a role in creating a human connection while online communication assists in growing and developing the community. They also emphasise the importance of teaching presence in establishing a blended community of inquiry, due to its role in fully integrating the face-to-face and online elements, supporting students to adjust to the BLE and acting to sustain the community (Vaughan and Garrison, 2006a).

4.4.3.2 *Communities of practice*

Lave and Wenger (1991) denote *communities of practice* as groups formed by people with similar interests, where active participation takes place and individuals learn from one another by interacting on an ongoing basis. This community is different from a geographical community or a community of interest, as it involves a shared practice. It is organised around a specific knowledge area which has significance for its members and around which relationships develop and communities build up over time.

Learning is a social process which is part of, rather than separate from, our everyday lives and is facilitated through social participation in a community, as newcomers learn from others moving from “legitimate peripheral participation” into “full participation”. When people join communities at the beginning, they participate and learn on the periphery, moving to the centre of the community over time as they gain competence. The learning is described as situated, as it depends on the context or situation in which it occurs (Lave and Wenger, 1991; Meessen *et al.*, 2011).

According to Wenger, McDermott and Snyder (2002), communities of practice have three core elements:

1. A domain – which is a shared area of interest and competence among members.
2. A community – a social dimension whereby members engage in joint efforts, sharing information in pursuit of the domain.

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3. A practice – whereby members develop a shared repertoire of communal resources, including experiences, stories and tools, that define their practice area or profession.

The knowledgeable experts within communities of practice model desired behaviour, rather than performing a teaching function. Furthermore, community members adopt different roles depending on their knowledge and experience, so there is less of a distinction between student and teacher roles, when compared with a community of inquiry (Powell, 2007).

While communities of practice are evident in apprenticeship and workplace learning settings where new members learn from more knowledgeable experts, the concept has been more recently seen as a valuable tool in other educational settings. In addition, sharing of practice, resources and ideas can take place seamlessly within online communities of practice without time and place restrictions, through the use of technology-based platforms, tools, features and configurations (Kirschner and Lai, 2007; U.S. Department of Education Office of Educational Technology, 2011).

4.4.3.3 Knowledge building communities

Constructionism extends the constructivist theory of learning to include the idea that learning is most effective when the learner is engaged in the construction of a meaningful product (Papert and Harel, 1991). Resnick (1996) further extends constructionism by introducing the concept of distributed constructionism whereby student collaboration on design and construction activities can be facilitated through the exploitation of advanced communications media. This can allow for development of knowledge-building communities where groups of people work collaboratively to construct and expand knowledge (Scardamalia and Bereiter, 1991). Distributed constructionism allows knowledge-building communities to further develop through the design and construction of meaningful artefacts.

Schools should aim to become knowledge building communities, where learners work together to produce knowledge, which can be facilitated by using technology to extend the discourse outside of school hours (Scardamalia and Bereiter, 1994). Technology and teaching strategies are important elements, but re-structuring of schools into communities which build their own knowledge is required to allow

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students to become collaborative knowledge builders. Scardamalia and Bereiter (1994) advance computer-supported intentional learning environments (CSILE) as a means for reshaping classroom discourse to support knowledge building outside of the classroom, associating the following characteristics with that discourse:

1. Focus on problems and depth of understanding, rather than on knowledge topics.
2. Decentralized, open knowledge building, with a focus on collective knowledge where participants interact and respond to one another's work constructively. Experts participate actively while less knowledgeable students have a role to play in pointing out difficulties or areas needing further explanation. The aim is to create a climate which promotes understanding and learning.
3. Productive interaction within broadly conceived knowledge-building communities.

In knowledge building classrooms, students work on authentic problems and engage in the democratic exchange of knowledge and ideas, leading to knowledge transformation and the advancement of understanding. Furthermore, these practices can be supported through the use of technology (Scardamalia, 2002).

The researcher was keen to cultivate knowledge-building skills among learners, cognisant of the need to prepare accounting students for future work roles in a knowledge society; thus, the prospect of fostering a knowledge building community resonated strongly with her:

the major advantage students in a knowledge-building classroom carry with them into a knowledge society: ability and willingness to take on responsibility for the collective solution of knowledge problems (Scardamalia, 2002, p. 22).

The researcher believes that a community of practice model would have less relevance within an introductory accounting group, due to the distinct teacher/student roles that exist within the first year classroom. While the researcher is keen to build higher order thinking skills associated with a community of inquiry, in relation to encouraging student collaboration the use of a CSILE is deemed as more appropriate to form a knowledge building community within the group. Furthermore, influences of Garrison, Anderson and Archer's (2001) CoI model and

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its links to Moore's (1989) three types of interaction are considered later in this chapter under the *Interaction* theme.

Based on the work of Scardamalia and Bereiter (1994), the researcher plans to incorporate opportunities for students to build knowledge outside of f2f contact hours. It will be important that the BL design embodies an asynchronous discussion element, modelled on the CSILE, which will facilitate peer commentary and act as a “communal space where they could read each other’s entries and engage in reflective activity” (Scardamalia, 2002, p. 5). It is anticipated that this may nurture higher levels of reasoning, allowing students time to think and reflect, without the pressure of instant response which is associated with oral discourse (Scardamalia and Bereiter, 1994; Garrison, Anderson and Archer, 2000). The asynchronous feature will eliminate problems associated with turn-taking in oral conversation, as contributions can be made to the forum at any time, providing a more democratic form of conversation. In addition, the forum will provide a written record of the discussion progression over time. Students will have an opportunity to express and share diverse ideas using the forum, with less knowledgeable students conceivably learning from more expert peers (Scardamalia and Bereiter, 1994; Swan, 2002).

In this way, student discourse patterns could be altered to allow them to assume “higher levels of agency” (Scardamalia and Bereiter, 1991) while also engaging students in “the collaborative solution of knowledge problems, in such a way that responsibility for the success of the effort is shared by the students and teacher instead of being borne by the teacher alone” (Scardamalia, 2002, p. 8). This would allow students to work collaboratively as part of a knowledge-building community, while also progress towards achieving learner autonomy, which relates to another theme within this research study as discussed earlier in this chapter.

4.4.3.4 Promoting a sense of community in the f2f setting

The most effective way to develop affinity within class groups is to arrange activities which promote discussion or group work among students so that they get to know each other which may then extend to out-of-class relationships, helping students to become friends rather than just classmates. Keeping students together as a cohort develops class cohesion and increases a sense of belonging. Relationships with

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teaching staff can promote attendance and class cohesion, placing relationship development within the teacher's role remit as it impacts on achievement of learning outcomes (Kember, Lee and Li, 2001).

Many teachers are less inclined to use collaborative team work in their classrooms having being trained using traditional teaching approaches with a resultant lack of experience of collaborative approaches and may resist use of collaboration due to changing teacher roles, time pressures to cover the course material and difficulties associated with assigning grades to students. While pair work is straightforward to arrange, organising larger groups may require innovative planning and re-configuration of the class seating layout (Blumenfeld *et al.*, 1996; Kearsley and Shneiderman, 1998). Shneidermann (1998) advocates use of collaborative group work to increase student engagement, arguing that while covering the material during the lecture, "lecturers have little assurance that students are learning anything" and perhaps collaborative group work which promotes greater student engagement may allow students learn better by "discovering the material for themselves" (p. 37). In addition, research on part-time students showed evidence that promoting a sense of belonging can lead to higher quality learning outcomes and increased student retention (Kember, Lee and Li, 2001).

4.4.3.5 Promoting a sense of community in the online setting

Active and collaborative learning can be facilitated in the online classroom as technology enables multichannel communication and stimulates higher order thinking through the use of asynchronous networks where the learner has time to reflect and think critically (Robinson and Hullinger, 2008) while also providing a "public archive of conversations" (Blumenfeld *et al.*, 1996, p. 39).

Instructors must facilitate discourse through reading and commenting on participant postings and encouraging reticent participants while curbing domineering ones so that students are engaged and motivated to learn as part of the online community. Identification of areas where students differ as well as concur can be used to advance learning (Anderson *et al.*, 2001; Salmon, 2011). Research has shown that students reported higher levels of learning and 'connectedness' when educators played an active role in furthering discussions online (Shea, Li and Pickett, 2006).

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Salmon (2011) developed a five-stage model which outlines a strategy for e-moderators to follow to promote scaffolding in online collaborative learning environments. Strategy recommendations, which informed design changes in cycle two, are as follows:

- Stage 1: Access and motivation – advises providing detailed instructions to ensure ease of access and a helpline for access problems, while also motivating participants by using individual welcomes, encouraging them to log on regularly and selling the benefits of interacting with others for learning. The e-moderator should also acknowledge anxiety and lack of confidence in participants and provide ‘hand-holding’ for individuals if required. The lecturer can assist in creating an online ‘presence’ by acknowledging the arrival of each participant in the conference and asking them to post a message early in the course. Mentioning participants by name in summaries and individual messages can act as a motivating factor. Groups of smaller size work best for online conferences, as they minimise the information overload which may occur in a larger forum (Hiltz and Wellman, 1997; Garrison, Anderson and Archer, 2000; Salmon, 2011). Active participation can be promoted by selling the benefits of conferencing for learning, understanding of course content and acquisition of life skills as well as linking participation to assessment grading
- Stage 2: Socialisation – re-assuring students that all contributions are welcome, regardless of spelling error or typos will encourage participation, along with praising contributions and efforts, rather than just outcomes.
- Stage 3: Information exchange – the lecturer, visiting the conference often as an equal participant, can stimulate the debate by offering ideas and stimulating questions (“sparks”) rather than answers.
- Stage 4: Knowledge construction – posing insightful questions will encourage participants to contribute, together with use of weaving and summarising comments by the lecturer. The lecturer can post a “weaving” message where she uses gaps in discussion to generate more discussion focused on filling those gaps, drawing out themes that may otherwise escape attention, often linking previous postings. “Summarising” messages can be used when a topic has been sufficiently discussed to draw together all the

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main themes and correct any misconceptions, usually signalling the end of a specific discussion. It is imperative to monitor the forum to ensure that one or two individuals do not dominate the conversation and to reward evidence of knowledge building.

- Stage 5: Development – identifying students with good online skills and communication styles and encouraging them to support others can facilitate a broader level of participation.

Social interaction, which is crucial to collaboration and group learning, must be designed into the online environment rather than assuming that the immediacy of the environment will automatically cause interaction to take place; furthermore, the use of non-task contexts can ensure the environment serves a social as well as functional purpose, helping to form learning communities (Kreijns, Kirschner and Jochems, 2003).

A BL model in introductory accounting must aim to foster a sense of community through both the f2f and online settings. Collaborative group activities must be deployed during f2f classes to allow students opportunities for scaffolding and peer learning, while also allowing them to get to know one another. An online discussion forum activity can be deployed to facilitate knowledge-building by students, while forum participation can be supported and encouraged through use of e-moderating strategies, as promulgated by Salmon (2011).

4.5 Engagement

Engagement is difficult to define operationally, but we know it when we see it, and we know when it is missing. Students are engaged when they devote substantial time and effort to a task, when they care about the quality of their work, and when they commit themselves because the work seems to have significance beyond its personal instrumental value (Newmann, 1986, p. 242).

Engagement plays an important role in ensuring effective student learning while also fostering a desire for lifelong learning (Kearsley and Shneiderman, 1998; Kuh, 2003) with considerable evidence pointing to the fact that student engagement contributes to positive learning outcomes at tertiary level (Trowler and Trowler, 2010).

4.5.1 Engagement with technology

Technology can have a positive influence on student engagement once it is integrated into the curriculum, is used based on suitability and not just availability, and reflects students' needs and is adapted to their interests and ability levels (Sandholtz, Ringstaff and Dwyer, 1994).

Csikszentmihalyi (1990) proposes flow theory, where flow is the circumstance “in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it” (p. 4). Nakamura and Csikszentmihalyi (2014) identify the following conditions as necessary to promote a state of flow:

- Engaging in challenges or opportunities which match one's capabilities. If the challenge presented is greater than an individual's skill level, anxiety occurs, whereas if the skill level is greater than the challenge, boredom results.
- Clear proximal goals and instant feedback on one's performance.

When one is in a state of flow, attention becomes focused entirely on the challenge one is confronted with, so that a loss of self-consciousness occurs and the passage of time becomes distorted. The individual continually seeks further flow experiences due to the intrinsically rewarding nature of being in a state of flow. As individuals gain skill and competency, they need to experience more complex challenges in order to continue to experience flow (Csikszentmihalyi, 1990).

O'Brien and Toms (2008) examined user engagement with technology based on theory constructs such as flow, aesthetic experience, play and information interaction, advancing the following definition of engagement based on their research:

Engagement is a quality of user experiences with technology that is characterized by challenge, aesthetic and sensory appeal, feedback, novelty, interactivity, perceived control and time, awareness, motivation, interest and affect (p. 949).

The authors assert that engagement has similarities with flow displaying characteristics such as: focused attention, feedback, control, interactivity and intrinsic motivation. However, differences exist, for example, engagement may be

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encountered in the absence of intrinsic motivation, and engaging experiences can occur without the loss of awareness of the outside world associated with flow (O'Brien and Toms, 2008). Their findings reveal that user engagement did not take place or was cut short where technology was perceived by users as too easy or too difficult to use. Furthermore, systems which are usable may not always be engaging. It is acknowledged, however, that user engagement can be challenging to define, design for and assess (O'Brien, Cairns and Hall, 2018).

While the researcher is cognisant of the fact that multimedia resources must be engaging in order for learning to take place (Webster and Ho, 1997), she is aware of the criticisms of Dick (1995) that one must retain instructional focus when designing resources using constructivist approaches to ensure that creativity does not take the place of effectiveness resulting in “mere edutainment or infotainment” (p. 10).

As learners on the programme are likely to have varying levels of prior accounting knowledge, the BL design must provide a set of graded challenges to enable learners with diverse skill levels to reach a state of flow. These graded challenges will also accommodate learners as their skill levels increase to allow learners to constantly maintain a state of flow. Furthermore, online resources employed as part of the BL design must be easy to use in order to stimulate learners' initial engagement coupled with in-built challenges of appropriate standard to promote sustained task engagement.

4.5.2 'Time on task' as a measure of engagement

The Irish Survey of Student Engagement (ISSE) focuses on students' engagement with their learning environments based on two elements: the time and effort students put into their studies as well as resources deployed and opportunities offered by institutions to encourage student participation in learning activities (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2017a) in a similar way to the National Survey of Student Engagement (NSSE) in the USA with its focus on the educational practices which colleges employ to enhance student learning (Kuh, 2003; Robinson and Hullinger, 2008). Attention has been drawn to the narrow focus of the NSSE as a measure of engagement, particularly as it concentrates on elements within an institution's control without consideration of

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student motivation or emotions and does not guarantee they will experience classes which engage them in authentic learning activities (Kuh, 2003; Kahu, 2013) to arouse their desire for learning:

when learning is divorced from doing a meaningful task – as are many arbitrary, decontextualized activities in the classroom – then learning becomes just another chore, low on the priority stack (Soloway, Guzdial and Hay, 1994, p. 40).

While Kuh (2003) values ‘time on task’ as a measure of engagement, Sandholtz, Ringstaff and Dwyer, (1994) describe time on task measures as “extremely limited” advocating taking a broader long-term view of student engagement to inform teaching practices. Furthermore, ‘time on task’ may not be a reliable measure due to the influence of a novelty factor when new technologies are introduced into the learning environment (Sandholtz, Ringstaff and Dwyer, 1994). Nonetheless, Chickering and Gamson (1987) emphasise the importance of ‘time on task’ as one of the *seven principles of undergraduate education*, stating that “time plus energy equals learning” (p. 4) suggesting that providing students with opportunities to integrate their studies into the rest of their lives can help them make efficient use of their time, while it is acknowledged that technology can increase time on task by saving commuting time and allowing better access to learning resources (Chickering and Ehrmann, 1996).

By offering a reduced f2f element as part of the BL design, it is anticipated that this will allow for increased time on task by students working in an independent fashion outside of class hours.

4.5.3 Engagement – a broader perspective

Kahu (2013) explores the concept of student engagement in higher education propounding a conceptual framework, subsequently refined by Kahu and Nelson (2018), which recognises the complexity and multi-level nature of student engagement and incorporates elements both within and outside of the institution’s control (see Figure 4.6).

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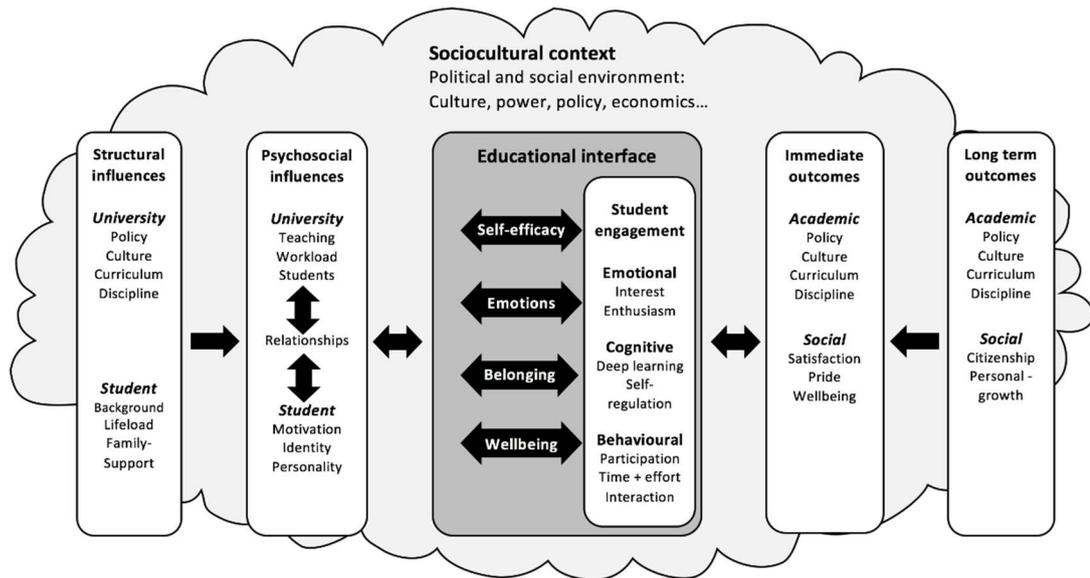


Figure 4.6 Refined conceptual framework of engagement (Kahu and Nelson, 2018, p. 64)
 [Reprinted with permission]

While student engagement is presented at the centre of the framework and is evidenced in emotional, cognitive and behavioural indicators, a much broader view of engagement is proposed. Rather than seen as a fixed inner state, the student experience is acknowledged as rooted within the socio-cultural context, impacted by the culture of the educational institution. Engagement is influenced by the psychosocial factors and structural influences of the educational institution, the student himself as well as relationships formed within the learning community. Kahu (2013) conceives *lifeload* as the combination of the student's many life responsibilities which may include dependants, health, part-time employment, finances as well as education.

The framework portrays both the immediate and long-term consequences for the student of engagement recognising that engagement has wider influences on students and society than mere learning of content (Zyngier, 2008). The entire framework is embedded within the political and social environment in recognition of the importance of socio-cultural influences on the whole engagement process. Students' self-efficacy, emotions, sense of belonging and well-being influence student engagement, learning and success within the educational interface. Thus, aligning learning tasks with student skills, interests and life experiences will allow students to engage emotionally and cognitively with subject content.

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Bearing in mind the above research by Kahu, the researcher is aware that there are many other factors impinging on the engagement of the student, apart from the quality or learner-centredness of the online resources. The BL design must offer a flexible course delivery approach which considers the varying influences on a student's engagement levels, including pressures from lifeload. The BL intervention and tasks therein must be designed so as to allow students flexibly manage their life pressures without placing unreasonable demands on student time outside-of-class hours; therefore, a reduction in f2f class contact hours will be employed to allow learners the freedom to engage with the online learning resources. The researcher is cognisant of the fact that the research is being conducted with first year students the majority of whom are embarking on tertiary education for the first time; therefore, the culture shock associated with starting college may act as a barrier to engagement for some students (Kahu, 2013). Therefore, it will be necessary to offer orientation activities to support online resource usage, ensure availability and ease of access to the lecturer outside of f2f hours, while also providing supports and learning activities to help to build learning community relationships within the class group.

4.5.4 Engagement through authenticity

Engagement theory, put forward by Kearsley and Shneiderman (1998), acts as a conceptual framework for technology-based learning and teaching and is premised on the idea that for effective learning to occur, “students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks” (p. 20) aligning itself with constructivist, situated learning, experiential and self-directed learning theories.

Engagement theory proposes that technology can be deployed in authentic contexts to invoke engagement of learners using interaction through group activities, as opposed to individual delivery of instruction, facilitating interaction and providing access to information. The theory is based on a Relate-Create-Donate philosophy (Kearsley and Shneiderman, 1998; Shneiderman, 1998):

1. Relate – collaborative learning allows students experience diversity, increases their motivation to learn and facilitates problem solution through

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verbalising and clarification of problems, which is necessary for their future careers.

2. Create – learning is problem-based and creative, fulfilling a specific purpose and allowing self-control for learners.
3. Donate – projects have an authentic focus, allowing students make a relevant contribution while learning, thereby increasing motivation.

Collaborative learning is a skill which will benefit learners in their future careers (Shneiderman, 1998); however, it can present levels of uncertainty for instructors in facilitating collaborative activities as well as for students in gaining skills to work together effectively. Projects which have an authentic focus allow students to acquire workplace relevant knowledge and skills, leading to higher levels of satisfaction for students when compared to working on artificial problems; however, it places an onus on the instructor to provide evaluative criteria to students in advance (Kearsley and Shneiderman, 1998). Barab, Squire and Dueber (2002) assert that authenticity lies in the interactions between the individual, the task and the community alluding to the challenge for instructional designers in designing authentic tasks in realistic contexts.

Use of authentic tasks encourages students to connect their learning with past experiences so that they can construct their own knowledge while identifying the real-life use of these concepts (Woo and Reeves, 2007), resulting in knowledge gained being more effectively applied when solving future real-life problems (Herrington and Oliver, 2000). Herrington, Oliver and Reeves (2003, p .61) offer guidance to educators in constructing authentic learning settings arguing that while students may initially display resistance, such contexts encourage a “willing suspension of disbelief” among learners which eventually leads to higher motivation and cognitive engagement, citing Laurel (1993) who likened the willing suspension of disbelief to engagement:

Engagement is what happens when we are able to give ourselves over to a representational action, comfortably and unambiguously. It involves a kind of complicity (Laurel, 1993, p. 115, cited in Herrington, Oliver and Reeves, 2003).

Herrington and Oliver (2000) propose a framework for authentic settings identifying ten characteristics of authentic learning environments and suggesting that students’ self-learning and self-regulation skills can be fostered within these learning settings:

Theoretical Framework

1. Authentic activities have real world relevance based on real world tasks rather than decontextualized classroom tasks.
2. Authentic activities are ill-defined and open to multiple interpretations, requiring students to define the tasks and sub-tasks need to complete the activity.
3. Authentic activities comprise complex tasks requiring a significant investment of time and intellectual resources.
4. Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources.
5. Authentic activities provide the opportunity to collaborate.
6. Authentic activities provide learners with an opportunity to reflect on their learning.
7. Authentic activities can be integrated and applied across different subject areas and lead beyond domain specific outcomes.
8. Authentic activities are seamlessly integrated with assessment reflecting real world assessment rather than an artificial assessment removed from the nature of the task.
9. Authentic activities create polished products valuable in their own right rather than as preparation for something else.
10. Authentic activities allow competing solutions and diversity of outcome rather than applying procedures to obtain a single correct response. (Herrington and Oliver, 2000; Reeves, Herrington and Oliver, 2002; Herrington, Oliver and Reeves, 2003)

The BL design must incorporate authentic activities in order to engage learners in a meaningful way; however, the researcher is cognisant of the challenge posed when incorporating authentic learning for first-year students studying accounting at an introductory level. This will involve the re-design of tasks, informed by the work of Herrington, Oliver and Reeves (2003) along with incorporating practical use of workplace digital tools and use of authentic continuous assessment tasks accompanied by evaluative criteria in the form of a grading rubric. As some resistance may be displayed towards this new type of learning, due to students being accustomed to playing a passive role in previous education settings, it will be important to implement both teacher and peer scaffolding strategies to encourage reluctant students to buy into this novel learning environment (Herrington, Oliver and Reeves, 2003).

4.6 Interaction

Interaction ... is the feeling that closeness and mutual benefit result from interacting with others. Interaction is either task-driven or socio-emotional in origin. ... Task-driven interaction is directed toward the completion of assigned tasks while socio-emotional interaction is directed toward relationships among learners. ... Accordingly, interaction is an important factor that supports both the community-building process and learning (Rovai, 2001, p. 35).

Theoretical Framework

Communication skills have been deemed of paramount importance to accounting graduates entering the workplace (Albrecht and Sack, 2000; Crawford, Helliard and Monk, 2011; Gray and Murray, 2011; Tempone *et al.*, 2012; Hagel, 2015).

Considering that a lack of interpersonal contact has been identified as a major criticism of online learning approaches among accounting graduate employers (Tabatabaei *et al.*, 2014; Kohlmeyer, Seese and Sincich, 2015; Grossman and Johnson, 2016, 2017; Mauldin *et al.*, 2018), interaction, identified as key to any experience which aims to foster learning (Dewey, 1938; Vygotsky, 1978), is recognised as a fundamental element when deploying a BL approach in introductory accounting.

4.6.1 Moore's (1989) three types of interaction

Moore (1989) identified three types of interaction – learner-content, learner-instructor and learner-learner – which instructors need to design into their educational programs in order to maximise their effectiveness.

1. Learner-content interaction – the learner's interaction with the content which results in advanced understanding and learning.
2. Learner-instructor interaction – interaction between the learner and expert instructor which involves the instructor planning and presenting subject matter, providing support and feedback to students, and assessing student performance.
3. Learner-learner interaction – interaction between learners which may occur in the presence or absence of the instructor with the learners taking control in constructing their own knowledge, which is highly beneficial for learning and also in the acquisition of skills required in the workplace.

Moore's (1989) three types of interaction functioning together to facilitate learning online, align with the three elements of the Community of Inquiry (CoI) model advanced by Garrison, Anderson and Archer (2000) for establishing learning communities using computer conferencing in higher education: cognitive presence, teaching presence and social presence (Swan, 2003). Swan (2003) equates cognitive presence with interaction with content, teaching presence with interaction with instructors, and social presence with interaction among students.

Theoretical Framework

Cognitive presence, essential to the development of critical thinking, framed around Dewey's concept of practical inquiry, involves communication among participants to build their own knowledge. Social presence assists the cognitive process by enabling participants to establish their role in the online community as "real people" (Garrison, Anderson and Archer, 2001, p. 89) while providing emotive support to sustain the learning community and ensure a high quality learning experience. Teaching presence involves the design and organisation of the learning experience which is performed by the teacher along with the facilitator role, which may be a joint responsibility among teacher and students. Anderson *et al.* (2001) stress the importance of robust teaching presence in the "lean medium of communication" that is the online environment, due to the inherent difficulty of facilitating collaborative learning while restricted to written communication outside of the f2f classroom. The authors assign responsibilities to the instructor in facilitating discourse and scaffolding the learning of the inexperienced student rather than taking the passive 'guide on the side' role which is endorsed by many others. In a study by Swan *et al.* (2000), perceived student learning was positively correlated with instructor feedback (interaction with instructor), peer communication (interaction with peers) and student activity (interaction with content), supported also by findings of others such as Garrison, Anderson and Archer (2001).

Within this BL intervention with the introductory accounting group, interaction with content will be promoted through the provision of high-quality online resources containing problem-solving activities which can be accessed by students for both learning and review purposes as part of the BL design. Course content in multiple forms will ensure the needs of a diverse learner group are accommodated; therefore, a hard copy notes manual will be provided as well as online solutions and multimedia resources. The use of automated testing for continuous assessments will ensure instant feedback to students.

The instructor plays an important role in fostering engagement through maintaining teacher-student discourse, displaying enthusiasm for the subject and exhibiting a high level of teaching professionalism (Bryson and Hand, 2007). Research evidence indicates that teaching duties increase in complexity in the online environment, with the instructor playing an interactive role in building a learning community (Anderson

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et al., 2001; Coppola, Hiltz and Rotter, 2002). Appropriate channels of communication must be put in place within the introductory accounting BL design so that students can access the lecturer to address queries which may arise outside of f2f contact hours, while the lecturer must act as facilitator in encouraging active learning rather than following a didactic teaching approach.

Research has shown that BL formats can lead to a reduced student desire for online interaction as students can meet, discuss and socialise in the f2f class setting (Vrasidas and McIsaac, 1999). Interaction among participants online can be increased by the inclusion of required online discussion activities which affect students' grades and are enshrined in grading rubrics (Vrasidas and McIsaac, 1999; Rovai, 2001; Swan, 2003); however, Rovai (2001) claims that definitive evidence does not exist to link rubrics to an increased sense of community. The BL design must facilitate interaction among peers both in the f2f and online environment. Online interaction can be promoted through use of a discussion forum activity; however, participation will need to be stimulated through use of a grading rubric which rewards forum participation and quality of postings. Initial course activities to foster trust among student participants will be deployed at the commencement of the financial accounting modules to nurture participation at the outset.

4.6.2 Learner-interface interaction

Hillman, Willis and Gunawardena (1994) identified a new type of interaction, learner-interface interaction defined as “the interaction that takes place between a student and the technology used to implement a particular distance education process” (Swan, 2003, p. 18). It refers to technology used by students when interacting with instructors, classmates and content, which can afford or constrain the quantity and quality of these interactions. Use of high-quality course interface designs along with essential orientation to their use can enhance student learning (Hillman, Willis and Gunawardena, 1994; Swan, 2003). The researcher must ensure effective and consistent course interfaces are used as part of the BL design to promote ease of access and clear navigation, hence supporting learning.

4.6.3 Vicarious interaction

Sutton (2000) argues that students not directly participating in online discussion can benefit from observing and processing cognitively the interactions of others, a process she calls “vicarious interaction”. Basing her findings on Bandura’s theory of observational learning, she asserts that vicarious interactors learn almost as much as direct interactors in a discussion. Goldman *et al.* (2005, p. 101) cite Fritsch (1997) who described vicarious interaction as “witness learning” establishing it as an essential component of f2f learning, presenting research evidence that students reported greater learning from reading message postings of other students than actively partaking in the discussion themselves. Similarly, in an investigation of witness learning online, he determined that users accessed many more discussion postings than the number to which they replied (Goldman *et al.*, 2005). According to Sutton (2000), learners who are shy or exhibit characteristics of oral communication apprehension, defined by McCroskey (1977, p. 78) as “an individual’s level of fear or anxiety associated with either real or anticipated communication with another person or persons”, will benefit from interacting vicariously.

The BL intervention within this study will provide introductory accounting students with opportunities to interact vicariously through the discussion forum element of the ratio analysis topic. This may help learners who are shy to progress their learning without fears of rejection they may associate with exposing their own ideas.

4.7 Technology

Any given instructional strategy can be supported by a number of contrasting technologies (old and new); just as any given technology might support different instructional strategies. But for any given instructional strategy, some technologies are better than others: Better to turn a screw with a screwdriver than a hammer – a dime may also do the trick, but a screwdriver is usually better (Chickering and Ehrmann, 1996).

4.7.1 Learner-centred design

Having originally focused on computer usability, Norman and Spohrer, (1996) called for the human-computer interaction (HCI) community to move from ‘user-centred’ to ‘learner-centred’ design (LCD) of technology. The learner-centred design (LCD)

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approach evolved in 1994 developed by Soloway, Guzdial and Hay (1994) along with a recognition that user-centred design principles are not sufficient to meet the needs of learners (Soloway *et al.*, 1996; Richards, 2006):

if addressing the needs of the user is the driver, then it is natural to focus on ease of use; if addressing the needs of learners is the driver, then it is natural to focus on the development of understanding, performance, and expertise. The former is unquestionably important; however, the latter is unquestionably critical (Soloway, Guzdial and Hay, 1994, p. 47).

Soloway *et al.* (1994, 1996) propose use of constructivist and social constructivist learning theories when designing systems to support learning. Active, constructive learning is proposed where enculturation is achieved through use of authentic activities from the work domain with learning supported through use of scaffolding. Soloway, Guzdial and Hay (1994) propose a TILT model (Tools, Interfaces, Learner's needs, Tasks) to guide learner-centred software design based on constructivist and sociocultural learning theories. The model places learners at the centre of the design process, addressing their diverse needs by ensuring they are assisted to use the software, motivated and engaged to persist at the task, and that their continuous growth and development is facilitated (see Figure 4.7).

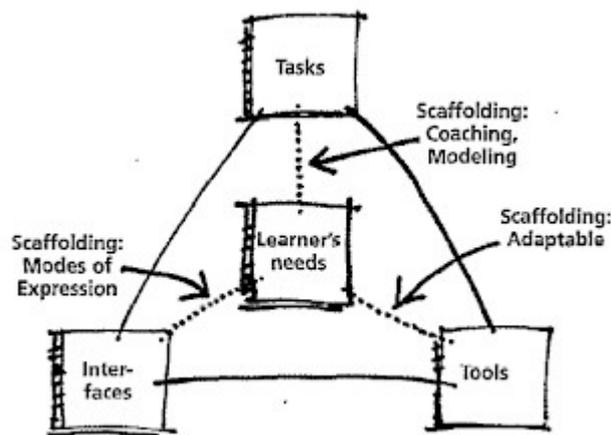


Figure 4.7 *Tools-Interfaces-Learner's Needs-Tasks (TILT) learner-centred model (Soloway, Guzdial and Hay, 1994, p. 41)* [Reprinted with permission]

Scaffolding is provided during the learning process to assist a learner in performing a task. The scaffolding is gradually faded until he can do it comfortably by himself, at which point the learner can perform the task completely independently of others.

Scaffolding strategies inherent in the TILT model are:

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- Tasks – coaching can be used to assist learners.
- Tools – tools must be adaptable to support learners as they develop competence and expertise.
- Interfaces – different media and modes of expression must be made available to support learners’ communication.

However, there exists a challenge when incorporating flexible scaffolding strategies in software compared to human scaffolding which can respond instantaneously to provide scaffolding which is suitable to the learner at a particular moment in time (Soloway, Guzdial and Hay, 1994). Scaffolding must be adaptable to the needs of the learner:

Scaffolding is not an all-or-nothing deal. Good scaffolding is there when the student wants it, and is not there when the student wants to work independently (Soloway, Guzdial and Hay, 1994, p. 46).

Jackson, Krajcik and Soloway (1998) advocate use of Guided Learner-Adaptable Scaffolding (GLAS) in interactive learning environments by designing ‘fadeable supports’ into educational system tools. Learners have diverse needs and scaffolding can support them in completing activities that would otherwise be beyond their capabilities. This scaffolding can be gradual, by providing fadeable levels of scaffolding to learners to accommodate their changing needs (Jackson, Krajcik and Soloway, 1998). This allows learners to adopt increasing levels of responsibility for completing tasks and exposes them to more complex tasks as they grow in expertise.

There is evidence to suggest that, despite having encountered technology from a young age, many students may not understand how to use technology for learning with incoming first year students exhibiting large diversity in technological abilities (Kennedy *et al.*, 2008). Ahola (2000) identifies “learning to learn” as one of the elements of the “hidden curriculum” in distance education, where students have to master communication tools, organisational and time management skills and “learn to learn” in different unconventional ways. Technological barriers, which may inhibit participation, exist, such as broadband availability and individual skills/attitudes towards technology, placing an onus on institutions to provide “work-arounds” in the form of training, technical assistance and other support services to deal with this part of the hidden curriculum.

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The lecturer is aware of the need to ensure the online BL elements are designed in a learner-centred fashion. Students must be scaffolded in using the online resources at the commencement of the programme to ensure that they are not deterred by initial technical problems while also being oriented in the use of MS Excel software which forms a significant part of the course delivery. Technological tools used must be easy-to-follow and engaging enough to ensure that students are motivated to persist with the task; learner interfaces should be easy to navigate. Various levels of task complexity must be provided to students to allow them tackle more challenging problems as their skill levels evolve, ensuring learner growth and development occurs.

4.7.2 Integrated learning

Technology use in education should aim to support high-quality learning rather than solely provide flexibility for students:

It is tempting to bring technologies into learning purely because of the flexibility they offer to students whose time for study is constrained. But the quality of their learning experience depends critically on the extent to which the learning process is fully supported (Laurillard, 2008b).

Indeed, it is argued that technology should go a step further in transforming the learning process to facilitate knowledge construction by students rather than knowledge transmission by teachers:

Computer literacy and CAI [computer-assisted instruction], or indeed the use of word-processors, could conceivably set up waves that will change school, but in themselves they constitute very local innovations – fairly described as placing computers in a possibly improved but essentially unchanged school. The presence of computers begins to go beyond first impact when it alters the nature of the learning process; for example, if it shifts the balance between transfer of knowledge to students (whether via book, teacher, or tutorial program is essentially irrelevant) and the production of knowledge by students (Papert and Harel, 1991, p. 9).

Harel and Papert (1990, p. 29) propose the *integrated learning* principle which states that “learning more can be easier than learning less”. They observed that students learning mathematics (fractions) and software design in an integrated fashion achieved more effective learning than had the learning material been taught separately.

If some knowledge facilitates other knowledge, then, in a beautifully paradoxical way, more can mean less! (Papert and Harel, 1991, p. 30).

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As discussed in chapter two, technological skills are deemed crucial for accounting graduates entering the workplace, with persistent appeals for integration of technology, including MS Excel, within accounting curricula to increase graduate employability (Lafond, McAleer and Wentzel, 2016; Rackliffe and Ragland, 2016; Al-Htaybat, von Alberti-Alhtaybat and Alhatabat, 2018; Kotb *et al.*, 2019). The integrated learning principle will be applied in the BL design by integrating the teaching of the MS Excel spreadsheet application with financial accounting, which will also expose students to a digital tool from the workplace. This will be facilitated by timetabling some of the f2f class hours in a computer laboratory rather than a traditional classroom, which will have implications for the instructor's pedagogical approach.

4.7.3 TPACK framework

Mishra and Koehler (2006) propose the technology, pedagogy, and content knowledge (TPACK) framework for use by teachers when integrating technology with their pedagogy. Building on the seminal work of Shulman (1986, 1987) on pedagogical content knowledge (PCK) which is the way in which subject matter is changed by teachers into a form that is easily understandable by learners, the TPACK model recognises that knowledge of technology is not isolated from pedagogical and content knowledge as technology use can place constraints on content delivery and affect pedagogical decisions.

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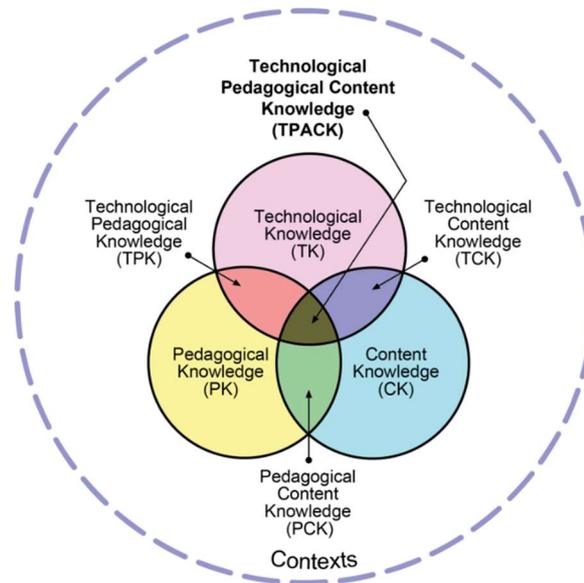


Figure 4.8 *The TPACK framework and its knowledge components* (<http://tpack.org>)
[Reprinted by permission of the publisher, ©2012 by t.pack.org]

Elements of the model as depicted in Figure 4.8 are as follows (Mishra and Koehler, 2006; Koehler and Mishra, 2009):

- Content knowledge (CK) – teacher’s knowledge of subject matter being taught and learned.
- Pedagogical knowledge (PK) – knowledge of teaching practices and methods and application of learning theories including lesson planning, classroom management and student assessment.
- Pedagogical content knowledge (PCK) – knowledge of suitable methods to transform subject matter for teaching and learning purposes.
- Technology knowledge (TK) – knowledge of and skills in technology use which changes over time as new technologies evolve.
- Technological content knowledge (TCK) – knowledge of how technology constrains and affords the subject matter being taught.
- Technological pedagogical knowledge (TPK) – teacher’s understanding of how teaching and learning can change when specific technological tools are used in certain ways.

TPK requires a forward-looking, creative, and open-minded seeking of technology use, not for its own sake but for the sake of advancing student learning and understanding (Koehler and Mishra, 2009, p. 66).

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When integrating technology into the classroom, there is no single solution that works for every teacher or programme, rather technology integration should take place through the teacher's creative ability to positively exploit the complex interactions between content, pedagogy, and technology which are specific to her own specific learning and teaching context (Koehler and Mishra, 2009). This model of integration of technology in teaching and learning proposes that:

developing good content requires a thoughtful interweaving of all three key sources of knowledge: technology, pedagogy, and content. ... Quality teaching requires developing a nuanced understanding of the complex relationships between technology, content, and pedagogy, and using this understanding to develop appropriate, context-specific strategies and representations (Mishra and Koehler, 2006, p. 1029).

Traditional teaching formats do not support effective technology integration in education. There is a need to integrate ICT in education with technology “grounded in” pedagogy rather than treating it as something you “add on” to existing pedagogy, coupled with an exigency to move away from use of technology to transmit knowledge in a learning approach which remains teacher-centred (Richards, 2006).

The technology alone can never be a solution, but in the hands of a knowledgeable teacher, appropriately designed technology can become a useful tool. ... We have to do more than teach kids to surf the net, we have to teach them to make waves (Shneiderman, 1998, p. 29).

According to Mishra and Koehler (2006), technology is not an independent tool which automatically improves teaching, and knowledge of a technology does not instinctively produce good teaching with the technology, as “merely knowing how to use technology is not the same as knowing how to teach with it” (p. 2033).

As pointed out in chapter three, educational technology design and implementation is frequently criticised for being technology-led rather than pedagogically-driven. The TPACK framework can be used to make predictions about suitable contexts for good teaching to occur, resulting in the design of more effective learning environments.

The three components (content, pedagogy, and technology) cannot be viewed in isolation as a dynamic relationship exists between the three of them. Introduction of a new technology affects the equilibrium between the three elements of the TPACK model and forces the teacher to re-calibrate by looking at content and pedagogy and changing her approach (Mishra and Koehler, 2006; Koehler and Mishra, 2009).

Mishra and Koehler (2006) advocate for learning environments which deploy

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technology in relating learning content to authentic contexts to enable effective learning.

Scheduling f2f classes within a computer laboratory setting with the concomitant use of MS Excel as a teaching tool which forms part of this BL design will require the lecturer to employ TPACK in reviewing her teaching content and adapting her pedagogical approach to suit the technology use. As MS Excel was not designed for educational use, it will be incumbent on the lecturer to re-purpose the software to serve a pedagogical purpose. Bearing in mind that “not every topic can be shoehorned into any technology and, correspondingly, any given technology is not necessarily appropriate for every topic” (Mishra and Koehler, 2006, p. 1040), the lecturer must consider carefully the suitability of each accounting topic for delivery using MS Excel. LanSchool classroom management software which facilitates teacher demonstrations within the computer laboratory setting is implemented as a design change from cycle two onwards.

4.8 Chapter summary

This chapter epitomises the theoretical structures underpinning the practical and empirical development work undertaken as part of this thesis. The model expounded is that which evolved over the course of the three BL design iterations. As will be discussed in the following chapters, the six design themes (1) pedagogy, (2) autonomy, (3) collaboration, (4) engagement, (5) interaction, and (6) technology guided the design, development and evaluation of a BL intervention within introductory accounting education. The orienting theoretical framework combined with the empirical findings of the study informed the thesis’ design guidelines for BL to enhance the learning experience for introductory accounting students. Table 4.1 overleaf illustrates the main theories which informed and shaped the PACE-IT model as presented within this chapter, along with a summary of their impact on the final BL design. A more detailed illustration of the design changes inspired by the various theories is presented in Appendix 21.

Theoretical Framework

Table 4.1 Theorists informing PACE-IT model themes and associated design impact

Theories / Authors	Impact on the BL design
PEDAGOGY	
<p>Conversational Framework (Laurillard, 2002, 2007, 2008a, 2008b, 2009)</p> <p>Constructivism</p> <p>Cognitive load theory:</p> <ul style="list-style-type: none"> • Cognitive theory of multimedia learning (Mayer, 2002) • Worked example effect (Sweller and Cooper, 1985; Sweller, 2006) 	<ul style="list-style-type: none"> • Theory applied through practical learning activities using pair and group work • Use of real-world activities which build on learners' prior experiences • CLT-informed multimedia resource design • Introductory classes to reduce cognitive load • Worked examples before moving onto problem-solving
AUTONOMY	
<p>Andragogy (Knowles, 1984)</p> <p>Heutagogy (Hase and Kenyon, 2000; Blaschke, 2012; Blaschke and Hase, 2016)</p>	<ul style="list-style-type: none"> • Learner-centred, focusing on context of task rather than memorisation • Use of reflective practice and collaborative opportunities
COLLABORATION	
<p>Scaffolding within zone of proximal development (Vygotsky, 1978)</p> <p>Knowledge-building communities (Scardamalia and Bereiter, 1994)</p> <p>Scaffolding online learning through e-moderating (Salmon, 2011)</p>	<ul style="list-style-type: none"> • Step-by-step content delivery • Clear instructions and orientation activities • Collaborative activities to build learning community • Asynchronous discussion forum for knowledge-building • Scaffolding learners for online forum participation

Theoretical Framework

Theories / Authors	Impact on the BL design
ENGAGEMENT	
<p>Flow theory (Csikszentmihalyi, 1990)</p> <p>Student engagement in the educational interface (Kahu, 2013; Kahu and Nelson, 2018)</p> <p>Engagement theory (Kearsley and Shneiderman, 1998)</p> <p>Authentic learning activities (Herrington and Oliver, 2000; Reeves, Herrington and Oliver, 2002; Herrington, Oliver and Reeves, 2003)</p>	<ul style="list-style-type: none"> • Graded challenges to maintain learner ‘flow’ • Reduced f2f contact to allow learners manage ‘lifeload’ • Use of collaborative, problem-based tasks and digital tools with real world relevance • Use of grading rubric to promote engagement with assessment • Diverse range of learning activities to stimulate and sustain engagement
INTERACTION	
<p>Learner-content, learner-instructor and learner-learner interactions (Moore, 1989)</p> <p>Learner-interface interactions (Hillman, Willis and Gunawardena, 1994)</p> <p>Vicarious interaction (Sutton, 2000)</p>	<ul style="list-style-type: none"> • High-quality online resources which are mobile-compliant • Appropriate student-lecturer communication channels, with the lecturer as ‘partner’ in the learning process • Easy-to-navigate, high-quality learner interface • Online forums providing peer and vicarious interactions

Theoretical Framework

Theories / Authors	Impact on the BL design
TECHNOLOGY	
<p>Learner-centred design (Soloway, Guzdial and Hay, 1994; Soloway <i>et al.</i>, 1996)</p> <p>Integrated learning (Harel and Papert, 1990)</p> <p>TPACK framework (Mishra and Koehler, 2006; Koehler and Mishra, 2009)</p>	<ul style="list-style-type: none"> • Scaffolding in online resource usage through orientation and MS Excel tutorials • Integrating learning of financial accounting and MS Excel • Adaptation of pedagogical practices in computer laboratory setting • Consideration of student connectivity issues and provision of support regarding technical issues

The next three chapters detail how the PACE-IT model evolved during the three iterative cycles of the BL intervention, informed by relevant educational theories under the concept themes of pedagogy, autonomy, collaboration, engagement, interaction, and technology. The output at the end of the third DBR cycle was a robust, adaptable and adoptable design framework for utilisation in the development of a BL intervention to enhance the learning experience for introductory accounting students in tertiary education.

Chapter 5 Design Cycle One

5.1 Chapter introduction

This chapter describes the first design cycle which involved the implementation of the initial BL design with a first-year accounting group, comprising 28 students in AIT. The chapter commences with a detailed account of how the BL design was implemented with the student cohort. A large body of both quantitative and qualitative data was collected and both examples of confirming and disconfirming evidence will be discussed to elucidate the BL design implications. The PACE-IT framework, which emerged from the literature and research questions and was informed by the study findings, will be used to frame the discussion of the analysis and the design changes. Finally, the chapter concludes with changes which will be implemented during the second iterative cycle to enhance the future impact of the design.

5.2 Implementation of design cycle one

5.2.1 Study participants

The study was conducted with students on the BAA1 and BALAW1 programmes who were studying Financial Accounting 1A and 1B as compulsory 5-credit modules with the researcher as instructor. There were 29 students studying on both programmes, with only four of these being BALAW1 students. One student was ineligible to partake due to being under 18 years of age. The remaining 28 students consented to take part in the study and completed a pre-implementation questionnaire, having been provided with participant information sheets fully informing them of what was involved. However, one student left the programme during semester 1; therefore, subsequent data collection was based on 27 students. The majority of students in the class were aged between 18 and 22 years of age and there were marginally more males than females in the cohort (see details in Appendix 11).

Design Cycle One

While the student cohort were predominantly Irish, five other nationalities were represented indicating quite a diverse class group. 14% (n=4) of the students identified themselves as students from abroad who were studying in Ireland.

5.2.2 The blended learning design

A blended instructional method was chosen in order to harness the benefits of both online and f2f learning environments. Re-designing a course into a blended format takes time as the f2f and online components need to be fully integrated in order to be successful. Aycock, Garnham and Kaleta (2002) recommend to “start small and keep it simple” so one topic per semester was selected in which to implement the blended format.

5.2.2.1 Learner interface

Online learning activities and assessments were delivered via the AIT Moodle platform, which was accessible to students as the mainstream course management system within the college. Learning and assessment activities were organised on the financial accounting Moodle page by topic, requiring students to scroll down to access the resources pertaining to a specific topic (see Figure 5.1). Students were provided with a hard copy question and notes manual at the commencement of each module. Solutions to questions in the manual were located under each topic heading in Moodle in MS Excel format.

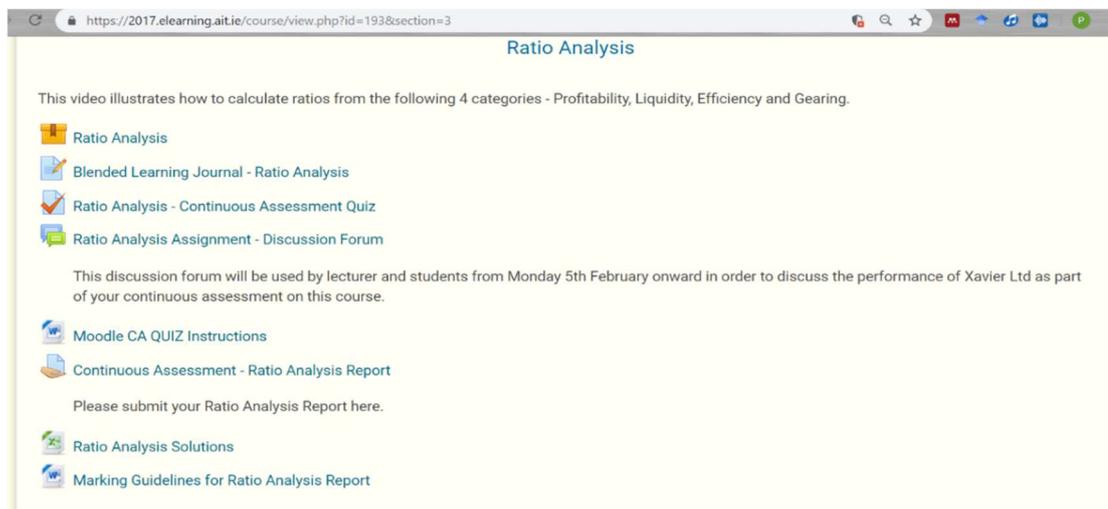


Figure 5.1 Moodle course interface, 2017-18

Design Cycle One

5.2.2.2 Online multimedia resource

In order to promote learner engagement, the BL design incorporated an online multimedia resource to be used as a pre-f2f activity to encourage students to take centre stage in the learning process. Students were required to view the resource asynchronously prior to the first f2f class on the topic. The resource, which combines a presentation, videos, problem to work through and quiz, incorporates many of Mayer's (2002) multimedia design principles based on cognitive theory research into multimedia learning (see Figure 5.2).

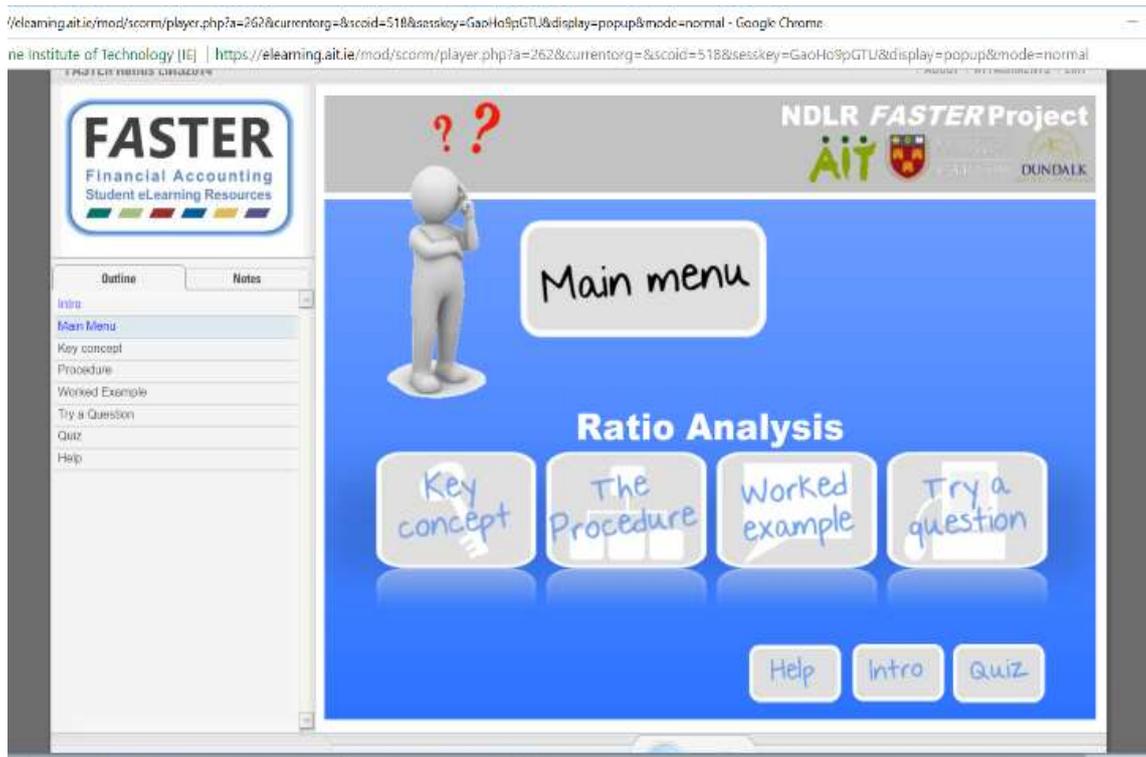


Figure 5.2 Online multimedia resource for ratio analysis topic

Learners are introduced to a key accounting concept through a short, interactive presentation before being guided through a worked example, with short videos (between 3 – 10 minutes in length) showing the development of the solution (see Figure 5.3). A problem is then presented that learners are encouraged to attempt before answering a series of short questions, each question accompanied by a hint in the form of an image taken from a model solution-in-progress. The resource also includes a review quiz, which draws randomly on a small bank of questions with immediate feedback provided. It is designed based on learner-centred principles and

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provides scaffolding, by expressing the learning task as a series of steps, with the aim of reducing cognitive overload (Soloway *et al.*, 1996).

The screenshot shows a spreadsheet interface with a video player overlay. The spreadsheet displays the calculation of Gross Profit Percentage for 2009 and 2008. For 2009, the calculation is $\frac{200,000}{400,000} \times 100 = 50\%$. For 2008, the calculation is $\frac{150,000}{350,000} \times 100$. The video player overlay shows an income statement extract for 2009 and 2008.

	2009	2008
Revenue	400,000	350,000
Cost of Sales	<u>200,000</u>	<u>200,000</u>
Gross Profit	200,000	150,000
Expenses	<u>120,000</u>	<u>65,000</u>
Net Profit before int & tax	<u>80,000</u>	<u>85,000</u>

Figure 5.3 Embedded video in ratio analysis multimedia resource

The resources were produced using Articulate Studio and supporting technologies such as Camtasia Studio, Screenr.com and Microsoft Office Suite. The learning resources were published in Articulate Studio as Sharable Content Object Reference Model (SCORM) compliant objects version 1.2 which means they can be delivered to learners via Moodle and student usage can be tracked for evaluation purposes.

5.2.2.3 Online assessments

Continuous assessment throughout the year consisted mainly of online quizzes delivered via Moodle (see Figure 5.4) outside of class time. Each quiz contained calculated random questions, and students were permitted two attempts at each quiz over separate one-week periods and were awarded the highest grade achieved. The calculated questions have random variables embedded within them so that each time

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the quiz is attempted the calculation within each question varies. Some of the questions within the assessment are also drawn randomly from a question bank which adds an additional layer of variety to the assessment quiz. This ensures that students attempting out-of-class assessments are all presented with different sets of questions. These quiz results formed part of their overall course grade, as evidence has shown that students exhibit preferences for online activities to be linked to a reward structure in a blended environment (Concannon, Flynn and Campbell, 2005; Gyamfi and Gyaase, 2015). The nature of these assessments was a significant departure from the traditional paper-based assessment which students would have previously taken as part of this module. It was anticipated that the feedback provided by the assessment quizzes may be used as a learning opportunity by students throughout the semester and may contribute to enhanced performance in the end-of-semester exam (Abraham, 2007).



The following is an extract from the accounts of Mabel company for the years ended 31 December 2017 and 2016:

	2017	2016
Current assets	98050	102700
Equity	100000	160000
Non-current liabilities	181681	301430
Current liabilities	37740	38977

Required:
Calculate the Gearing (debt/total capital) ratio for 2017.
Express your answer as one single number, correct to one decimal place.
Do not use any symbols (words, commas or euro symbols) in your answer.

Figure 5.4 Question taken from an online assessment quiz delivered via Moodle, 2017-18

5.2.2.4 Communication channels

Communication with students was facilitated by using an announcements forum, which allows messages to be posted by the lecturer on the Moodle page to which students may also reply. This allowed a line of communication to be opened between the students and lecturer. Announcement forum posts are also emailed

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directly to students' email accounts. Several announcements were made throughout the course via this forum; however, students were reluctant to use the forum to post queries, opting instead to contact the lecturer directly via email.

5.2.2.5 Orientation exercise

In advance of the BL intervention, an orientation session took place in a computer laboratory where a print-out of the lecture schedule and activities involved in the BL process was provided to the students (Appendix 12 illustrates the instructions handout provided in cycle three). This schedule of activities was also posted on the Moodle announcements forum and sent to students via email. Students were instructed on how to utilise the online resources. Students were taken through the process of navigating the multimedia resource and the use of the various tools, including announcement forum and online quizzes. A sample online Moodle quiz was made available to students to attempt in their own time in advance of the continuous assessment quizzes which would form part of their final course grade. Furthermore, an online multimedia resource similar to the resource to be used during the BL topic was made available to students and they were encouraged to view the resource outside of class time to pre-empt possible technical issues which may be encountered.

Student feedback was sought during subsequent lectures to establish if they had been confronted with any technical issues while viewing the multimedia resource. This was perceived to be crucial as the resource would form a key element of the BL process and it was essential that students were in a position to launch and navigate through the resource with ease. A number of students had difficulties with the sound when playing the resource using Google Chrome, so students were encouraged to use an alternative internet browser.

5.2.2.6 Computer laboratory classes

Students were also timetabled with one class per week in the computer laboratory throughout the year to improve competence in the use of information technology (IT) and provide scaffolding in the use of the online resources as they were introduced (Wood, Bruner and Ross, 1976). MS Excel was the software application used for teaching purposes, which added to the authenticity of the students' education while

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developing the accounting-related IT skills they would require when entering the workplace (Albrecht and Sack, 2000; Spraakman *et al.*, 2015; Rackliffe and Ragland, 2016; Tysiac, 2019).

5.2.2.7 Face-to-face meetings

Allen, Seaman and Garrett (2007) define a blended program as one which delivers between 30 and 79 percent of the course content online. As outlined in chapter two following a review of the literature, the BL approach adopted within this study was characterised by a 50/50 split between online and f2f hours (Bleed, 2001; Orhan, 2008).

5.2.2.7.1 Semester 1 – Bank reconciliation topic

The bank reconciliation topic was taught during week 9 of semester 1. Students received a reduction of three hours on their timetable to compensate for time spent engaging in online learning activities. The Tuesday 5 – 6 pm class was removed from the timetable in weeks 8 – 10 to achieve the required reduction, following agreement with students who determined it as the most suitable for removal due to its inconvenient lecture time. Students engaged in three contact hours during week 9 in a f2f setting on the bank reconciliation topic (see Table 5.1 overleaf). The bank reconciliation multimedia resource was made available to students via Moodle and they were instructed to view this resource before the f2f class on Tuesday 14 November 2017 as it contained the background knowledge required to complete a bank reconciliation question.

A discussion forum was opened to allow students to discuss issues around the bank reconciliation topic. They were advised to post any questions they may have on bank reconciliation statements or on the BL process. Any notifications in relation to the bank reconciliation topic were posted here by the instructor which also linked directly to each student's email inbox. Students were provided with a detailed handout containing specific instructions in relation to implementation of the BL topic, both in hard copy format as well as soft copy via the discussion forum and their student email. The importance of viewing the online resource in advance of the f2f class was strongly emphasised.

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Table 5.1 Blended topic contact timetabled hours in semester 1, 2017-18

Week 8	Tues 7 November 11 – 12 noon	Sole trader final accounts
	Tues 7 November 5 – 6 pm	NO CLASS
	Thurs 9 November 9 - 11 am	Sole trader final accounts
Week 9	Tues 14 November 11 – 12 noon	Bank reconciliation statements
	Tues 14 November 5 – 6 pm	NO CLASS
	Thurs 16 November 9 - 11 am	Bank reconciliation statements
Week 10	Tues 21 November 11 - 12 noon	Correction of errors
	Tues 21 November 5 – 6 pm	NO CLASS
	Thurs 23 November 9 - 11 am	Correction of errors

Students' first f2f class on the bank reconciliation topic (14 November) took place in a computer laboratory where they were required to complete a short 10-minute Moodle quiz. Twenty-five of the participants were present and attempted the quiz, which assessed their knowledge of the bank reconciliation topic following use of the multimedia resource. The average mark achieved by participants was 84% (minimum mark = 50% and maximum mark = 100%). This was a formative quiz which would not be included in their final course grade. The lecturer moved on to illustrating the solution to a more advanced bank reconciliation question.

During the next f2f class (16 November), which took place in a traditional classroom, the content that had previously been delivered online was supplemented with application and problem-solving activities in order to promote learning at a deeper level. Students were required to attempt a problem during class individually while they consulted with peers sitting nearby. The lecturer circulated the class to assess progress, following which students were given more difficult problems to attempt, with some assistance from the lecturer illustrating parts of the solution using MS Excel.

All continuous assessment exams for this module (which account for 20% of the students' final grades) were administered via Moodle in the form of online assessment quizzes. Assessments were scheduled in week 6 and week 11, each worth 10% of their final grade, with students being allowed two attempts at each

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quiz. Due to recurring technical problems with Moodle during semester 1 which caused problems for a few students, the lecturer opened both assessment quizzes for an additional period to allow students the option of taking a third attempt at the quiz, which was availed of by some students.

5.2.2.7.2 Semester 2 – Ratio analysis topic

Students were provided with a set of instructions in advance of the ratio analysis BL topic in both hard and softcopy format (see Appendix 12) and received four contact hours in week 3 of semester 2. The researcher chose to conduct these classes in a traditional classroom setting as the layout allowed for better class discussions to develop the higher cognitive skills associated with this topic. To achieve the reduction in f2f hours, students had no class during week 2, which allowed them time to view the multimedia resource (see Table 5.2).

Table 5.2 Blended topic contact timetabled hours in semester 2, 2017-18

Week 1	Tues 16 January 2 - 4 pm	Company final accounts
	Thurs 18 January 9 – 11 am	Company final accounts
Week 2	Tues 23 January 2 - 4 pm	NO CLASS
	Thurs 25 January 9 – 11 am	NO CLASS
Week 3	Tues 30 January 2 - 4 pm	Ratio analysis
	Thurs 1 February 9 - 11 am	Ratio analysis
Week 4	Tues 6 February 2 - 4 pm	Depreciation
	Thurs 8 February 9 – 11 am	Depreciation

Once students returned to the f2f class (30 January) in week 3, the lecturer checked their knowledge by giving them a ratio analysis question to attempt independently while allowing consultation with nearby peers to double-check answers. Correct answers were displayed by the lecturer using MS Excel followed by a discussion of the significance of each ratio in terms of the performance of the company. In the next class (1 February) the lecturer concentrated on developing students' abilities in analysing company performance. Students were asked to prepare ratio calculations in advance of class which would be used to discuss company performance. During

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this class, the researcher sensed that the majority of students were slow to offer opinions and observed that she contributed most of the points towards the discussion.

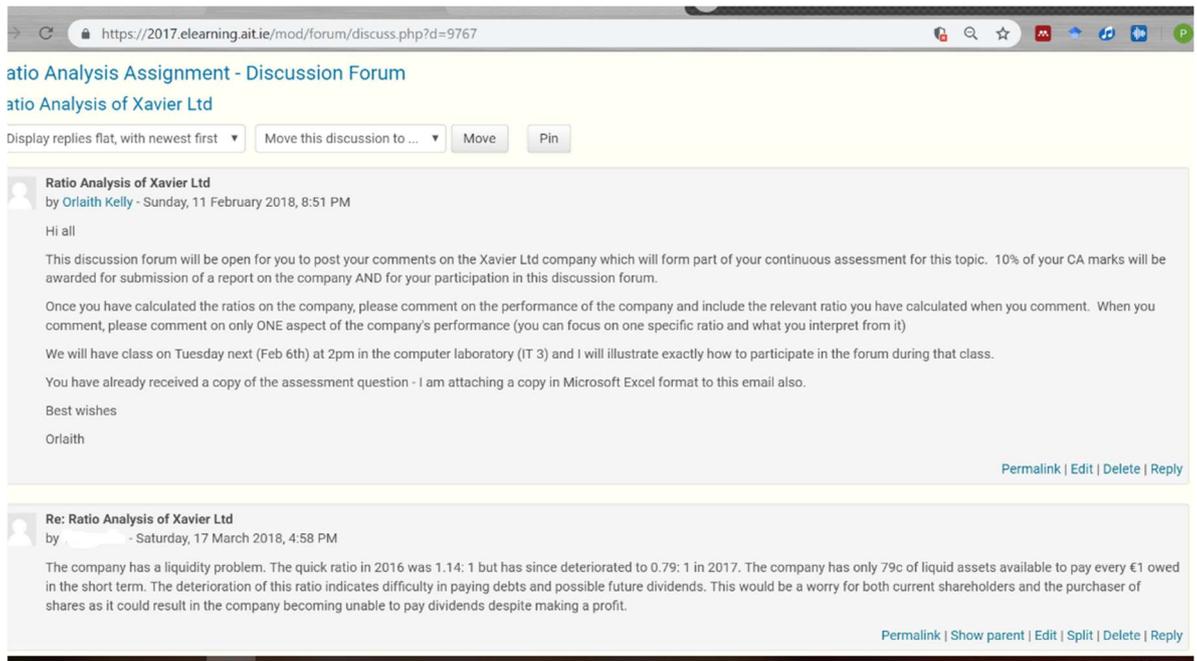
Continuous assessment consisted of one online assessment on the ratio topic (10%) which students attempted twice, once in advance of the f2f hours on the topic in week 3, and a second attempt after the f2f hours. This allowed the lecturer to gauge students' knowledge on the topic in advance of the first timetabled contact hour. As the ratio analysis topic lends itself to use of critical thinking skills, the researcher included a ratio analysis report as part of the continuous assessment for the module (10%) to be submitted via Moodle by March 11 (Appendix 13 illustrates the assessment task deployed in cycle three), fulfilling the aims of the Conversational Framework (Laurillard, 2002) and providing an opportunity for authentic assessment (Herrington and Oliver, 2000).

5.2.2.8 Ratio analysis assignment and discussion forum

Students were required to assess the performance of a company over a two-year period and in comparison to industry averages using ratio analysis and prepare a report. A further requirement was to contribute to a discussion forum which was set up specifically to discuss the performance of the company (see Figure 5.5).

The aim of the discussion forum was to require students to interact with others, share ideas and engage in deeper level thinking, resulting in more effective learning of the course material. It was anticipated that students may also learn from the postings of others on the discussion forum while students could also develop their critical thinking skills when participating in an online discussion forum by having time to think about comments before replying to postings. Moreover, misconceptions by students could be identified by the lecturer when reading online postings (Cheung and Hew, 2011).

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The screenshot shows a web browser window with the URL <https://2017.elearning.ait.ie/mod/forum/discuss.php?id=9767>. The page title is "Ratio Analysis Assignment - Discussion Forum" and the specific thread title is "Ratio Analysis of Xavier Ltd".

At the top, there are controls for displaying replies (flat, newest first), moving the discussion, and pinning it.

The first post is by Orlaith Kelly, dated Sunday, 11 February 2018, 8:51 PM. The content of the post is as follows:

Hi all

This discussion forum will be open for you to post your comments on the Xavier Ltd company which will form part of your continuous assessment for this topic. 10% of your CA marks will be awarded for submission of a report on the company AND for your participation in this discussion forum.

Once you have calculated the ratios on the company, please comment on the performance of the company and include the relevant ratio you have calculated when you comment. When you comment, please comment on only ONE aspect of the company's performance (you can focus on one specific ratio and what you interpret from it)

We will have class on Tuesday next (Feb 6th) at 2pm in the computer laboratory (IT 3) and I will illustrate exactly how to participate in the forum during that class.

You have already received a copy of the assessment question - I am attaching a copy in Microsoft Excel format to this email also.

Best wishes

Orlaith

At the bottom right of the post are links for Permalink, Edit, Delete, and Reply.

The second post is a reply titled "Re: Ratio Analysis of Xavier Ltd" by an anonymous user, dated Saturday, 17 March 2018, 4:58 PM. The content of the reply is as follows:

The company has a liquidity problem. The quick ratio in 2016 was 1.14: 1 but has since deteriorated to 0.79: 1 in 2017. The company has only 79c of liquid assets available to pay every €1 owed in the short term. The deterioration of this ratio indicates difficulty in paying debts and possible future dividends. This would be a worry for both current shareholders and the purchaser of shares as it could result in the company becoming unable to pay dividends despite making a profit.

At the bottom right of the reply are links for Permalink, Show parent, Edit, Split, Delete, and Reply.

Figure 5.5 Ratio analysis discussion forum thread, 2017-18

Use of the discussion forum while completing the ratio analysis assignment report fulfils the requirements of the Conversational Framework (Laurillard, 2007) by requiring students to think about theory to achieve a task goal, share and discuss outputs with their peers, reflect and improve on their practice thereby augmenting their conceptual understanding, epitomising “learning as shared understanding” (Laurillard, 2002, p. 145) and extending the discourse outside of the classroom (Scardamalia and Bereiter, 1994).

Students were provided with marking guidelines to direct them in completing the assessment. When marking the assignments, the researcher developed an assessment rubric which proved a useful tool. The rubric was developed based on Bloom’s taxonomy of educational objectives (Krathwohl, 2002) which was also used by De George-Walker and Keeffe (2010) to guide the design and sequencing of learning activities while focusing on the development of students’ critical thinking skills using a BL approach. Students were allocated marks for applying the knowledge of the ratio, analysing the information provided by the ratio, evaluating the company’s performance and creating and presenting a report. Marks were also allocated for frequency and quality of comments on the discussion forum (Appendix 9 illustrates the rubric used in cycles two and three).

5.2.3 Data analysis

Data were collected using pre- and post-implementation questionnaires, a group interview, student logs, instructor field notes, think aloud protocol, Moodle activity logs, discussion forum postings, ratio analysis report assignments and student final exam results, all of which were subjected to data analysis.

Twenty-eight students were eligible and agreed to take part in the study having been provided with participant information sheets informing them of what was involved. All 28 students completed the pre-implementation questionnaire; however, one student left the programme during semester 1, so data collection throughout the year was based on 27 students. The post-implementation survey was completed by 25 students with one response deemed invalid. Data analysis was conducted on 24 responses, which represented an 89% response rate (N=27). The questionnaire was available online and data were downloaded and imported into MS Excel and SPSS for descriptive statistical analysis.

A think aloud protocol was carried out in January 2018 with one study participant to gather data on the usability of the ratio analysis multimedia resource.

A group interview was conducted with eight participant volunteers and the audio was subsequently transcribed and coded using concept mapping, which is a research tool for analysing qualitative data (Balan *et al.*, 2016). Using UCINET6 software, 152 coded participant statements were exhibited as a graphical output map identifying clusters of concepts illustrating the relationships between the underlying concepts (see Appendix 22).

As discussed in chapter three, mixed methods data analysis was performed using an integrative analytic approach developed by Moran-Ellis *et al.* (2006) for use with multiple datasets, known as ‘following a thread’. Based on the literature and research questions, a theme identified within one dataset was selected and followed across the others (the thread) to create “a constellation of findings which can be used to generate a multi-faceted picture of the phenomenon” (p. 54).

5.3 Design cycle one findings

5.3.1 Pedagogy

5.3.1.1 Prior knowledge

Constructivist theory holds that learners are not passive recipients of knowledge but are more active in the process, constructing their own knowledge in relation to the world around them. They build on previous experience in order to make sense of what they are learning (Dewey, 1938). Awareness of students' prior knowledge is important when designing learning experiences in order to enable effective knowledge construction among learners.

In the pre-implementation survey students were asked to identify their highest previous level of education. The majority of students (57%) were embarking on this course having completed the LC examination; nevertheless a considerable number had followed alternative educational routes (see Appendix 11).

In general, students in the class group had studied accounting at some level prior to embarking on this programme, with only one student stating she had not studied accounting previously, as is evident from Figure 5.6. While 29% of students had encountered accounting as part of the junior cycle Business Studies subject, this would be considered a limited level of exposure to the subject. However, 68% of students indicated they had studied Accounting as a subject at leaving certificate level or as part of a post leaving certificate course. Responses to this question indicate mixed levels of prior accounting knowledge among students in the class group, which needed to be taken into consideration by the lecturer when planning learning activities.

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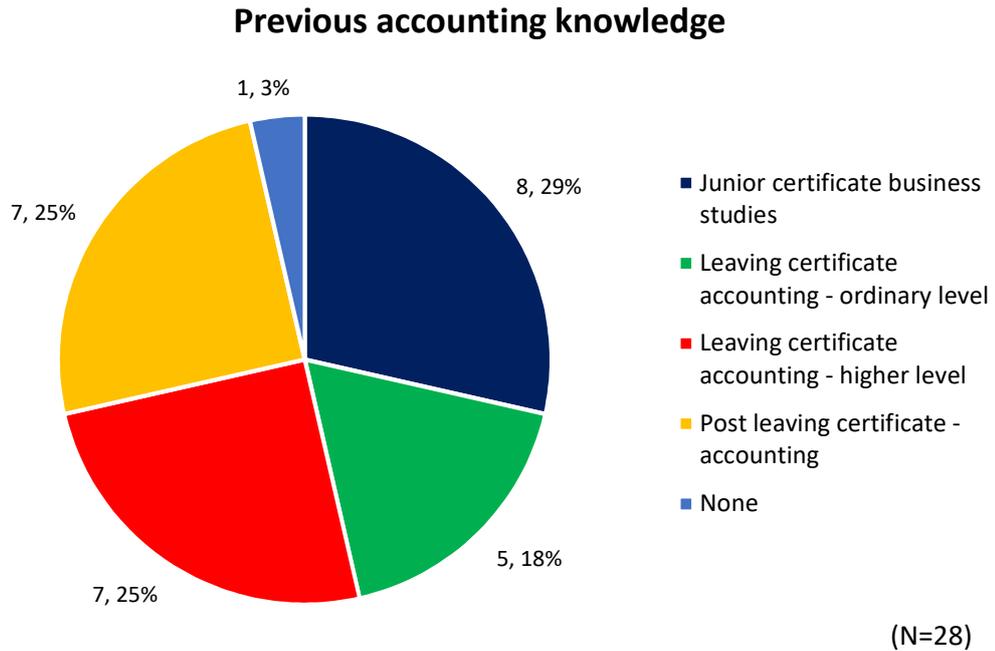


Figure 5.6 Students' previous accounting knowledge, 2017-18 questionnaire data

During the group interview, one student referred to the benefits offered by the online resources in dealing with the varied prior knowledge levels within the class group. The lecturer was also cognisant of facilitating the diverse student group when designing the BL resources, noting that students who studied accounting at leaving certificate level may decide to use the online resources as revision aids rather than learning tools (Kelly, 2018).

It kinda put everyone on an even playing field as well 'cause some came in with accountancy, some didn't, you know this gave everyone everything from scratch. So we were all kind of even starting off. (2017-18 Student 2, group interview)

This point was also highlighted within student logs, when some students referred to their ability to move quickly through material which they had previously encountered:

It's easier to focus on the things you yourself can't get your head around in class so you can view it as many times as you wish and on what part you want, also saves you time if you're pretty confident with the material, you're able to skip it and go straight to questions. (2017-18 Student 14, semester 2 student log)

I have done accounting and business before so I have good knowledge on ratio analysis and it was better that I could do it on my own and not have to go at a slow pace for the benefit of the people in my class who never done it before. (2017-18 Student 15, semester 2 student log)

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It is apparent that the online multimedia resources not alone benefitted novice learners who needed to work slowly through new learning material, but also those who had previous accounting knowledge by allowing them review the resources at a faster pace.

5.3.1.2 Perceived effects on learning

Students were asked to rate the usefulness of the various course elements on the financial accounting Moodle page on a five point Likert type scale from *Not at all useful* (1) to *Extremely useful* (5). Results are displayed graphically in Figure 5.7 where it is clear that there was high student satisfaction with all course elements, apart from the ratio analysis discussion forum, which only 42% of respondents rated as very/extremely useful.

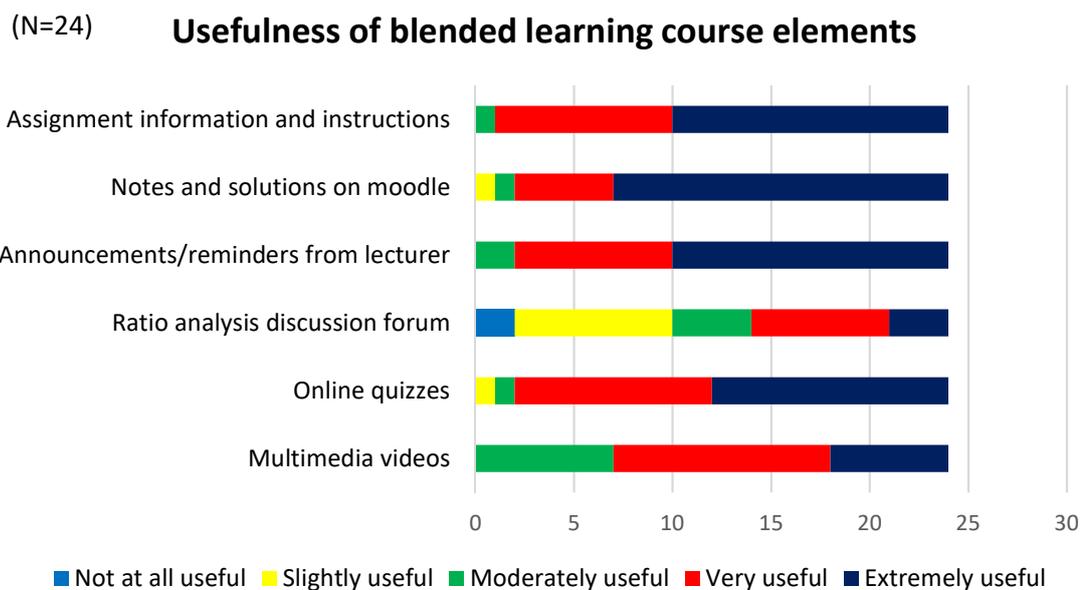


Figure 5.7 Students' perceived usefulness of blended learning course elements, 2017-18 questionnaire data

Students were asked ten questions which assessed their perceived learning benefits following their experience of BL using a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Five of these questions were adapted from a study on BL in higher education in Saudi Arabia (Almalki, 2011). Results show evidence of pronounced agreement among students that BL facilitated better understanding and revision of course content, increased their confidence in the financial accounting

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subject and, in particular, extended their learning outside of the classroom. Figure 5.8 illustrates students' level of agreement/disagreement with each question item.

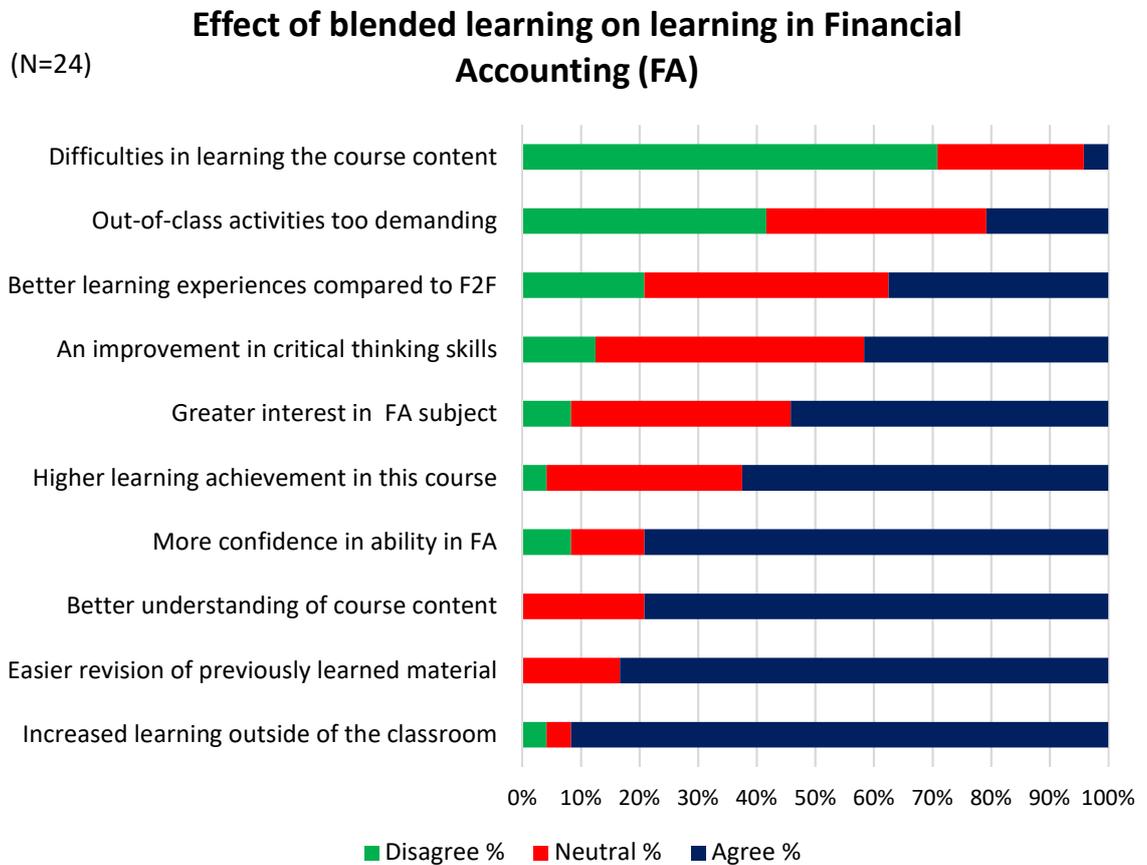


Figure 5.8 *Effect of blended learning on students' learning in Financial Accounting, 2017-18 questionnaire data*

A survey response revealed that 79% of respondents agreed that BL led to more confidence in their ability in Financial Accounting. In the student logs, one student commented on the increase in confidence she achieved having completed the online learning activities:

[I] felt more confident going in the first class to do a question on the topic having looked at the video and practised the online questions and assessments. (2017-18 Student 2, semester 2 student log)

71% of respondents disagreed when asked if BL led to difficulties for them in learning the course content, with only 4% expressing agreement. Nonetheless, only 42% agreed that the BL improved their critical thinking skills, indicative of a potential area for improvement.

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5.3.1.3 Learning from ratio analysis discussion forum

Mixed results were manifest in responses to questions dealing specifically with the effect of the ratio analysis discussion forum on student learning, as can be seen in Figure 5.9. While 38% agreed that the forum improved their critical thinking skills; still 25% expressed disagreement. Similarly, 42% disagreed with the statement “I felt that the discussion forum did not improve my learning”; yet 25% indicated they were in agreement. Nevertheless, a majority of students agreed that the discussion forum was of assistance when completing the ratio analysis assignment report. This was also corroborated by participant feedback during the group interview.

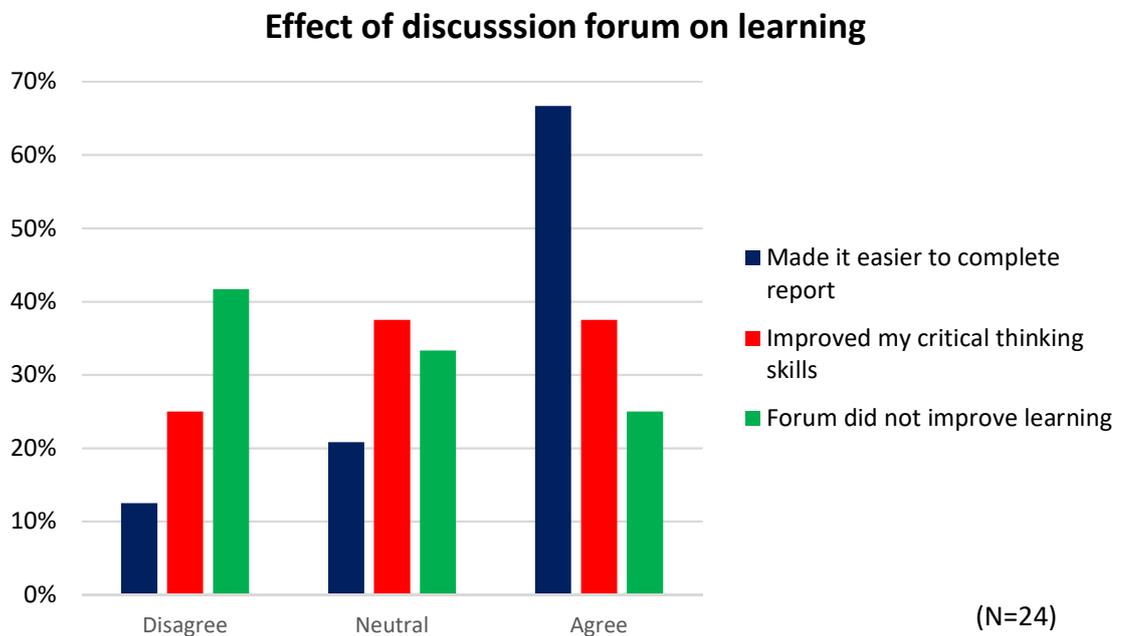
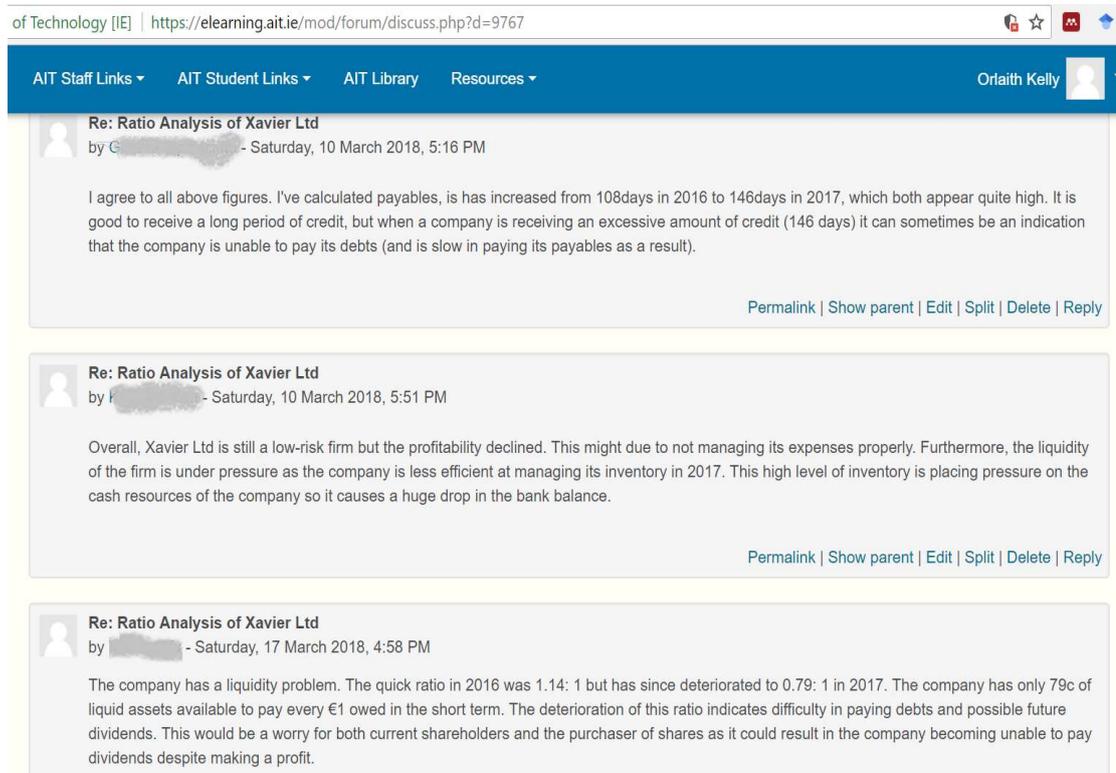


Figure 5.9 Effect of ratio analysis discussion forum on students' learning, 2017-18 questionnaire data

Overall, the evidence regarding positive effects of the BL on critical thinking skills of students is unconvincing, as illustrated in Figure 5.8 and Figure 5.9. The researcher uncovered little evidence of knowledge-building when reviewing posts to the forum, with the majority of posts unlinked to previous posts as evident from the discussion forum screenshot displayed in Figure 5.10. However, this may be due to the fact that all 27 students were posting to the same forum about one company, leading to a lack of content material on which to comment, as suggested by participants during the group interview. In addition, the structure of the forum may have inhibited students' ability to comment coherently in a knowledge-building

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fashion. This will be discussed later under the *Interaction* heading within this chapter.



The screenshot shows a forum page with a blue header containing navigation links: 'AIT Staff Links', 'AIT Student Links', 'AIT Library', and 'Resources'. The user 'Orlaith Kelly' is logged in. The forum title is 'Re: Ratio Analysis of Xavier Ltd'. There are three posts:

- Post 1:** Posted by 'C...' on Saturday, 10 March 2018, 5:16 PM. Content: "I agree to all above figures. I've calculated payables, is has increased from 108days in 2016 to 146days in 2017, which both appear quite high. It is good to receive a long period of credit, but when a company is receiving an excessive amount of credit (146 days) it can sometimes be an indication that the company is unable to pay its debts (and is slow in paying its payables as a result)." Actions: Permalink | Show parent | Edit | Split | Delete | Reply
- Post 2:** Posted by 'F...' on Saturday, 10 March 2018, 5:51 PM. Content: "Overall, Xavier Ltd is still a low-risk firm but the profitability declined. This might due to not managing its expenses properly. Furthermore, the liquidity of the firm is under pressure as the company is less efficient at managing its inventory in 2017. This high level of inventory is placing pressure on the cash resources of the company so it causes a huge drop in the bank balance." Actions: Permalink | Show parent | Edit | Split | Delete | Reply
- Post 3:** Posted by '...' on Saturday, 17 March 2018, 4:58 PM. Content: "The company has a liquidity problem. The quick ratio in 2016 was 1.14: 1 but has since deteriorated to 0.79: 1 in 2017. The company has only 79c of liquid assets available to pay every €1 owed in the short term. The deterioration of this ratio indicates difficulty in paying debts and possible future dividends. This would be a worry for both current shareholders and the purchaser of shares as it could result in the company becoming unable to pay dividends despite making a profit."

Figure 5.10 Ratio analysis discussion forum postings. 2017-18

It is obvious that the ratio analysis discussion forum and report must be adapted in design cycle two to include a comparative analysis of two companies which would extend further the critical thinking skills of students and provide more enhanced learning benefits.

5.3.1.4 Enhanced understanding

Seventeen of the group interview coded statements related to students' enhanced understanding having engaged with the online learning resources. A number of students emphasised a move away from rote learning, particularly in relation to the ratio analysis topic:

It was easier to learn the ratio formulas as well because I hadn't a clue about doing it in the LC, just learned them by heart. (2017-18 Student 12, group interview)

Personally I thought that it was very useful especially the blended learning that we had on the ratio analysis because I know in the leaving cert I found out from the teacher that I could totally skip that section and still do the exam so I didn't do the ratios, so that was a great just trying to get back and you know try and actually learn

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what it is this time around, rather than just skimming through it like I did last [time] ... that was the reason why I didn't do it in the LC because we were just given the formulas, no reasons why we are using these figures or anything like that. (2017-18 Student 9, group interview)

I've done ratios and accountancy before and it wasn't until I actually did them and I did the forum and I did the questions this time that I got an actual understanding of what I was saying. Last time it was just rote learning and hoped to God it matched the ratio we were working out. (2017-18 Student 2, group interview)

In the student logs, many of the students referred to their ability to easily understand the online material:

I liked the fact that we were able to do the resource in our own time. This allowed me to get a better understanding and have more time to look at how to do them [ratio calculations]. (2017-18 Student 12, semester 2 student log)

I also liked how well the topic was explained and the use of quizzes and questions to reinforce my learning. (2017-18 Student 28, semester 1 student log)

The blended learning process was beneficial as you could go back into the resource if you were ever stuck with a question and if you didn't understand it the first time you could do it again until you understood it. (2017-18 Student 17, semester 1 student log)

This point was also repeated in open-ended comments in the post-implementation questionnaire:

I liked being able to go back and review the videos and improve my understanding of the topic. (2017-18 Student 28, survey response)

Being able to take my time with the online resource ... helped with what I had previously learned but not understood at leaving certificate. (2017-18 Student 9, survey response)

It's a great way to learn because you can keep going over it until you get it. (2017-18 Student 27, survey response)

5.3.1.5 *Ease of revision*

Agreement was expressed by 83% of questionnaire respondents agreed that BL led to easier revision of learning material. Furthermore, during the group interview, participants stressed the usefulness of the online resources when revising material, with comments such as:

They're [online quizzes] actually a good thing to look at before you start studying to see what actually have to really focus on. (2017-18 Student 2, group interview)

Especially before exam. You can remind yourself before exam. You can come back to blended learning ... to catch up. (2017-18 Student 6, group interview)

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5.3.1.6 Online assessments

Seven of the questions in the post-implementation survey dealt with students' perceptions of using online quizzes for continuous assessment, where students responded by stating their level of agreement on a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). A mean score was calculated for each question item. Results displayed in Table 5.3, revealing mean (M) and standard deviation (SD) for each question item, indicate that students were predominantly positive about their experience of online continuous assessment, with the majority of students indicating agreement with all question items.

Table 5.3 Students' perceptions of online continuous assessment, 2017-18 questionnaire data

	M (N=24)	SD	% Agree or Strongly Agree
The Moodle assessment quizzes were effective in assessing my level of knowledge.	4.00	1.10	79%
I prefer continuous assessment using an in-class assessment rather than a Moodle quiz (reverse-scored).	3.50	1.50	29%
I liked being able to sit the assessment in my own time.	4.58	0.78	92%
I liked being able to have two attempts at the assessment.	4.75	0.44	100%
I liked getting instant feedback on my result once I completed the quiz.	4.83	0.48	96%
The Moodle assessment quizzes prepared me well for the end-of-semester exam.	4.29	0.86	83%
Moodle assessment quizzes result in better feedback to students than in-class assessments.	3.87	0.95	58%

Students were particularly pleased with the ability to take the assessment in their own time, having more than one attempt, and the instant feedback they received once the quiz was completed. Students made no suggestions for improvement regarding

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the online assessments which appears indicative of overall student satisfaction with this aspect of the BL design.

5.3.1.7 Face-to-face learning and teaching experience

As BL is an educational approach which delivers learning activities using a combination of f2f and online learning modes, it was deemed appropriate to assess students' perceptions of the quality of the f2f learning experience. Seven items were included in the post-implementation questionnaire to assess students' perceptions of the lecturer's integration of technological, pedagogical and content knowledge in her teaching. These items were adapted from the TPACK questionnaire developed by Jang and Tsai (2012) to examine elementary school science and math teachers' TPACK when using interactive whiteboards. Items were rated on a Likert type scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). A mean (M) score along with standard deviation (SD) was calculated for each item, results of which are presented in Table 5.4.

Responses indicated a profound level of satisfaction among students regarding the teaching and assessment approaches used in the module, combined with the use of technology. Students also valued the variety offered by learning activities integral to the BL approach. During the group interview, one student commented:

Because you're kind of doing something different from week to week and you're not just repeating the same thing like go in for a class and eventually have everything in one exam. You're actually doing different things. You don't get bored of the subject. ... I know we have subjects where we just go in for a lecture, take notes and that's all we do. And I think after a while that just gets very repetitive and you don't really want to just sit there and just do the same thing over. (2017-18 Student 9, group interview)

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Table 5.4 Students' perceptions of lecturer's integration of technological, pedagogical and content knowledge, 2017-18 questionnaire data

	M (N=24)	SD
The lecturer had a sufficient knowledge of the subject to answer students' questions.	4.42	0.97
The lecturer adjusted her teaching approaches based on the students' level of understanding.	4.33	0.70
The teaching approaches used made me stay interested in the content of the accounting subject.	4.17	1.05
The assessment methods used evaluated my understanding of the accounting subject.	4.12	0.85
The lecturer used technology in her teaching activities.	4.54	0.66
The use of technology in this module made the teaching more effective.	4.37	0.82
The use of technology increased my understanding and learning of the content.	4.21	0.72

Group interview participants expressed satisfaction with the teaching style employed by the lecturer whereby solutions to problems were illustrated using Excel or the whiteboard, with one student remarking:

It's good to see you work through it instead of just seeing the answer. (2017-18 Student 26, group interview)

Student responses to a survey question asking for their opinions on the adequacy of the number of f2f hours they received for each BL topic are illustrated in Figure 5.11. The majority of respondents believed they received the correct number of contact hours for each topic.

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(N=24) Students' views on number of face-to-face hours received per topic

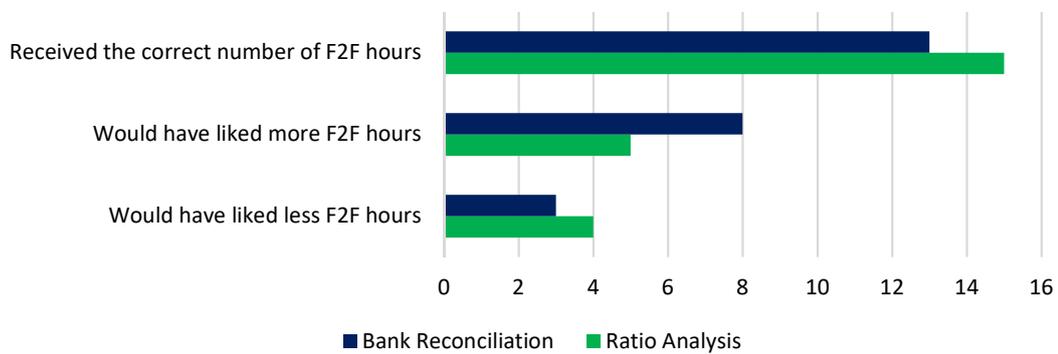


Figure 5.11 Students' level of satisfaction regarding number of face-to-face hours received, 2017-18 questionnaire data

Students who indicated they would have preferred less f2f hours explained by commenting they preferred to work at their own pace, or felt they had adequate accounting knowledge from their previous study at leaving certificate level.

Students who would have liked more f2f hours indicated it would have given an opportunity for them to ask questions, with two students suggesting they would have preferred an introductory class on each topic first before viewing the multimedia resource in their own time. While students were introduced to the online resources in the computer laboratory prior to the BL topic, all the f2f contact 'topic' hours took place after viewing the multimedia resource. The researcher believes that re-scheduling of f2f hours to incorporate one contact hour in advance of viewing the resource in design cycle two may reduce student anxiety around the inability to ask questions while viewing the resource.

5.3.1.8 Worked examples

During the group interview, students also recommended including another worked example, as part of the online resource, which illustrated the solution to a more advanced problem. Four students (17%) recommended this as a proposed change for the second design iteration in response to an open-ended survey question. This was also echoed by a number of students in their student log entries and during the group interview. In open-ended questions in the post-implementation questionnaire, one student remarked:

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I would have liked to go over some easier question before we started on the harder questions, as I was confused as the resource only went through one question. (2017-18 Student 12, survey response)

The researcher intends to develop additional worked examples for each topic for the next design cycle to scaffold students with additional example practice before they move onto independent problem-solving exercises.

5.3.1.9 Exam results

The exam paper at the end of each semester assessed topics studied, with the relevant BL topic being examined in Q2 on each paper in the 2017-18 academic year. Both Q1 and Q2 were compulsory questions with students also required to choose one question from Q3 and Q4. Students know in advance that Q1 will be a final accounts question, so they typically tend to focus their study efforts on this topic, generally resulting in higher scores for this question. The mean mark achieved on Q2 (both blended topics) was above the overall mean mark achieved on the exam paper in both semesters, indicating above average performance in both of the BL topics for this class group. Further details of exam scores are provided in Appendix 15.

Twenty-six students completed the ratio analysis assignment report. Marks awarded included 25% for lower-level skills (formulae calculations and presentation), 25% for discussion forum participation and 50% for use of higher level cognitive skills (analysis, evaluation and report creation). Students achieved a mean mark of 60.29% on the assignment (SD = 14.39%) with a mean score of 61.54% achieved on the 'higher level cognitive skills' element of the assignment (SD = 16.54%).

The majority of students achieved a second-class honours overall grade on the assignment, with only one student receiving a failed grade (see Figure 5.12). Eight students refrained from posting comments to the discussion forum, which had a marked effect on their final assignment grade. Four of the five students who achieved a pass or fail grade on the assignment had not posted any comment to the forum. When the 'higher level cognitive skills' aspect of the report is examined in detail, a level of disparity is evident, with 46% of students (n=12) achieving a first-class honours grade, while 12% (n=3) of students failed this element.

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(N=26)

Ratio analysis assignment grades 2017-18

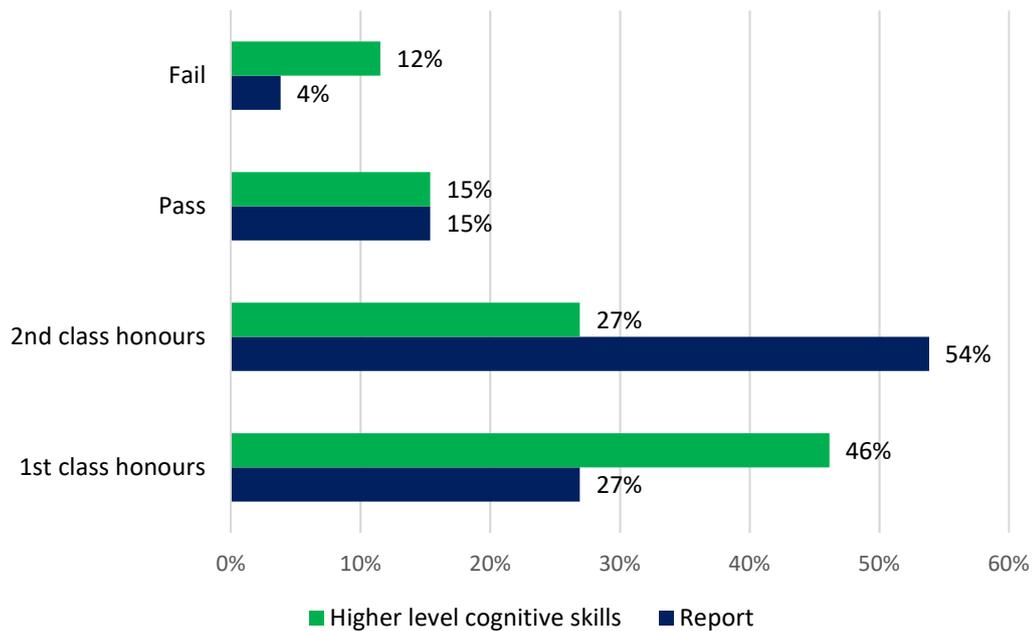


Figure 5.12 Students' grades on ratio analysis assignment task, 2017-18

5.3.2 *Autonomy*

Holec (1981) cited in Chan (2001, p. 505) defines autonomy as “the ability to take charge of one’s own learning”. Thanasoulas (2000) illustrates learner autonomy as an ongoing volatile process responsive to educational interventions rather than a fixed end-state, which is reached once and for all. The BL educational experience was designed with a view to allowing students become more autonomous as learners.

5.3.2.1 *Students' lifeload*

A BL design should facilitate students in achieving a balance between their college workload and the other time commitments which they face in life. Kahu (2013) postulates that ‘lifeload’, which is a combination of all the pressures in a student’s life (finances, health, dependants, employment), plays a crucial role in determining student engagement. In the post-implementation survey, students were asked to identify their time commitments apart from studying on this course (see Figure 5.13). All except six students identified they had other time pressures outside of their college course commitment, with the majority of students (54%) engaging in

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part-time employment. Five students (18%) had responsibilities for child dependants and six students had more than one outside time commitment.

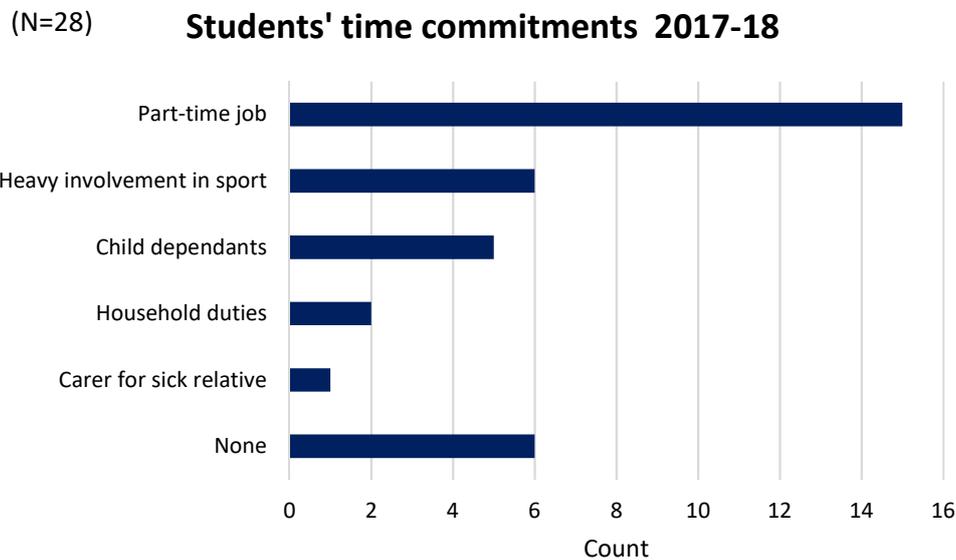


Figure 5.13 Students' other time commitments, 2017-18 questionnaire data

Students provided details of their commute distances to college in the pre-implementation survey. Eleven of the students in the class group (39%) commute a distance greater than 20 kilometres to college on a daily basis, with four of these students enduring a journey time of over one hour each morning (see Appendix 11).

5.3.2.2 Perceived flexibility of blended learning

One of the questions on the post-implementation survey sought students' views of the flexibility offered by the BL process by stating their level of agreement with five statements using a five point Likert type scale where 5 is *Strongly Agree* and 1 is *Strongly Disagree*. Four of these questions were adapted from a study on BL in higher education in Saudi Arabia (Almalki, 2011). The mean results per question item are displayed below in Table 5.5. Students particularly valued the flexibility offered by the BL design in terms of their learning time and access to course materials outside of class time.

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Table 5.5 Flexibility scores by question item, 2017-18 questionnaire data

<i>Blended learning allowed me to:</i>	Mean (N=24)	SD
Have more flexible learning time.	4.21	0.66
Save time on unnecessary travel to college.	3.88	1.33
Better manage my other commitments outside of college.	3.62	1.06
Access lessons on Moodle on days when I am absent from class.	4.12	0.85
Save money on unnecessary travel to college.	3.71	1.37
Total flexibility score	19.54	3.95

As BL was only introduced in two financial accounting topics, students would not have experienced the full benefits of the possible savings in time and travel cost had it been implemented across an entire module or programme, leading to reduced agreement in relation to these items across all participant responses.

Student scores on each question item were summed to achieve individual student ‘flexibility scores’, which were subsequently classified as low (5-11), medium (12-18) or high (19-25). As Figure 5.14 illustrates, the majority of students achieved high flexibility scores, with only two students placing a low value on the flexibility offered by the BL design. Strong disagreement expressed by these two students in relation to saving time and money on unnecessary travel to college as a result of BL, contributed to their low flexibility scores.

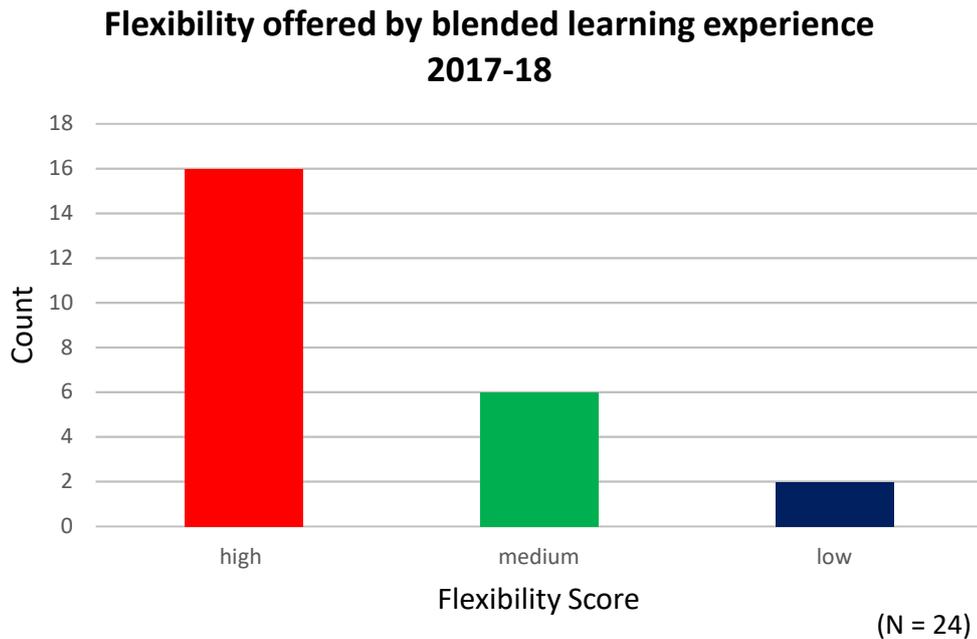


Figure 5.14 Flexibility scores from 2017-18 post-implementation questionnaire data

The BL design, offering online learning material coupled with reduced f2f hours, was deemed highly flexible by the majority of questionnaire respondents. The fact that a large number of students on the programme have outside commitments, such as part-time employment and child dependants, as well as many engaging in long commutes to college may have contributed to this heightened sense of satisfaction. Further supporting evidence lies in the fact that 71% of students agreed that they would like to see BL offered in more financial accounting topics and 88% agreed they would like to see BL offered in more modules on their programme. Students who disagreed remarked that the suitability of BL in other topics/modules would depend on the nature of the learning material to be delivered.

5.3.2.3 Independent learning

McDevitt (1997) recognises the creation of an independent learner as one of the aims of education. The BL experience was designed with a view to offering students a greater opportunity to take responsibility for their own learning.

There was resounding agreement that the multimedia resource resource allowed students to work at their own pace, with 88% of students who completed the post-implementation survey expressing agreement along with no dissenting response (see Figure 5.15).

Multimedia resource allowed me work at my own pace

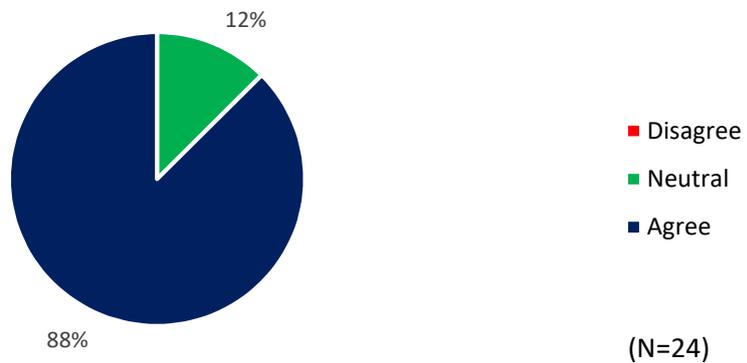


Figure 5.15 *Students' views on multimedia resource allowing them to work at own pace, 2017-18 questionnaire data*

Students clearly appreciated the flexible learning time offered by the BL approach. When asked open-ended questions in the post-implementation survey on what they liked most and least about the BL process, eighteen respondents (75%) determined that the autonomy of learning in their own time and at their own pace was the aspect they liked best about the BL process. These sentiments were further evident in 35 of the coded group interview statements as well as in the student logs.

The value of working at their own pace was emphasised within qualitative datasets:

You could take it at a slower pace than if you are in the classroom environment where you might be dazing in and out. You wouldn't be concentrating 100% whereas you could stop and start this. (2017-18 Student 28, group interview)

The benefit of blended learning is that it allows a student to learn at his/her own pace. It can be difficult for some students to keep up in a classroom whereby using the material supplied in the blended learning program, you can review the program numerous times in order to better understand. (2017-18 Student 20, semester 2 student log)

I liked that I was able to learn at my own pace and easily go over topics I needed help with and skip those I understood. (2017-18 Student 18, semester 2 student log)

Students commented on the flexibility offered by the availability of learning resources for use in their own time:

If you're not able to make it to college one of the days, it's not a major problem as you're well able to review the video any time at home for as many times as you need. Some people learn quicker and so they're able to skip parts which they know well and save some time. (2017-18 Student 14, semester 1 student log)

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Overall I found the experience OK and better for me as a mother having to spend less time in college but still able to keep up with the topic. I was home earlier on a Tuesday and could access the topic when I had free time to do so. (2017-18 Student 2, semester 1 student log)

Doing the assessment on Moodle during the weekend was a great help because I had time to study and watch the video. (2017-18 Student 10, semester 2 student log)

It eliminates the need to come into college. Most of our class travel everyday so that more we can do at home the better. (2017-18 Student 15, survey response)

The reduced f2f hours were mentioned as important in the student logs, group interview and open-ended survey responses:

It's an extra workload [online resources] on top of what you already have. It didn't feel like an extra chore when we got a couple of hours off. (2017-18 Student 2, group interview)

I liked the freedom you had and not having an extra class in the evenings as well. (2017-18 Student 10, semester 1 student log)

[I liked] not having to attend class and I have to drive from Cavan so it was nice to be able to not drive up and still get work done. (2017-18 Student 19, semester 2 student log)

The ability to review or catch up on material using the online learning resources was endorsed by a number of students in both the group interview and student logs:

Sometimes you can be in class, you might just be having an off-day. There could be something going on and you mightn't take everything in, but to have something there to go fall back on is a great help ... Or even say if you were sick or something and couldn't make the class that's specifically on. That's always there to go back and do it when you're feeling well or whatever. 'Cause if you miss a double class, you miss a lot. (2017-18 Student 2 group interview)

It is also handy to be able to go back and review the resource whenever one wants to, as you are being guided through the lesson again rather than just reviewing notes. (2017-18 Student 28, semester 2 student log)

While students clearly valued the flexibility offered by the BL process, some students clearly struggled with taking responsibility for their own learning. Three students (13%) admitted that they disliked the responsibility of learning on their own, when asked what they liked least about the process in the post-implementation survey. This was also alluded to by some students in their student logs. Students remarked:

I disliked not being in a classroom environment free from distractions and I like being able to ask my teacher and classmates face-to-face questions on topics that we are learning. (2017-18 Student 28, semester 1 student log)

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Was very nervous teaching myself at home. Don't trust myself in case I'm wrong. (2017-18 Student 2, semester 1 student log)

I feel that it is beneficial to learn on my own, I am sometimes unsure if I am right or not and I'm very doubtful of myself. (2017-18 Student 23, semester 1 student log)

I left it till last minute and didn't give myself enough study time because I didn't have a lecturer telling me to do it. (2017-18 Student 10, survey response)

You had to remember to look at the resource. Classes are scheduled, blended learning wasn't and it was easy to pass off. (2017-18 Student 15, survey response)

This may be due to students' familiarity with traditional teaching methods which often engender a passive role for the learner, concurring with the findings Chen *et al.* (2015) where there was evidence of student reluctance in taking greater responsibility for their own learning in a flipped classroom approach. Notably, the majority of comments relating to issues with taking responsibility for their own learning were made in the semester 1 student logs, with only one student making reference in semester 2. One student remarked during the group interview how she became more comfortable with the BL approach as she became familiar with it:

It wasn't as nerve-wrecking doing it the second time. The first time you're like, "Oh my God I'm trying to learn this, there's no teacher here" and the second time you're thinking "Well I've done this already, so I probably have the capability of doing it again". (2017-18 Student 2, group interview)

This corresponded with the researcher's view as she observed students becoming more relaxed with the new online learning and assessment approach in semester 2. (Kelly, 2018).

It was clear from the findings that the BL experience could be improved by facilitating the students to become more autonomous as learners, allowing them to become more comfortable with taking responsibility for their own learning. Students can be facilitated to regulate their learning by ensuring appropriate orientation towards online resources, promoting interaction among students, monitoring of online activities and encouraging reflective learning (McDevitt, 1997; Smith, 2003; Cho and Shen, 2013). These aspects of the BL experience will require further development in design cycle two; in particular, there is a need to focus on promoting student interaction and allowing opportunities for learner reflection.

5.3.3 Collaboration

The researcher placed a focus on collaborative online opportunities within design cycle one, primarily through the provision of a ratio analysis discussion forum. Collaborative group work activities in the f2f setting were not formally instituted within the design, with a reliance instead on informal pair work activities which occur spontaneously to facilitate such collaboration. It became apparent from subsequent analysis of the cycle one findings that, in order for rich and valuable collaboration to occur, it must be designed into the learning experience with student feedback revealing a desire for such opportunities in the f2f class setting. Relevant findings are presented here, with an aim of collaborative activities featuring more prominently within the BL design going forward.

Students were asked about how BL facilitated them in collaborating and contributing to course materials. 54% agreed (n=13) that BL encouraged them to collaborate and share ideas, while 50% agreed (n=12) that it facilitated them in contributing to course materials, as seen in Figure 5.16.

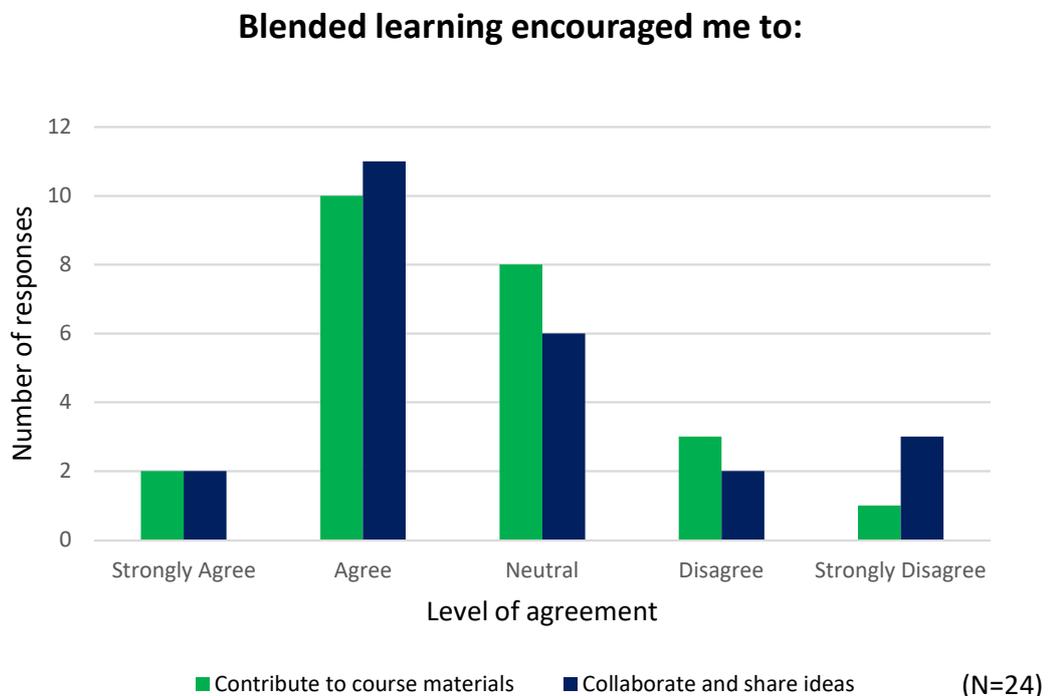


Figure 5.16 Effect of blended learning on student collaboration, 2017-18 questionnaire data

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There was considerable disagreement among students that BL helped them to learn from others, as evident from Figure 5.17. This may be due to the reduced f2f hours which formed part of the design.

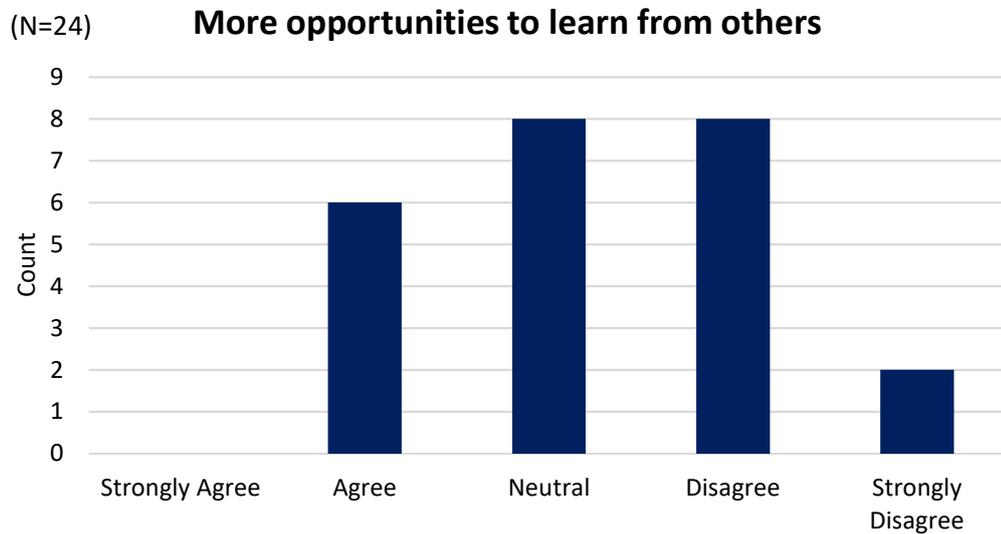


Figure 5.17 *Students' perceptions of opportunities provided by blended learning to learn from others, 2017-18 questionnaire data*

While students often double-checked answers in pairs while working on solutions in class, the researcher is cognisant of her failure to incorporate more formal collaborative group work activities during f2f classes. It is apparent that increased opportunities for collaboration during f2f classes must be employed in the next design iteration. This finding corresponds with the lack of engagement with the ratio analysis discussion forum, which will be discussed presently. Increased participation in the discussion forum going forward would lead to further opportunities for students to learn from one another.

5.3.3.1 Collaboration through ratio analysis discussion forum

The ratio analysis discussion forum was the element of BL which enabled students to collaborate and contribute to course materials. It is evident from Figure 5.16 above that, while the majority of students agreed that collaboration was encouraged, there was a large percentage expressing a neutral or dissenting position.

Scardamalia and Bereiter, (1994) argue for knowledge-building communities that “work to produce knowledge – a collective product and not merely a summary report of what is in individual minds or a collection of outputs from group work” (p. 270)

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and recommend using technology to support knowledge-building communities in extending the discourse outside of school hours. The aim of the ratio analysis discussion forum was to provide an opportunity for collaboration among learners while also employing technology to extend the learning process outside of the classroom.

Student participation in the online ratio analysis discussion forum was measured using Moodle activity logs to track student usage. Summary usage data are reported in Table 5.6 below. Students used the forum in semester 2 for analysis and discussion in advance of submitting a written assignment on the financial performance of a company on 11 March 2018. All students in the class group (N=27) accessed the forum; nevertheless, only 19 students posted content to the forum, with an average of 2.9 posts per student, evidence of some students playing a ‘lurking’ role whereby they read discussion postings rather than engaging in active participation (Salmon, 2011). The forum was viewed 226 times by students with an average of 8.4 views per student. Although students were awarded marks for posting to the forum as part of their assignment, this appeared to be an insufficient incentive to encourage all students to post comments. Two students accessed the forum in advance of the end-of-semester exam on 30 April 2018, presumably for revision purposes.

Table 5.6 Ratio analysis discussion forum usage, 2017-18

	Number
Students who accessed/viewed the forum	27
Students who posted to the forum	19
Posts to forum by students	55
Posts to forum by lecturer	15
Forum views (excluding posts)	226
Students who accessed the forum before end-of-semester exam	2
Viewing period	4 Feb – 29 Apr 2018

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The researcher noted that this was the element of BL with which the students engaged the least (Kelly, 2018). Students were reluctant to comment on the forum, with only 50% of students posting comments during the first week of opening. Additionally, 54% students agreed that they felt anxious while commenting on the forum as displayed in Figure 5.18.

Felt anxious while commenting on forum

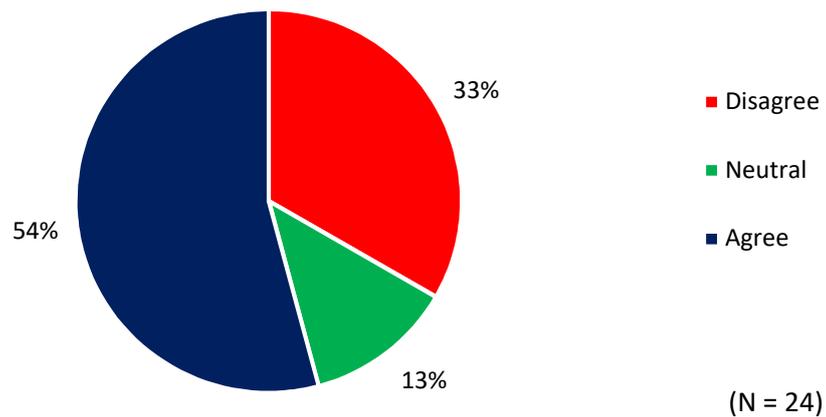


Figure 5.18 Anxiety about commenting on discussion forum, 2017-18 questionnaire data

This was corroborated by students during the group interview who commented:

It was hard to actually put yourself out there and type something and think oh my God like there's 20 odd people about to shoot me down anytime now. (2017-18 Student 2, group interview)

I didn't put anything [post on the discussion forum] until I was kinda sure and when I saw somebody else had the same answer, I was like ticking them off. (2017-18 Student 26, group interview)

These findings support the view of Harel and Papert (1990, p. 26) that students are “emotionally safe” when regurgitating knowledge delivered from instructors and many view poor exam performance as a lesser threat than “exposing one’s own ideas”.

When asked specifically about the learning benefits of the ratio analysis discussion forum in a survey question, 50% of students agreed that the forum helped them to learn from others, with 29% expressing disagreement (see Figure 5.19). Similarly, while group interview participants indicated that they disliked participating on the forum, they all agreed that it contributed to enhanced learning. This contrasted with

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findings by Jones and Chen (2008), where it was felt by the majority of students that required discussion forum participation did not lead to enhanced conceptual understanding on a blended MBA programme. One student alluded to this during the group interview, indicating an absence of higher-order thinking on the forum:

The problem was, there wasn't enough opinions. That's what I found the problem. Some people just put the ratio up and left it. (2017-18 Student 26, group interview)

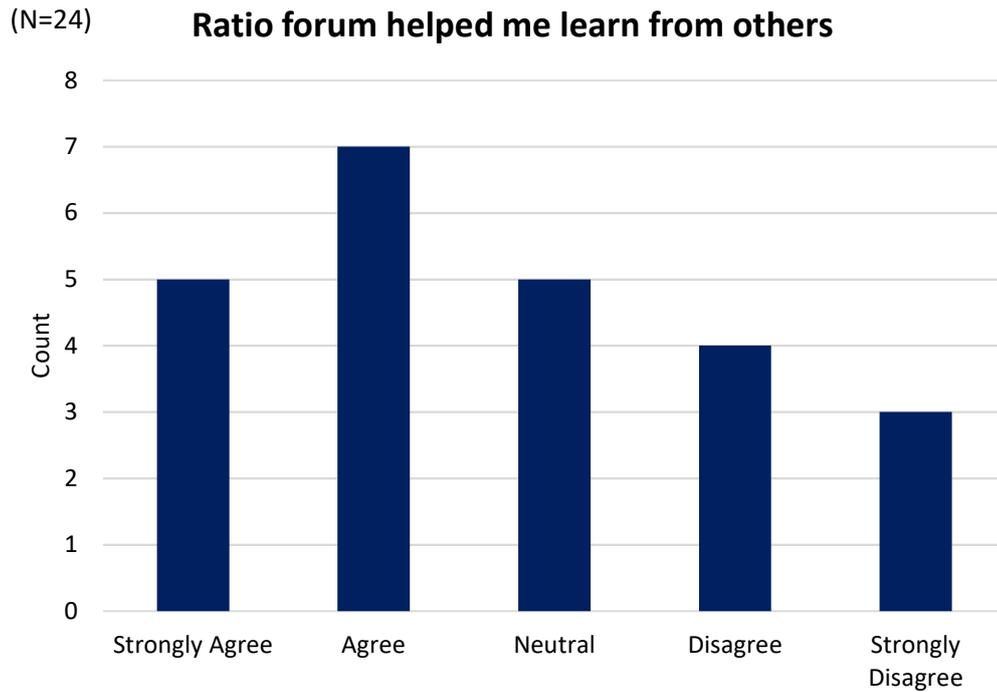


Figure 5.19 Student perceptions of learning from others through ratio analysis discussion forum, 2017-18 questionnaire data

Due to the fact that discussion forum use was a novel experience for students in the class, a level of stress existed among some students regarding its use, with one student commenting that it would be “less daunting” next year. Mechanisms to prevent and alleviate student anxiety around using the forum and promote increased engagement need to be adopted in design cycle two, such as scaffolding students while allowing them an opportunity to slowly become accustomed to discussion forum use.

5.3.3.2 Communication apprehension

A review of the literature in chapter two revealed research findings which show evidence of high communication apprehension levels among accounting students

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(Simons and Riley, 2014), defined by McCroskey (1977, p. 78) as “an individual’s level of fear or anxiety associated with either real or anticipated communication with another person or persons”.

The researcher observed that the majority of students in the class group were particularly averse to speaking out and responding to questions during lectures (Kelly, 2018), which inhibited engagement in some learning activities. This was noted by one student, who attributed the problem to the learning and teaching ‘culture’ of the entire programme:

I think that might just be an issue with our class this year, for some reason. Every class we’re in, we just don’t like answering at all. I think it’s also like if you [financial accounting lecturer] were to have a very talkative class I think it might not work if in all the other ones we don’t talk. I think it just needs to be overall we would need to be more engaged with all the other classes as well. (2017-18 Student 9, group interview)

One student suggested using group work to counteract the problem, with all group interview participants expressing agreement with the proposal:

Use smaller groups. You know like if you ask a question at the top of the class, everyone looks down ... You’re just afraid you’re going to say the wrong thing and look like an idiot in front of everyone. So maybe if it was like broken down into smaller groups it might not be as bad. (2017-18 Student 28, group interview)

It appears evident that students’ reluctance towards speaking out in class may be averted by use of collaborative group work exercises, while also providing further opportunities for students to learn from one another. Such collaborative activities must be incorporated in the BL design during the next iterative cycle.

5.3.4 Engagement

5.3.4.1 Engagement with online multimedia resource

Students’ level of engagement with the online multimedia resource was measured using ten items on the survey adapted from *The User Engagement Scale*, which was devised by O’Brien and Toms (2008), based on flow, play, aesthetics, and information interaction theories. Ten of the survey items were adapted from The User Engagement Scale and assessed using a five point Likert type scale.

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O'Brien, Cairns and Hall (2018) present the items using four subscales – aesthetics, focused attention, perceived usability and reward factor – recommending that scores should be calculated as an average for each sub-scale and that a total score should be obtained by summing the averages for each sub-scale. Results are displayed in Table 5.7.

Table 5.7 Mean engagement scores by sub-scale item from 2017-18 post-implementation data

	M (N=24)	SD
<p>Aesthetics</p> <p>The screen layout of the resource was visually pleasing.</p> <p>I liked the graphics and images used in the resource.</p>	3.77	0.81
<p>Focused attention</p> <p>I blocked out things around me when I was using this resource.</p> <p>I was so involved in using this resource that I lost track of time.</p>	2.81	0.91
<p>Perceived usability</p> <p>I felt frustrated while using this resource (reverse-scored).</p> <p>Using this resource was stimulating.</p> <p>Using this resource was difficult (reverse-scored).</p>	3.72	0.60
<p>Reward factor</p> <p>Using this resource was worthwhile.</p> <p>I would recommend that others use this resource.</p> <p>I continued to use this resource out of curiosity.</p>	3.50	0.61
<p>Total Mean Engagement Score</p>	13.80	1.85

Total engagement scores for individual students were calculated by summing students' mean scores on each sub-scale. Resultant total scores were subsequently classified as low (4 – 9.33), medium (9.34 – 14.66) or high (14.67 – 20), revealing that the majority of students displayed medium or high levels of engagement with the online multimedia resources, as displayed in Figure 5.20.

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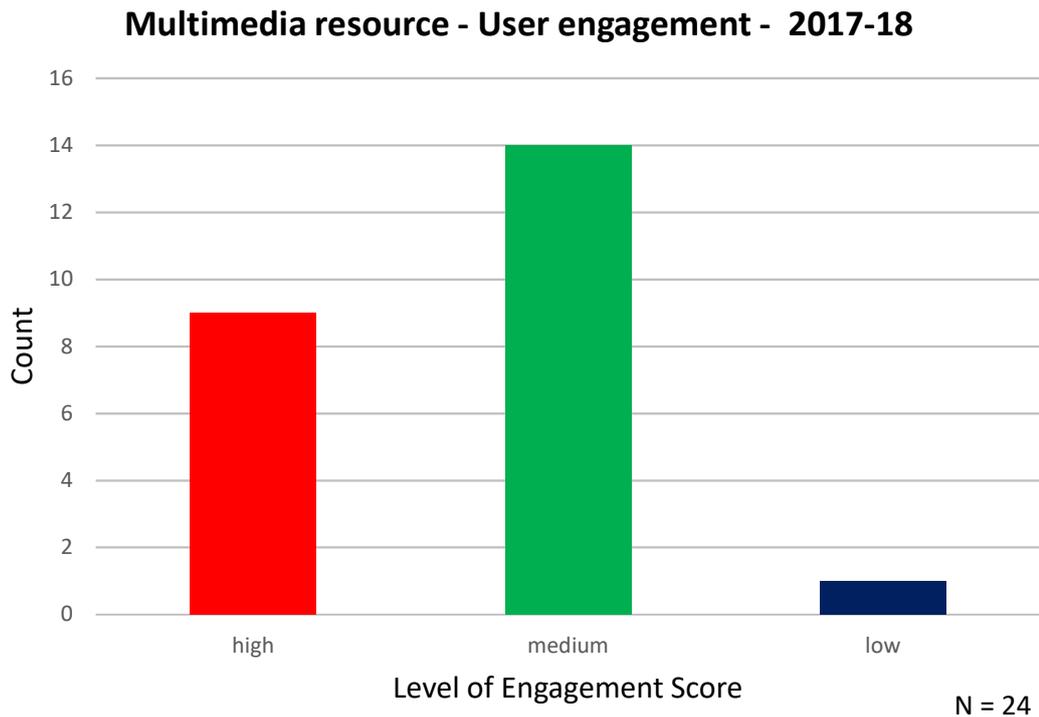


Figure 5.20 Level of engagement scores from 2017-18 post-implementation questionnaire data

The solitary student who exhibited a low level of engagement in respect of the multimedia resource, reacted negatively towards the aesthetics and focused attention question items; however, she did indicate that the resource was not difficult to use, was worthwhile and that she would recommend it to others.

O'Brien and Toms (2008) identify intrinsic motivation as a subset of engagement. Six items were taken from the *Intrinsic Motivation Instrument* (IMI) and adapted for inclusion in the post-implementation questionnaire. The IMI was developed by the Self-Determination Theory Group and assessed using a scale of 1 to 7 (Center for Self-Determination Theory, 2018). However, in order to maintain consistency within the post-implementation questionnaire in this study, students were asked to state their level of agreement with the six statements on a five point Likert scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Mean scores for each question are displayed in Table 5.8 with a maximum possible score of five for each item.

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Table 5.8 Mean motivation scores by question item, 2017-18 post-implementation data

	M (N=24)	SD
Interest/Enjoyment		
Using this resource was quite enjoyable.	3.50	0.83
Using this resource was a boring activity (reverse-scored).	3.67	0.96
This resource was fun to use.	3.25	0.85
Pressure/Tension		
I was anxious while using the resource (reverse-scored).	4.08	0.83
Value/Usefulness		
This resource helped to improve my knowledge of bank reconciliation / ratios.	4.13	0.85
This resource is useful for revision of a topic before the final exam.	3.88	1.04

Students expressed higher levels of motivation in respect of the perceived usefulness of the multimedia resources in promoting learning and revision, rather than the fun and enjoyment they derived from using the resources. In addition, use of the multimedia resources did not appear to invoke anxiety among students, despite having to learn on their own without teacher assistance.

Student comments in open-ended post-implementation survey questions included:

I feel a mixture of face-to-face learning and online learning made this topic more interesting and enjoyable, a lot easier to learn. (2017-18 Student 28, survey response)

I really enjoyed the time spent studying in my own time and place like at home. (2017-18 Student 6, survey response)

Level of motivation scores for each individual student were obtained by calculating a mean score for responses to all six questions which were subsequently classified as low (1 – 2.33), medium (2.34 – 3.66) or high (3.67 – 5). Most students who participated in the questionnaire displayed high levels of motivation as illustrated in Figure 5.21.

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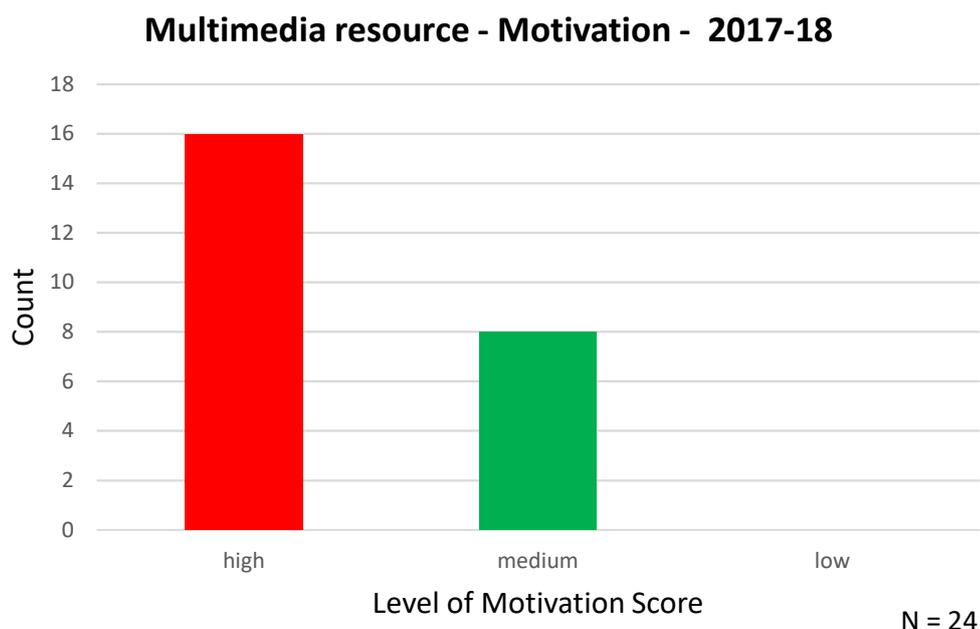


Figure 5.21 Level of motivation scores from 2017-18 post-implementation questionnaire data

5.3.4.2 Engagement with online assessment quizzes

Three online assessment quizzes formed part of continuous assessment for the financial accounting modules during the academic year. Tracking statistics obtained from Moodle activity logs are displayed in Table 5.9 below.

Table 5.9 Online assessment quiz participation, 2017-18

	Quiz 1 Oct 2017 (semester 1) N = 28	Quiz 2 Nov 2017 (semester 1) N = 28	Quiz 3 Feb 2018 (semester 2) N = 27
No. of students who submitted the quiz	28	28	27
Total number of attempts	62	62	43
No. of reviews following completion	42	50	16
No. of students who reviewed the quiz prior to end-of-semester exam	2	2	1
Mean mark achieved	76%	60%	94%

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Quiz 3, based on the ratio analysis topic, took place during semester 2 and was based on calculations using ratio formulae, assessing lower level cognitive skills. As this was the least challenging of the quizzes, it attracted a higher mean mark, coupled with some students perceiving no need to take a second attempt.

Due to some students experiencing technical difficulties and issues regarding Moodle in semester 1, students were offered a third attempt at the quizzes in that semester, which was availed of by some students. All students engaged with the online assessment quizzes, probably influenced by the fact that they counted towards their overall final mark in the financial accounting modules. In total, four different students reviewed their quiz attempts online prior to sitting their final semester exam. As the researcher has experienced students printing their completed quiz attempts and using hard copies for review purposes, it is likely that the figures in Table 5.9 do not fully reflect students' level of engagement with the quiz learning material. 63% of students indicated in the post-implementation survey that they had used the quizzes as a revision aid before the final exam.

As illustrated in Figure 5.22, there was profound agreement (88%) among students that being allowed two assessment attempts encouraged further study time to increase assessment scores. The lecturer observed students working hard following their first quiz attempt, based on communication she received from students (Kelly, 2018).

I studied more to increase my score on the second attempt

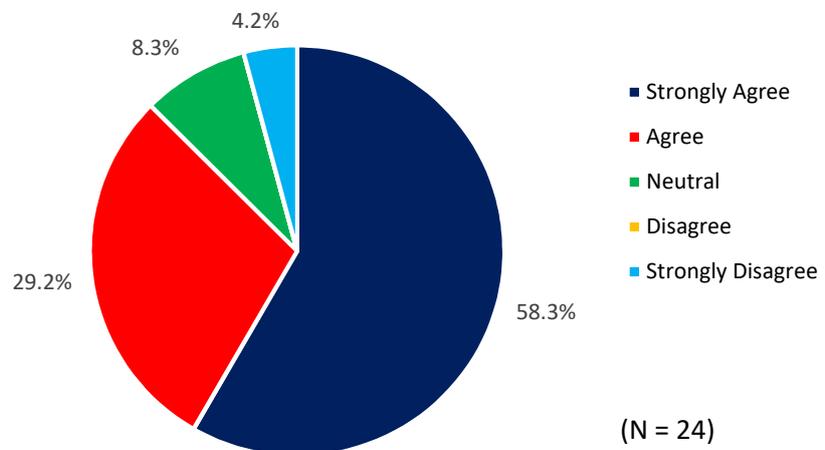


Figure 5.22 Study effort for online quizzes, 2017-18 questionnaire data

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This was echoed by students in group interviews, with comments such as:

It actually made you sit down and revise topics through the year as opposed to leaving it to one big bunch at the end of the semester. (2017-18 Student 2, group interview)

Definitely, because if it wasn't there [online quiz] I would be doing way less! (2017-18 Student 26, group interview)

It appears that the online assessment quizzes contributed to heightened and more consistent study efforts among students throughout both semesters, concurring with findings by Concannon, Flynn and Campbell (2005) in their study of accounting students e-learning habits in an Irish university.

5.3.4.3 Time invested in online activities

Survey responses revealed that students accessed the internet routinely with the majority of students reporting internet use frequency of more than once per day. Access to Moodle was less frequent; however, the majority of students logged onto Moodle regularly throughout the week, with only one student reporting infrequent access.

'Time-on-task' is often taken as a measure of engagement and is identified as one of the seven principles for good practice in undergraduate education (Chickering and Gamson, 1987). To establish the amount of time spent engaging with the online resources, students were asked to estimate the time spent viewing the ratio analysis multimedia resource and time spent completing one of the online quizzes. Reported results are shown in Figure 5.23. Students reported spending an average of 4.6 hours viewing the multimedia resource and preparing for and completing one online quiz. This would exclude any time spent at the end of the semester reviewing these resources as the post-implementation survey was administered before the end of semester 2.

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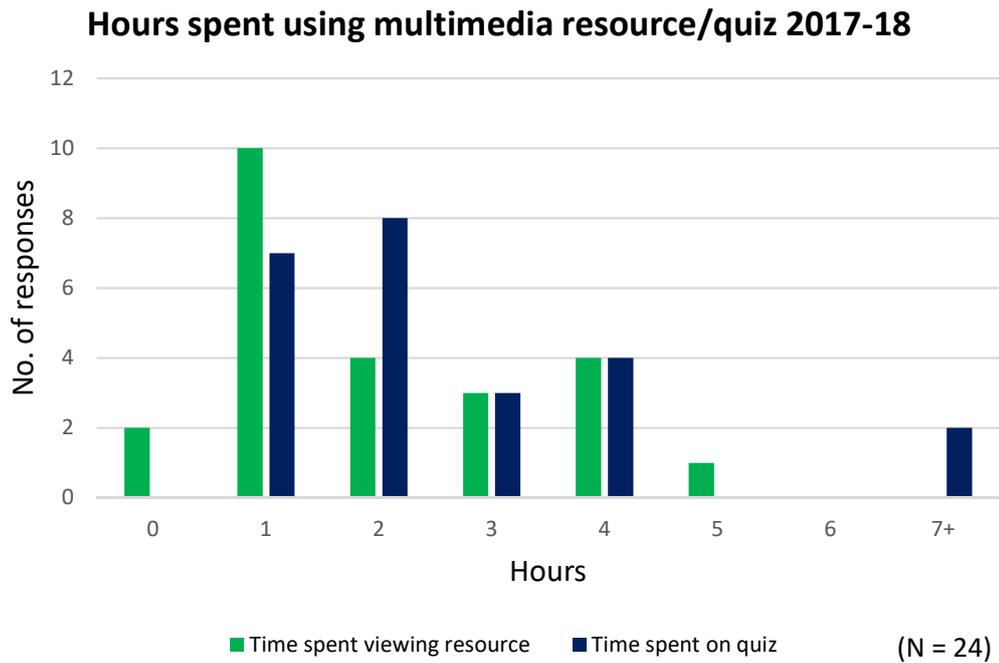


Figure 5.23 Hours spent using multimedia resource and quiz, 2017-18

5.3.4.4 Engagement in face-to-face class activities

Students reported positively on their engagement with learning activities, with 67% expressing agreement that BL encouraged them to engage in learning activities. However, only eight students (33%) indicated that BL encouraged greater participation in class activities, as illustrated in Figure 5.24. The researcher noted that students in this class group were reluctant to participate in class discussions or volunteer answers during class (Kelly, 2018). It is apparent that if class participation is to be increased it will need to be designed as an inbuilt part of the learning experience. Devising a way to increase in-class participation and encourage active learning during f2f classes is something which will need to be addressed in design cycle two.

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Blended learning encouraged me to:

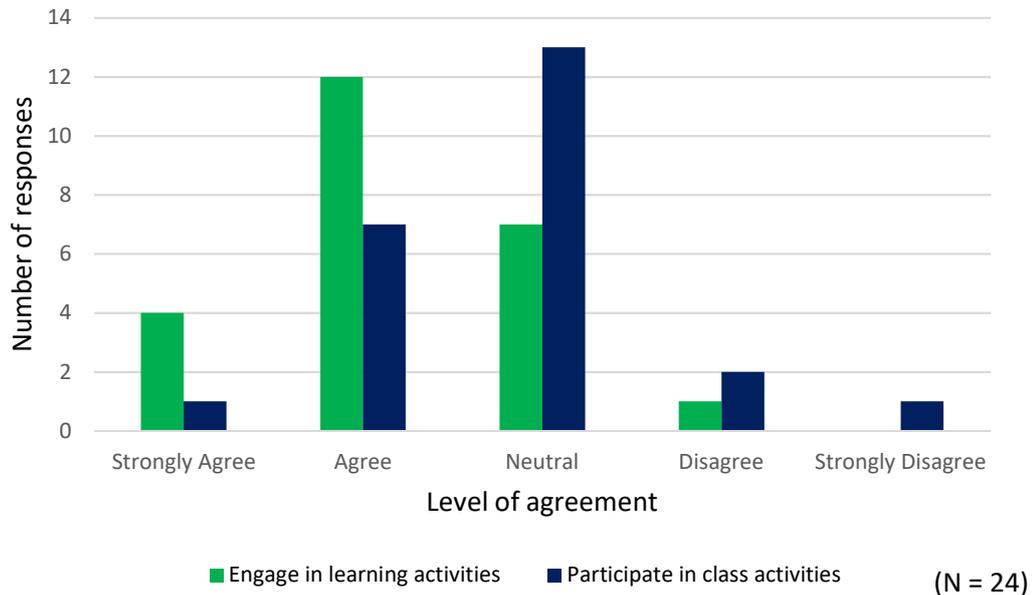


Figure 5.24 Survey response regarding participation in face-to-face class activities, 2017-18

5.3.4.5 Student logs – evidence of increasing engagement

Twenty-five students completed logs over the academic year detailing the elements of BL that they liked and disliked along with their recommendations for changes to the process. Figure 5.25 illustrates students' log entries relating to elements which they liked. As the year progressed, students placed more emphasis on the flexibility offered by BL and the value it offered them in terms of more effective learning. In semester 2, students placed less emphasis on the f2f element of BL and noted that the resources were user-friendly. As students became accustomed to using the resources, they gained confidence in working on their own outside of class and acknowledged the resources as easy to use. This was confirmed by one student, who commented:

I preferred my experience of the blended learning resource this time [semester 2] in comparison to last time [semester 1] as I knew what to expect and had a greater insight into what it entailed. (2017-18 Student 28, semester 2 student log)

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Blending learning 'likes'

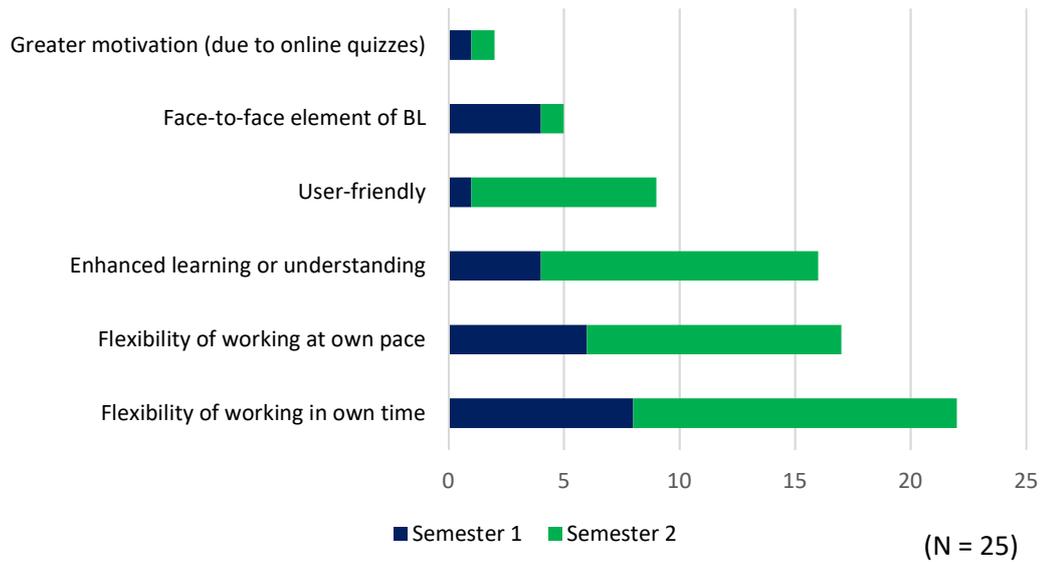


Figure 5.25 What students liked about blended learning, 2017-18 student logs

Students made fewer comments in their learning logs relating to elements of the BL process which they disliked, as represented in Figure 5.26 (19 'dislikes' compared with 71 'likes'). Moreover, as the number of 'likes' increased in frequency in semester 2, the number of 'dislikes' correspondingly decreased. There were some issues regarding the Moodle VLE in the college during semester 1, which were resolved by semester 2, which explains the presence of 'technical issues with Moodle' as a dislike in semester 1. A few students expressed some dissatisfaction with the multimedia resources, stating they were 'too broad' and felt the quiz questions contained within one of the resources could be improved. These are areas which will need to be addressed in design cycle two. Students appeared more comfortable with the BL process in semester 2. This was evidenced by the fact that five students were challenged by the responsibility of learning on their own in semester 1, followed by only one student expressing this concern in semester 2, commenting:

Overall I would prefer to learn in a classroom environment as it makes it easier to understand and I can ask questions and also see where I'm going wrong. (2017-18 Student 24, semester 2 student log)

The inability to ask questions appeared to be an influential factor in forming students' opinions on the BL experience. The BL discussion forum opened during the bank reconciliation topic at the beginning of the course was not utilised by

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students to pose questions; they preferred instead to contact the lecturer directly by email with any queries, which concurred with the findings of Concannon, Flynn and Campbell, (2005) in their study in an Irish university. The researcher feels that this is an area that needs to be addressed in the second iteration of the design through the use of strategies which will reduce the number of student questions which may arise and also alleviate students' concerns around the inability to ask questions.

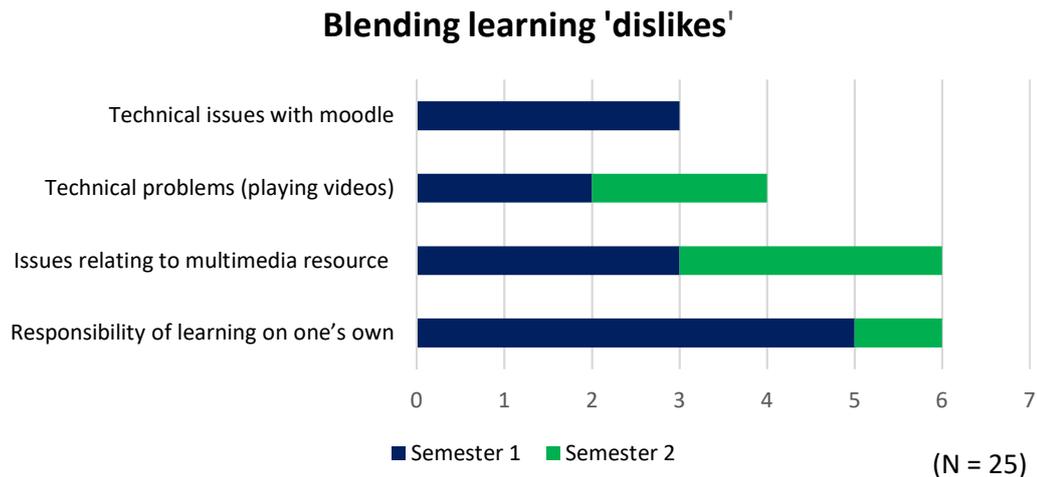


Figure 5.26 What students disliked about blended learning, 2017-18 student logs

Student logs were completed well in advance of the end of semester 2; therefore, students did not address any issues relating to the use of the ratio analysis discussion forum in their log comments. Students were also asked open-ended questions in the post-implementation survey (N=24) to identify what they liked and disliked about the BL design. Student replies were similar to points raised in learning logs. Three respondents (13%) mentioned the discussion forum as their 'dislike', while six others (25%) stated that they liked everything about their BL experience. A total of eight respondents (33%) mentioned the responsibility of learning on their own or the inability to ask questions as the element they liked least about the BL process.

Comments in student logs generally were more positive than negative, with some students having no dislikes and/or recommending no changes to the BL design. This was corroborated in responses to an open-ended question in the post-implementation survey, where 13 students (54%) stated they would recommend no change to the BL process for the second iteration. Moreover, students' sense of satisfaction appeared

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to increase in semester 2 as they became familiar with the use of online learning activities and assessment.

5.3.5 Interaction

Moore (1989) identifies three types of interaction which work together to facilitate learning online – interaction with content, interaction with instructors, and interaction among peers – recommending that instructors design these interactions into their educational programs in order to maximise their effectiveness.

5.3.5.1 Interaction with content

Two online multimedia resources were provided to students for viewing outside of f2f hours. Interaction with the multimedia resources was measured using Moodle activity logs which tracked student usage. Table 5.10 summarises usage statistics for each resource.

Table 5.10 Online multimedia resource usage, 2017-18

	Bank Reconciliation multimedia resource (semester 1, N=28)	Ratio Analysis multimedia resource (semester 2, N=27)
Number of students who accessed resource	22	23
Number of hits/views	66	57
Average views per student	3	2.5
No. of students who accessed resource prior to end-of-semester exam	4	2
Viewing period	1 Nov – 20 Dec 2017	19 Jan – 29 Apr 2018
End-of-semester exam date	21 December 2017	30 April 2018

In total, 25 students (93%) accessed one or both of the online multimedia resources. Students' access patterns are likely to have been affected by the fact that a large percentage of the class would have studied these topics previously in the leaving certificate Accounting subject and have achieved a reasonable level of proficiency.

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Students are provided with a notes and question manual at the commencement of each module with detailed notes on each topic; nevertheless, 58% of students indicated that they also took notes while viewing the multimedia resources. In general, students viewed each resource more than once with five students using at least one of the resources for revision purposes before the end-of-semester exam.

Only 17% of the post-implementation survey respondents felt that it was unnecessary to attend class having viewed the multimedia resource. To the contrary, in response to an open-ended survey question, four students (17%) recommended the addition of extra worked example videos as a proposed change for the second design iteration. This was corroborated by a number of similar suggestions made in student log entries.

5.3.5.2 Interaction with instructor

Students were asked for their opinions on the effect of BL on interaction with the lecturer, results of which are presented in Figure 5.27.

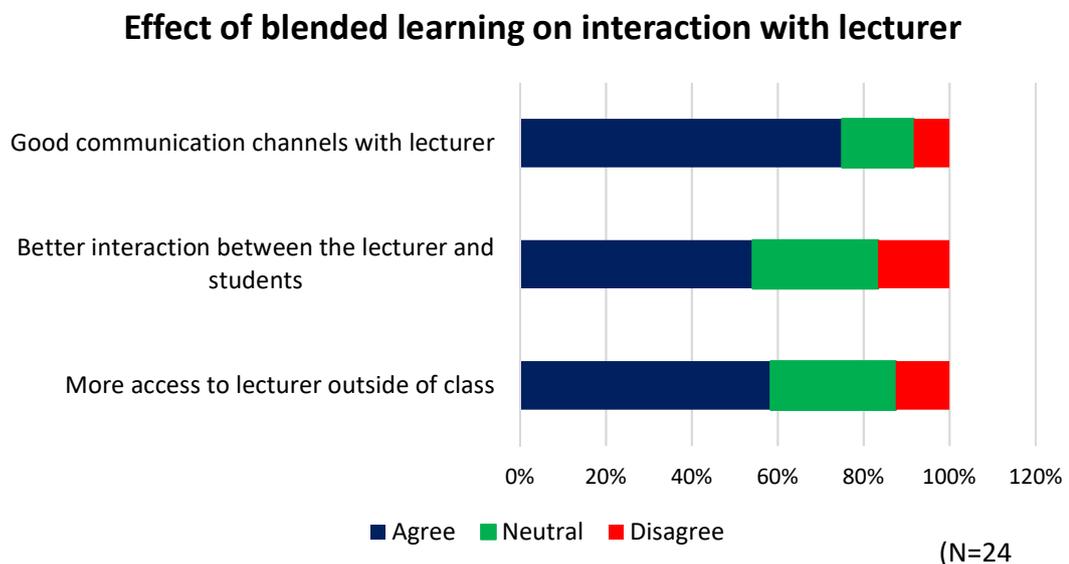


Figure 5.27 Student perceptions of effect of blended learning on interaction with lecturer, 2017-18 questionnaire data

Students expressed high satisfaction (75% agreed) with the available communication channels with their lecturer. While a communications forum was made available to students in advance of the BL topics, students' preferred method of communication with the lecturer was by individual email. The researcher noted increased and varied

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email communication from this group of students and monitored email communication regularly outside of college hours to offer support to students particularly during online assessment periods (Kelly, 2018).

Seven of the coded group interview statements related to interaction with the lecturer. The importance to students of access to lecturers was emphasised by one student during the group interview:

Well at least you were contactable, you know you checked your email ... You were fairly certain if you had an issue it was going to be solved in a certain amount of time. There was no like extra anxiety over it. (2017-18 Student 2, group interview)

The majority of post-implementation survey respondents also agreed that there was better interaction between the lecturer and students and more access to the lecturer outside of class, as displayed in Figure 5.27. This concurred also with the view of the lecturer (Kelly, 2018). Nonetheless, a small percentage also expressed disagreement. Additionally, there was a mixed response to a survey question which asked students if BL provided less opportunities to interact with the lecturer, with 50% adopting a neutral stance (see Figure 5.28). This may be due to the reduction in f2f classes, which may have caused students to perceive less opportunities to interact with the lecturer, despite the alternative communication channels which had been made available.

Blended learning provided less opportunities to interact with lecturer

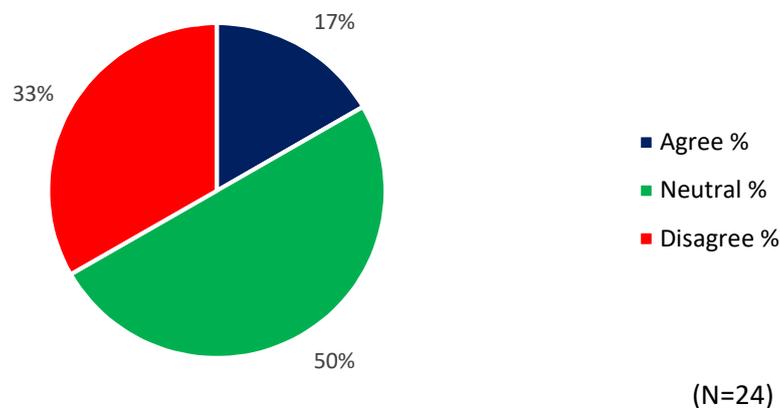


Figure 5.28 *Blended learning effect on opportunities to interact with lecturer, 2017-18 questionnaire data*

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This was confirmed by one student who strongly disagreed that there was better interaction between the lecturer and students commented:

I thought that there was less interaction because there was no lecturer present and questions couldn't be asked as a question was being done or explained. (2017-18 Student 24, survey response)

This view was also reflected in a survey item response which indicated that 33% (n=8) of respondents strongly agreed that they disliked not being able to ask questions while viewing the multimedia resource (see Figure 5.29).

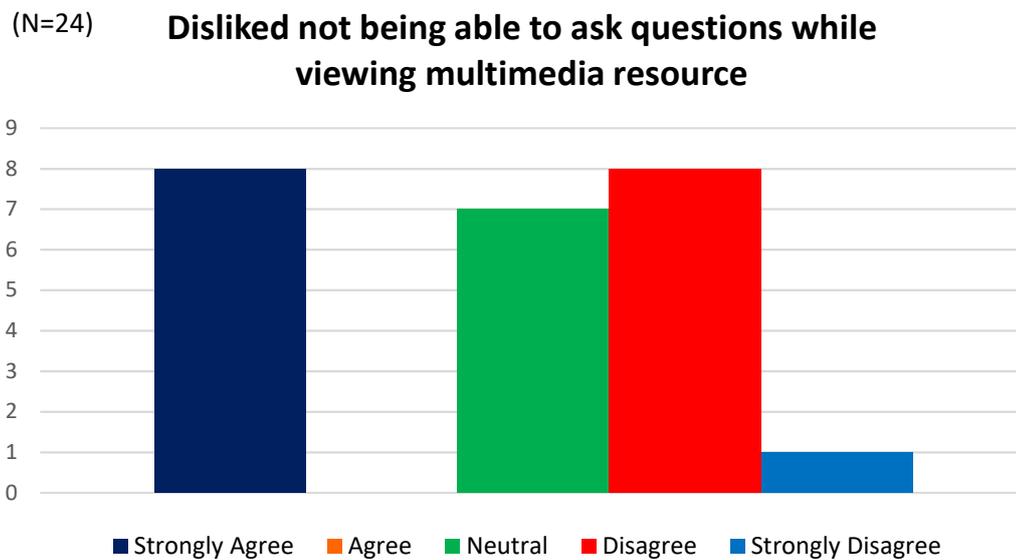


Figure 5.29 Student feelings on inability to ask questions, 2017-18 questionnaire data

In an open-ended question on the survey asking students what they liked least about the BL process, five of the respondents (21%) indicated that they disliked not being able to ask questions when learning outside of the f2f class setting, with one student making the point that he disliked:

Not being able to ask questions and when I'm in class, when we are doing a question I like being able to get help off the student beside me and I can help them too. This doesn't happen outside of class. (2017-18 Student 24, survey response)

Similar views were also expressed in the student logs and in open-ended survey responses, confirming the importance of f2f class contact in line with the accounting education research literature (Vamosi, Pierce and Slotkin, 2004; Concannon, Flynn and Campbell, 2005; Chen and Jones, 2007; Wong, 2012; Osgerby, 2013; O'Keefe,

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Rienks and Smith, 2014; Weil, De Silva and Ward, 2014; Lento, 2017; Fortin *et al.*, 2019):

Upon reflecting upon my use of the online resource I have discovered that despite our task being to learn the basics of bank rec online, most of my learning came through doing questions in class and being shown how more detailed and different questions work instead of only the ones in the online resource. Which shows that the “blended” part is what is needed to learn something and if there was only the online resources I would have struggled with more detailed questions which actually come up in the exams. (2017-18 Student 9, semester 1 student log)

I find it more beneficial as errors arise to ask the teacher in person as I better understand the concepts. (2017-18 Student 28, semester 1 student log)

I prefer the classroom environment as I can ask questions and the answers to other students questions show me something I might not have noticed. (2017-18 Student 24, survey response)

One student remarked in his student log during semester 1:

I didn't like it at all. The fact that I couldn't ask a question or there was nobody else to ask a question meant when there was something I didn't understand, as simple as it may have been, I was stuck. In class if you don't understand something it may be broken down further or a different twist put on it to help a particular mind “get it” when it won't click in the way it has been explained in blended learning. (2017-18 Student 1, semester 1 student log)

However, at the end of the year in an open-ended question on the post-implementation survey, he was more positive:

It [blended learning] has more advantages than disadvantages. The only real issue was if I did have a question and something wasn't clicking with me I had no one to ask. Apart from that I thought it was a great tool. (2017-18 Student 1, semester 2 student log)

Another student who disagreed with the statement ‘I disliked not being able to ask questions while viewing the multimedia resource’ made the observation:

We still had access to the lecturer via classes and email if we had questions. (2017-18 Student 9, survey response)

On reflection, the researcher felt that the reduction in f2f hours in semester 2 by holding no f2f classes in week 2 may have contributed to students' feelings of anxiety regarding an inability to ask questions due to the absence of class contact time over an extended period. A reduction of two hours per week over a fortnight may have been more suitable and would have allowed students an opportunity to ask questions as they arise, rather than having to wait for a period of over a week.

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Students' sense of discomfort with their inability to ask questions may also be due to encountering an innovative teaching approach which forced them to take more responsibility for their own learning. Albeit, it was apparent that students' positivity towards use of BL increased as they became more accustomed to the new learning and teaching approach.

5.3.5.3 Interaction among peers

On the post-implementation survey, students were asked to identify the effect of BL on interactions with their classmates. Four students (17%) agreed that interactions were superior with 38% expressing disagreement, as can be seen in Figure 5.30.

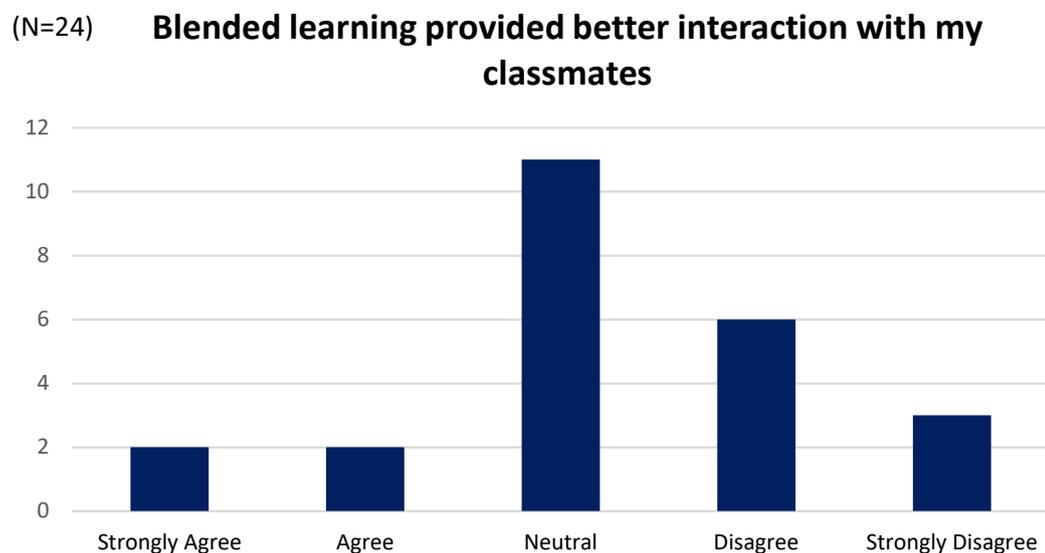


Figure 5.30 Effect of blended learning on interaction with classmates, 2017-18 questionnaire data

The reduction in f2f class time may have been responsible for students' perception of reduced interactions with peers, with one student justifying her response to the above item by stating:

This was the only element of the blended learning I didn't like. I usually study with my friends and blended learning meant that we stayed at home and did our work alone. Classmates in the same position as you are helpful when studying. (2017-18 Student 15, survey response)

Group interview participants expressed a view that BL encouraged greater interaction among peers outside of class:

We'd remind one another that stuff was going on ... I thought there was more of that [interaction with peers] with the blended learned because there was more things to do

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and we all kinda needed to ask each other like what else there was to do. (2017-18 Student 9, group interview)

They also appreciated the opportunity afforded by the discussion forum to allow them interact with their peers and learn from one another:

You could think something but then someone else could say something and you think oh yeah I never actually looked at it that way. It gave you a different perspective on people's thoughts. (2017-18 Student 2, group interview)

Nevertheless, during the group interview one student was emphatic that f2f interaction be considered as an integral part of any learning experience:

I think one thing we need to make sure of is don't eventually end up with learning that's only online because I think a lot of people do need that time to be able to talk to someone about what they're doing, so just leave it at blended, blended! (2017-18 Student 9, group interview)

It was clear from the findings above that this interaction among peers is a potential area for improvement and that the facilitation of enhanced interaction and collaboration among students needs to be integral to the BL approach in the next iteration of the design.

5.3.5.4 Learner-interface interactions

Hillman, Willis and Gunawardena (1994) extended Moore's (1989) theory by adding learner-interface interaction which focuses on the technologies which deliver the online instruction which can afford or constrain interactions with instructors, classmates and content. Course interface designs must be of high quality with orientation to their use essential to provide enriched student learning.

An orientation process took place at the beginning of the BL experience to ensure that all students could access and navigate through the course interface and online resources. At each point that new learning or assessment resources were introduced, orientation exercises in their use were employed during classes held in the computer laboratory. During the group interview one student remarked:

I thought you gave us the opportunity to actually have a look at what it's like first, so when we actually went to do it with the bank recs, we actually knew what we were supposed to do ... You didn't just push us into the deep waters and we had to do it all by ourselves. So I thought that was helpful. (2017-18 Student 9, group interview)

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noting the value of the orientation class exercise which took place in the computer laboratory in advance of the BL topic:

to make sure everyone knows what they're supposed to do, and like you did to make sure everything is working as well. (2017-18 Student 9, group interview)

A think aloud protocol was carried out with one participant to gather data on the usability of the ratio analysis multimedia resource. Minor errors in the resource were identified which will be corrected in advance of design cycle two. Due to time constraints at the beginning of semester 1, it was not feasible to carry out similar testing with the bank reconciliation multimedia resource, so the think aloud protocol on this resource was deferred to design cycle two.

Five of the group interview coded statements related to usability issues students experienced while engaging with the ratio analysis discussion forum. The forum comprised one initial introductory post by the lecturer relating to the company in question, to which students made their replies pertaining to various aspects of the financial performance and position of the company. Group interview participants raised the point that replies were posted randomly in reply to the initial post with the result that the discussion forum became difficult to follow and unwieldy, with students remarking:

It's all over the place! (2017-18 Student 9, group interview)

You had to just go through it a bit more in-depth, it wasn't just following simply. (2017-18 Student 2, group interview)

This lack of structure may have acted as a deterrent to students when interacting with the forum, thereby contributing to the low participation rate, as discussed earlier. It was apparent to the researcher that the discussion forum interface needed to be re-designed to allow for easier access and navigation during the next design iteration. Participants' advice included setting up threads for each aspect of the company's performance to allow replies to be posted into separate sections, "instead of having all the comments jumbled up together" (2017-18 Student 9, group interview). This would improve the usability of the forum and perhaps increase forum participation.

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5.3.5.5 Vicarious interaction

Vicarious interaction is identified as a new type of interaction by Sutton (2000) who, based on Bandura's theory of observational learning, argues that students who do not directly participate in an online discussion can benefit from observing the interactions of others. Results displayed earlier in Table 5.6 show that while only 19 students posted to the ratio analysis discussion forum, all students in the class group accessed the forum; furthermore, the majority of students indicated that the forum assisted them when completing the ratio analysis report (see Figure 5.9), both of which may convey evidence of vicarious interaction.

5.3.6 Technology

The majority of questionnaire respondents (75%) accessed technology (computer, laptop or tablet) both at home and in college with only one student stating that he/she relied solely on college to gain internet access. Laptops were the most popular device used to view the online resources; however some students used PCs and their phones, as displayed in Figure 5.31. Eleven respondents (46%) used more than one device to access the online resources.

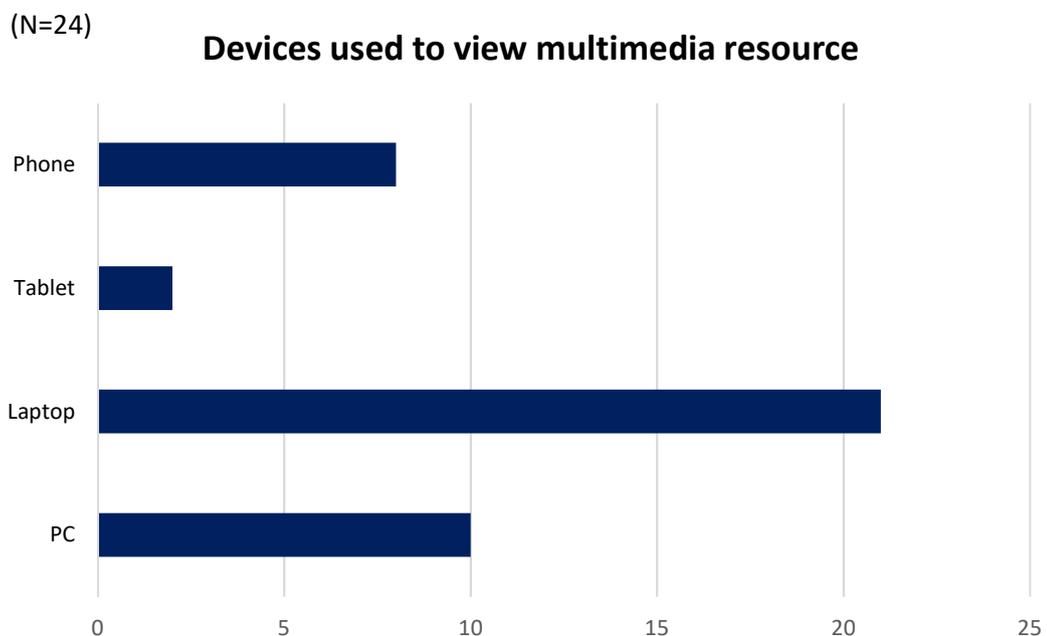


Figure 5.31 Devices used to access multimedia resources, 2017-18 questionnaire data

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5.3.6.1 *Technical and internet connectivity issues*

Students encountered very few technical issues when using the online learning and assessment activities. Just two of the 152 coded group interview statements related to IT technical problems, with one student stating that he had difficulties accessing the multimedia resource on his phone. In semester 1, three students identified their study efforts being hampered by technical problems with Moodle, with one student commenting in her student log:

I did not like the fact that Moodle, which we need in order to access the blended learning resource, was down a lot of the time when we had to study at home. This caused difficulty as a lot of the time I had free time to study, Moodle wasn't working. (2017-18 Student 9, semester 1 student log)

However, these technical issues with Moodle were resolved by the end of the semester, resulting in greater student satisfaction in semester 2. In addition, as displayed in Figure 5.32, when surveyed at the end of the BL experience only 17% of students agreed that they would have liked access to technical support while taking part in this BL course. The fact that students were given the option of an extra attempt on two of the quizzes in response to technical problems with Moodle in semester 1, as well as an opportunity to trial a multimedia resource in advance of the blended topics, may have negated students' need for technical support.

I would have liked access to technical support

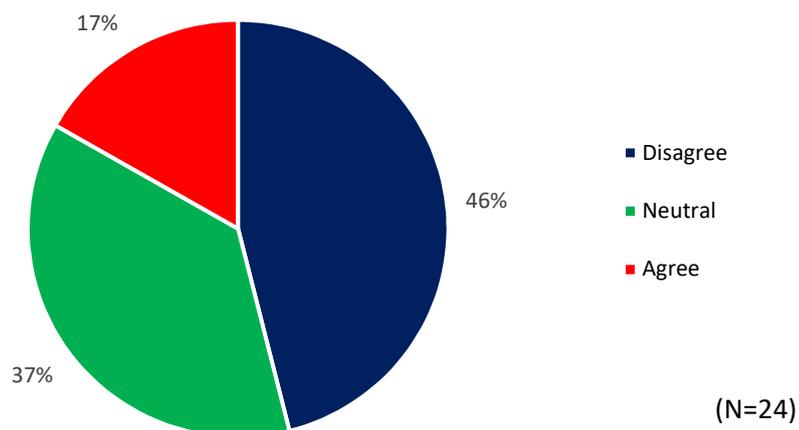


Figure 5.32 *Students' preferences for access to technical support, 2017-18 questionnaire data*

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While 50% of students agreed that slow internet speeds reduced the effectiveness of the online multimedia resource, a smaller number indicated that they had difficulties accessing course materials due to broadband connectivity problems at home or in college (see Figure 5.33). One student indicated that she had to access the resources in the college due to poor internet connectivity at her student accommodation, while another mentioned that the internet access in the college was poor when using his own laptop.

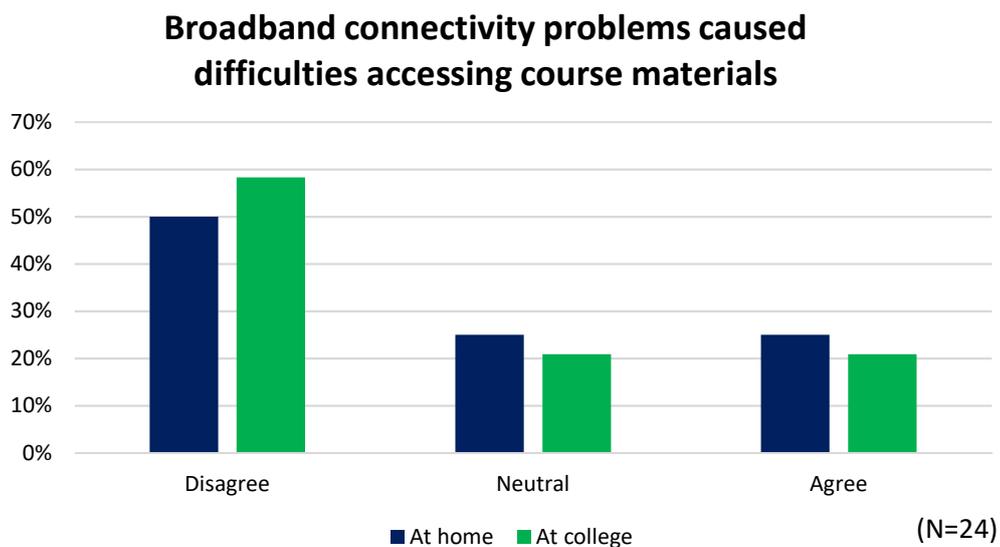


Figure 5.33 Difficulties accessing course materials due to broadband connectivity problems at home or at college, 2017-18 questionnaire data

5.3.6.2 Technology self-efficacy

At the commencement of the course, students' prior encounters with online and BL were investigated through questions in the pre-implementation survey. Results displayed in Figure 5.34 demonstrate that while 50% of students had previously used a VLE, very few had experienced online and blended forms of learning or assessment.

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Students' previous online/blended experience

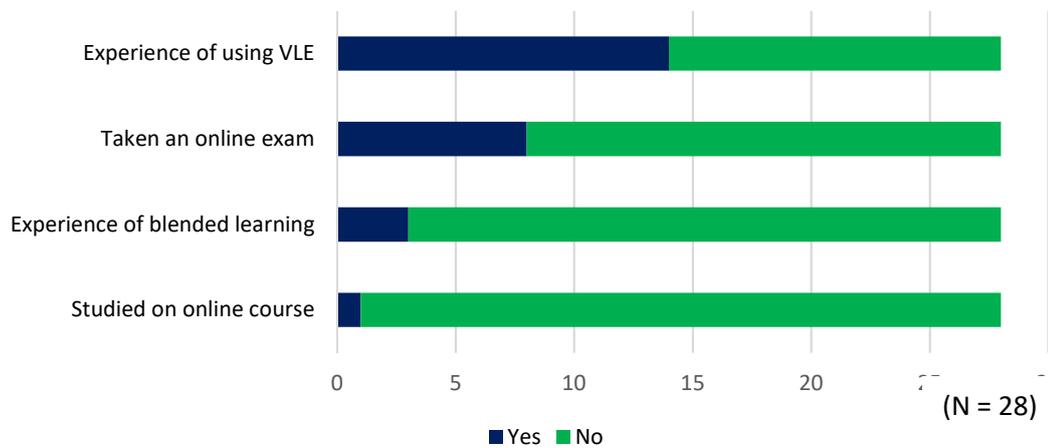


Figure 5.34 Students' prior experience of blended and online learning, 2017-18 questionnaire data

Students were asked to rate their perceived level of skill as a computer user in both the pre-implementation and post-implementation surveys. There was an apparent increase in skill level across the student cohort, as displayed in Figure 5.35.

Perceived computer skill levels

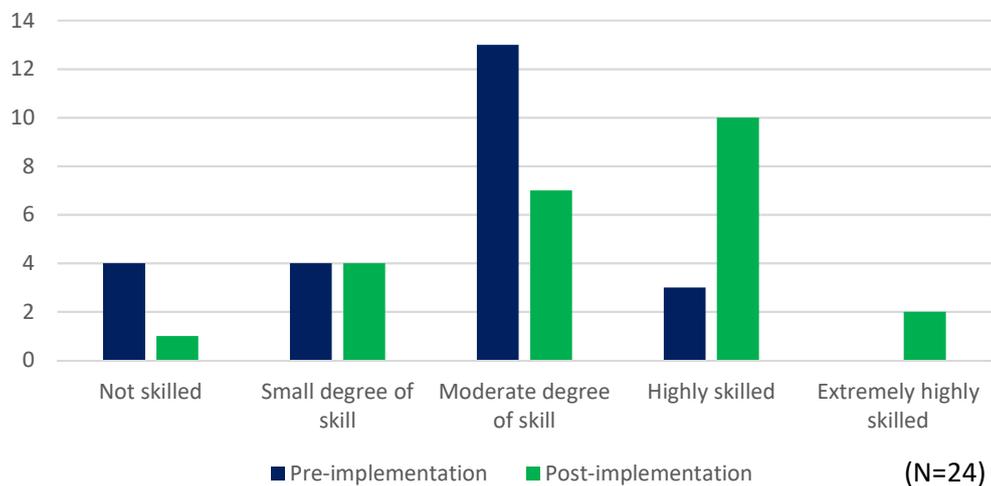


Figure 5.35 Students' perceived skill levels as computer users, 2017-18 questionnaire data

This was corroborated by students' answers to Q.12 on the post-implementation survey presented in Figure 5.36, where the majority of respondents acknowledged a moderate to very high improvement in their computer skills after taking part in the BL course.

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Perceived improvement in computer skill

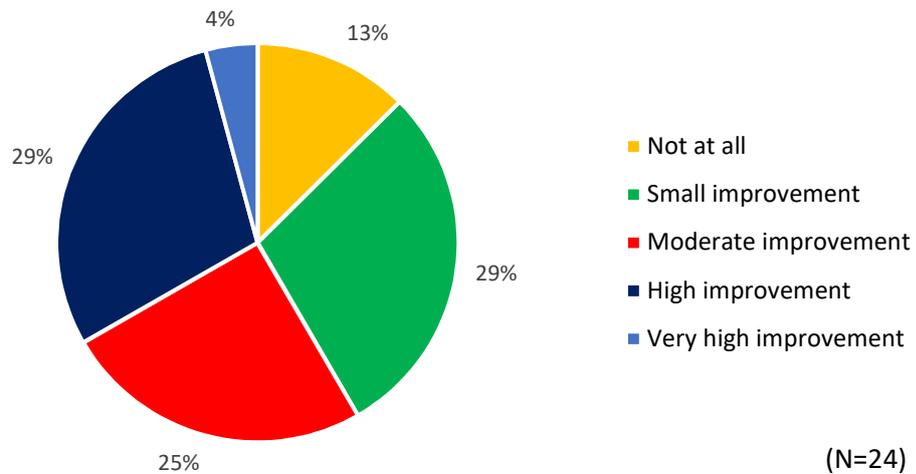


Figure 5.36 Students' perceived improvement in computer skill, 2017-18 questionnaire data

Students also rated their perceived skill levels in using MS Excel at the commencement and end of their BL experience. Students were less confident in their skill levels in MS Excel when compared with their computer user skill, with 63% of students indicating they had a small or no degree of skill at the commencement of the course. This percentage decreased to 25% by the end of the course, with 75% stating moderate to extremely high levels of perceived skill. Results are displayed in Figure 5.37.

Perceived Microsoft Excel skill levels

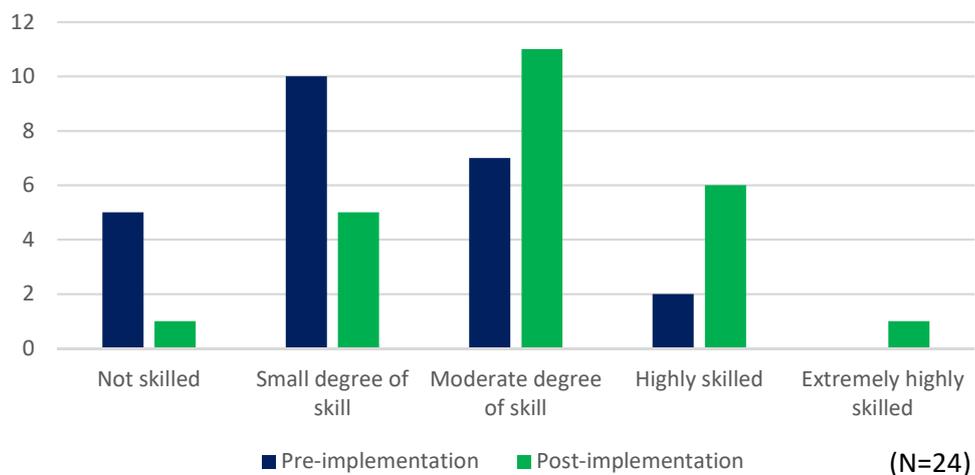


Figure 5.37 Students' perceived skill levels in using MS Excel, 2017-18 questionnaire data

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Figure 5.38 demonstrates students' perceived improvement in level of skill when using MS Excel, with 71% students stating that they had achieved moderate to very high levels of improvement. As students take an IT and computer applications module during semester 2 of the first year programme, it must be acknowledged that some of this increase in skill may be attributable to exposure to Excel during this module.

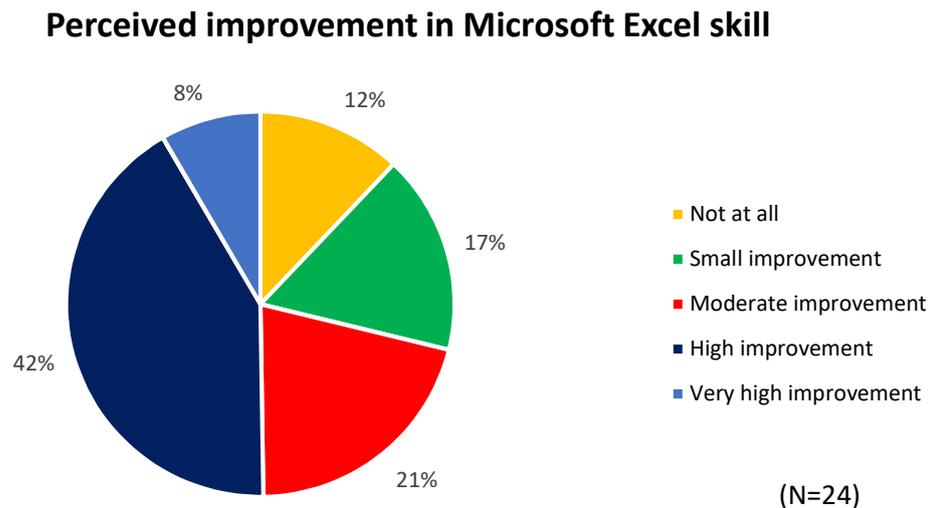


Figure 5.38 Students' perceived MS Excel skill improvement, 2017-18 questionnaire data

In general, students did not seem to be overly challenged by the technology which they needed to use while engaging on this BL course, as only two students (8%) believed that their lack of technology skills added to the difficulty of the subject.

Students were asked four questions relating to their technology self-efficacy. These questions were based on an instrument developed and validated by Torkzadeh and van Dyke (2001) and adapted for use within this study. Question responses were based on a Likert type scale, from *Strongly Disagree* to *Strongly Agree* and scored from one to five accordingly. Mean response scores for each question item are displayed in Table 5.11.

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Table 5.11 Mean self-efficacy scores by question item, 2017-18 post-implementation data

	M (N=24)	SD
The use of blended learning has increased my confidence in using technology.	3.42	0.97
Accounting classes in the computer laboratory have increased my confidence in the use of MS Excel.	3.79	0.88
I feel confident using MS Excel during financial accounting classes.	3.75	1.03
My lack of technology skills made this subject difficult for me (reverse coded).	3.79	0.88
Total Self-Efficacy score	14.75	2.19

A total ‘self-efficacy score’ for each student was obtained by the summation of all four item responses. Scores for each student were subsequently coded into low, medium or high self-efficacy categories (low 4-9; medium 10-14; high 15-20). Evidence presented in Figure 5.39 shows that all except one student displayed high to medium levels of self-efficacy at the completion of the BL experience.

Technology self-efficacy scores - 2017-18

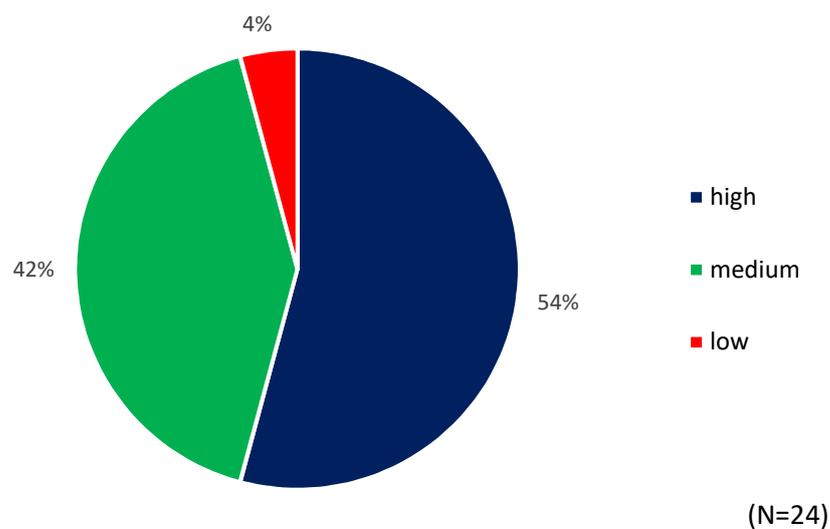


Figure 5.39 Technology self-efficacy scores, 2017-18 questionnaire data

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The student with low self-efficacy indicated no prior experience with online or blended learning and classified himself as unskilled in the use of computers and MS Excel at the commencement of the programme. However, he did acknowledge improvements in his skill levels as a result of partaking in blended learning.

5.3.6.3 *Computer laboratory class*

In semester 1, students were timetabled with a one-hour class in the computer laboratory each week. This class served a dual purpose; it enabled online resources to be easily demonstrated to students throughout the semester to scaffold them in their use, while also integrating the teaching of financial accounting and MS Excel.

At the end of the semester students were surveyed to explore their satisfaction with computer laboratory classes. The response rate was lower than desired probably due to the proximity of the end-of-semester exam. Nonetheless, sixteen students responded with 75% agreeing that they had benefited from classes in the computer laboratory and 87% affirming that they wished to have a timetabled class in the computer laboratory again in semester 2. Due to the nature of the timetable in semester 2, a two-hour class was held in the computer laboratory in that semester.

Nine of the group interview coded statements concerned issues students experienced as a result of financial accounting classes timetabled in the computer laboratory:

Trying to keep up with the typing and look at what you are doing at the same time wouldn't be my strong point ... You're trying to balance the book, you're trying to type, you're trying to look. It's too much! (2017-18 Student 2, group interview)

I feel less is done in the computer class. (2017-18 Student 26, group interview)

It's different when you're typing and then you go into the exam and you're writing. (2017-18 Student 15, group interview)

This sentiment was echoed by the researcher in her own field notes. While she acknowledged the value of the computer laboratory for demonstrating online resources, she noted the resultant drawbacks. Unlike a traditional lecture room where all students sat facing the top of the room, the computer laboratory seating arrangement resulted in some students facing towards the sides and back of the room. This caused difficulties when the lecturer needed to address the whole class and caused a 'separateness' among students, inhibiting group exercises or double-

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checking of answers. As one student noted above, the end-of-semester exam consisted of a written paper, reinforcing the thoughts of the researcher who was conscious that the improvement in technology skills were not acquired at the expense of impeding learning in accounting (Kelly, 2018). Mishra and Koehler (2006) note that technology use within the classroom can place constraints on content delivery and affect pedagogical decisions. In the second semester, the researcher decided to adapt her pedagogical approach by preparing Excel templates for use during class to accommodate the different levels of Excel competency and scaffold students in the use of technology.

Despite their cognisance of the limitations imposed by classes in the computer laboratory setting, students in the group interviews accepted the benefits offered in the opportunity to demonstrate the online resources. They recommended using LanSchool classroom management software to take control of student PCs for lecturer demonstrations of problem solutions, which would overcome difficulties created by the laboratory seating layout. Reverting to a traditional classroom setting for course material which was less suitable for delivery was another student suggestion:

I think it should be brought in for the blended learning but I don't think every week. I think we're losing a bit if we're having it every week. (2017-18 Student 26, group interview)

The researcher believes that this is an area which needs to be addressed in design cycle two.

5.4 Changes for design cycle two

5.4.1 Pedagogy

5.4.1.1 Worked example videos

A recurrent suggestion in a number of the qualitative datasets included providing additional worked example videos to illustrate solutions to a problem set at a more advanced level than that contained within the multimedia resource. Sweller and Cooper (1985) identified the *worked-example effect* which is based on cognitive load theory, and states that learning through use of worked examples is more effective for novice learners than discovering a solution to a problem. Based on participant

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feedback and a review of the literature on the worked example effect, the researcher decided to develop additional worked examples for each topic to scaffold students with additional example practice before they move onto independent problem-solving exercises. As learners become experts, the worked example effect disappears and then reverses, known as the *expertise reversal effect*. In this case, studying a worked example becomes a redundant activity (Kirschner, Sweller and Clark, 2006; Reisslein *et al.*, 2006). As many of the students in the group have significant previous accounting knowledge, additional worked examples will be made available on an optional basis, in order to avert the advanced learners in the class experiencing the expertise reversal effect.

5.4.1.2 *Ratio analysis report assignment*

As noted earlier, there was less evidence of higher cognitive thinking in ratio analysis discussion forum posts; therefore, the researcher decided to amend the ratio report assignment in design cycle two to include financial information for two companies rather than one, to propel students towards using higher cognitive skills. Students will be asked to evaluate the comparative performance of both companies, increasing the challenge associated with the task and testing higher level skills (Herrington, Oliver and Reeves, 2003). The continuous assessment weighting on the assignment will be increased to 15% of the final course grade to reflect the challenge associated with the task, with a corresponding reduction to 5% for the online quiz in that semester, which matches the lower level skills it assesses.

The researcher decided to develop a comprehensive assessment rubric using Bloom's taxonomy to match the amended task and furnish students with a copy in advance to ensure transparency around assessment requirements and marking which would provide students with an opportunity to maximise their assessment grade (Herrington, Oliver and Reeves, 2003; Kenney and Newcombe, 2011). Rewarding students for discussion form postings within the rubric should act to stimulate participation on the forum also (Vrasidas and McIsaac, 1999; Rovai, 2001; Swan, 2003).

5.4.2 *Autonomy*

Some students expressed difficulties with taking responsibility for their own learning and disliked not being able to ask questions while learning independently. The addition of an extra worked example video which students will view subsequent to the multimedia resource should enable students to move onto independent problem solving with greater ease, thus providing “fadeable layers of scaffolding” (Jackson, Krajcik and Soloway, 1998) allowing learners to gradually take on more responsibility for completing the task as they are ready to do so.

Reflective practice and metacognitive have been highlighted as central to development of a heutagogical learning environment (Blaschke, 2012) and are considered as important factors in cultivating autonomous learning (Wenden, 1998; Chan, 2001). McLaren (2012) advocates use of reflection as part of the assessment process to promote metacognitive awareness. With this in mind, the researcher decided to include a metacognitive element as part of the ratio analysis assignment task, where students would be awarded marks for reflection, encouraging them to become explicitly aware of the cognitive benefits of their learning, to nudge them towards taking more responsibility for their own learning.

5.4.3 *Collaboration*

5.4.3.1 Face-to-face collaborative activities

The researcher observed an air of hesitation among the class group when volunteering answers in class or partaking in group discussions. Having concentrated her efforts on developing online learning activities for the blended model, she believed she had not focused sufficiently on the design of collaborative f2f class activities during the first design cycle. Authentic learning activities which involve collaborative learning and scaffolding among peers are deemed advantageous in the construction of knowledge (Herrington and Oliver, 2000). In design cycle two, collaborative group activities will be designed into f2f classes to promote collaboration and encourage creative and critical thinking.

During the bank reconciliation topic in semester 1, it was decided to incorporate an authentic learning task which students would complete individually while seated in

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groups of four, allowing students to obtain assistance from their peers as they worked. Students would be required to employ their IT skills by completing their solutions individually outside of class using MS Excel and submit via Moodle as part of their continuous assessment. Students will be awarded 5% of their continuous assessment marks in semester 1 for this activity, with the marks awarded for the first online assessment quiz being correspondingly reduced to 5%. It has been decided that the first online quiz in semester 1 will be based on the bank reconciliation topic with students being required to complete the quiz after viewing the multimedia resource so that the lecturer can determine students' knowledge levels in advance of the f2f classes on the topic. Collaborative in-class activities will be timetabled in traditional classroom settings due to the unsuitable nature of the computer laboratory.

In semester 2, during the ratio analysis topic students learn the basics regarding financial ratio calculations using the multimedia resource. The ensuing f2f classes focus on developing students' knowledge of employing ratio results to analyse the financial performance of a company. The researcher observed a lack of participation on behalf of students when discussing company analysis during these classes. Therefore, it was decided to introduce collaborative activities as recommended by Bonk and Smith (1998) for use in the accounting classroom, along with the use of clickers to allow students actively participate without feeling they are being 'put on the spot'.

5.4.3.2 Collaborative knowledge-building

The discussion forum aims to promote ongoing personal engagement and gradual evolution of knowledge, while also facilitating sharing of that knowledge with class members, which in turn should encourage learners to continue to build upon their own and other people's ideas (Scardamalia and Bereiter, 1994). However, the absence of collaboration and knowledge-building among students on the forum was clearly evident during the first iteration.

As described earlier, the ratio analysis assignment task, to which the forum is linked, will be amended in cycle two requiring students to evaluate the comparative performance of two companies; this should offer greater scope for commenting by

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students and help to address the problem regarding student collaboration. The researcher turned to the literature for further guidance and, following e-moderating guidelines provided by Salmon (2011), she decided to divide students into two forum groups initially, each discussing a separate company. This would reduce the number of participants on each forum and encourage greater student participation. Subsequent to this, a comparison forum will be made available where students can post comments comparing the performance of both companies. Students will be required to prepare a report analysing the comparative performance of both companies for submission for assessment purposes, so it is envisaged that the discussion forum will act as a scaffold in the report preparation process.

Salmon (2011) also offered advice regarding lecturer use of summarising and weaving comments to motivate students to actively engage and prevent ‘lurking’ behaviours along with the use of warm-up activities to allow students become accustomed to discussion forum use. The researcher decided to set up an introductory forum at the beginning of design cycle two to allow students to introduce one another to the class group, serving a dual purpose of allowing students to become acquainted while also familiarising themselves with discussion forum use. The researcher further elected to increase student exposure by using forums throughout semester 1 to facilitate conversations on the theory elements of financial accounting.

5.4.4 Engagement

While students showed high levels of engagement with the multimedia resources and online quizzes, and worked quietly on problems assigned during class, there were few student questions during class and little evidence of vocal discussion. The review of the literature detailed in chapter two revealed that increased student engagement has been associated with clicker use in accounting modules (Carnaghan *et al.*, 2011; Premuroso, Tong and Beed, 2011; Chui, Martin and Pike, 2013; Eng, Lea and Cai, 2014). It is anticipated that the introduction of clicker technology during f2f classes in cycle two will inspire students to play a more active role by providing them with a ‘safe mode’ with which to answer questions. Incorporation of authentic learning activities, rather than decontextualized tasks, in the bank

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reconciliation topic is aimed at fostering student participation and engagement as well (Kearsley and Shneiderman, 1998).

The availability of additional video worked examples, as described earlier, will provide a set of graded challenges to accommodate learners as their skill levels increase, thereby promoting ‘flow’ among learners (Csikszentmihalyi, 1990) in order to increase engagement.

5.4.5 Interaction

5.4.5.1 Learner interface interactions

Dissatisfaction was expressed regarding the structure of the ratio analysis discussion forum during the first iteration. Based on student feedback, the researcher decided to re-design the discussion forum interface to allow easier access and navigation during the next design cycle. She decided to set up threads for each aspect of the company’s performance (profitability, liquidity and efficiency, gearing, other comments) to allow similar comments to be grouped together, as recommended by students, with a view to improving usability and increasing participation.

The researcher felt also that the Moodle page layout which she traditionally used was not suitable for the large volume of online resources required using the BL format. Hillman, Willis and Gunawardena (1994) stress the need for high-quality course interface designs to enhance student learning. The Moodle page layout will be adapted and enhanced in design cycle two with topics presented in collapsed form on the financial accounting Moodle homepage, accompanied by a topic description and graphical image. Clicking on topic titles will take students to individual topic pages where learning resources pertaining to that topic will be located. This should provide an easy-to-follow layout, simplifying the navigation process for students.

5.4.5.2 Timing of face-to-face classes

The majority of students on the programme had no previous experience of online or blended learning. A common concern expressed by students was the inability to ask questions while viewing the multimedia resource outside of the classroom. During design cycle one, f2f classes took place subsequent to the students viewing the

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resource. In line with student suggestions, the researcher has decided to hold an introductory class on the blended topic in advance of partaking in online activities, with the aim of providing assistance and support to students before they embark on independent learning activities. Learners benefit greatly from the scaffolding received from a mentor while in the zone of proximal development (Vygotsky, 1978; Holton and Clarke, 2006). It is anticipated that this will abate any anxieties the students may have with regard to learning independently and limit the number of questions which may arise as students engage with the online resources.

In design cycle one, the reduction in f2f hours in semester 2 was implemented by eliminating all f2f hours in week 2. In hindsight, the researcher feels that this allowed a long gap for students with limited access to the lecturer, which may have contributed to students' feelings of anxiety regarding an inability to ask questions. For the next cycle, the researcher has decided to ensure that students have f2f classes in every week which will hopefully mitigate students' concerns.

5.4.5.3 Interaction with lecturer

The discussion forum opened by the lecturer for announcements by the lecturer regarding the bank reconciliation topic was not used by students, despite one student recommending the use of an online chat facility for questions. Students preferred to contact the lecturer directly by email or after class with queries, perhaps due to the fear of posting a foolish question which could be viewed by the entire class. The researcher has chosen to continue to use an announcements forum in cycle two for posting course announcements and reminders and allow student communication to continue via email or queries in-person before or after class. The addition of an introductory class, as detailed above, may result in diminishing student queries in cycle two.

5.4.5.4 Interaction with peers

It is anticipated that the addition of f2f collaborative activities and the re-designed ratio analysis continuous assessment task will contribute to enhanced peer-to-peer interactions in the next design cycle.

5.4.6 Technology

The researcher was mindful of a slower pace of learning in the computer laboratory due to varying levels of skill in MS Excel and which was also dependent on the nature of the topic being taught. This was confirmed by student feedback during the group interview. It was decided to continue with computer laboratory classes due to the value they offered in terms of orientation in using online resources and integrated learning of financial accounting and MS Excel. However, in the next iteration, the class group would return to a traditional classroom setting for learning material unsuited to computer laboratory delivery. The researcher has chosen to adapt her pedagogical approach, informed by the TPACK model (Mishra and Koehler, 2006) by using LanSchool classroom management software for demonstrating resources and solutions during class and to provide additional templates using MS Excel to accelerate data entry where appropriate.

5.5 Chapter summary

This chapter recounted the design and implementation of the BL experience within the financial accounting modules during the first iteration cycle. The findings were configured within the PACE-IT framework with examples of both confirming and disconfirming evidence presented to illuminate the diverse influences of BL on the educational experience of the students.

Many positive findings emerged from this initial pilot study. Students expressed greater perceived levels of understanding and technological self-efficacy along with higher satisfaction levels regarding the flexibility of the learning process at the end of cycle one. The pilot demonstrated the potential of BL in enhancing the learning experience of students in introductory accounting. It also suggested important changes which would need to be made, particularly in terms of improving interaction and collaboration, to enrich the design so that it may be further optimised in enhancing students' learning experience. Where feasible, desirable changes which emerged were implemented in design cycle two. These changes and their resultant impact will be described and analysed in the next chapter.

Chapter 6 Design Cycle Two

6.1 Chapter introduction

This chapter will discuss the second BL design cycle, illustrating how the design was enhanced and re-iterated with a similar student cohort to that in cycle one. The chapter commences with a depiction of the implementation of the design placing a particular focus on design changes effected in this cycle. Cycle two findings are related, involving analysis of qualitative and quantitative data. Exemplars of data will be employed to demonstrate the impact of the BL design on the students' learning experience. Finally, design changes proposed for cycle three are presented. The PACE-IT framework has been used to frame the discussion of the design and the analysis of the data.

6.2 Implementation of design cycle two

6.2.1 Study participants

Design cycle two was implemented with a similar cohort who were studying on the Financial Accounting 1A and 1B modules as part of the BAA1 and BALAW1 programmes in the 2018-19 academic year. Twenty six students commenced on these programmes; however two students were ineligible to partake in the study due to being under 18 years of age. The remaining 24 students consented to participate having been informed fully of what the study entailed. One of these students was studying on the BALAW programme with the remainder being BAA students. One student left the programme at the end of semester 1; therefore data collection during semester 2 was based on 23 participants.

Similar to cycle one, the majority of students in the group were Irish, despite the presence of seven other nationalities in the group. There was a considerable international presence in the group with 33% (n=8) identifying themselves as students from abroad who were studying in Ireland. The majority of students were aged between 18 and 22 years old (83%) resulting in a reduced number of mature students relative to cycle one and, a further contrast evident due to class members being predominantly female (63%). Further details are available in Appendix 11.

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6.3 Design changes

6.3.1 Pedagogy

6.3.1.1 Worked example videos

During cycle one, some students expressed a desire for supplemental videos illustrating solutions to more advanced questions for use outside of class. The lecturer prepared additional worked example videos for use during cycle two to provide extra practice opportunities for students on the blended topic areas which was also supported in the cognitive learning literature (Sweller and Cooper, 1985; Sweller, 2006). Short videos of less than 15 minutes each zoning in on specific topic areas were provided illustrating the solution to a question within their question manual (see Figure 6.1).

Cash Book					
	dr		cr		
		€		€	
01-Mar	Balance b/d	760	03-Mar	Cheque 81	455
09-Mar	Lodgement	920	05-Mar	Cheque 82	290
15-Mar	Lodgement	890	08-Mar	Cheque 83	310
28-Mar	Lodgement	520	12-Mar	Cheque 84	120
			13-Mar	Cheque 85	505
			14-Mar	Cheque 86	370
			18-Mar	Cheque 87	140
			31-Mar	Balance c/d	900
		3,090			3,090

1 Opening Bank Reconciliation Statement - 1 March		
Balance as per bank statement		€ 980
Add: outstanding lodgements		130
Less: unrepresented cheques		(350)
Balance as per cash book		760

3 Closing Bank Reconciliation Statement - 31 March		
Balance as per bank statement		€
Add: outstanding lodgements		
Less: unrepresented cheques		
Balance as per cash book		

Bank Statement on 31 March 200X					
Date	Particulars	Debit	Credit	Balance	
		€	€	€	€
01-Mar	Balance b/d			980	
04-Mar	Cheque 77	350			630
06-Mar	Lodgement		130		760

Figure 6.1 Screenshot taken from bank reconciliation worked example video, 2018-19

6.3.1.2 Assessment

Assessment in cycle two was amended along with changes in mark weightings to reflect the level of challenge associated with each task (see Table 6.1).

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Table 6.1 Assessment schedule, 2018-19

Date.	Assessment type	Weighting
Semester 1: Financial Accounting 1A		
Oct 2018	Online quiz (bank reconciliation topic) in advance of f2f class	5%
Oct 2018	In-class authentic bank reconciliation group activity submitted out-of-class using MS Excel via Moodle	5%
Nov 2018	Online quiz (various other topics)	10%
Semester 2: Financial Accounting 1B		
Jan 2019	Online quiz (ratio analysis topic) in advance of f2f class	5%
Mar 2019	Ratio analysis assignment report, including discussion forum participation	15%

It was decided to assign an online quiz which students would complete following use of the multimedia resource, but in advance of the first in-depth f2f class on each blended topic. Each quiz assessed students' knowledge of material covered in the online learning resources. The change in timing of the quizzes relative to cycle one was designed to allow the lecturer to establish the learning achievement of students in advance of the first in-depth f2f class on each topic, facilitating the adaption of in-class learning activities and scaffolding, if necessary (Laurillard, 2002). The weighting on each quiz was reduced to 5% (from 10% in cycle one) as the quizzes addressed the introductory material which was covered in the online resources. In semester 1, a class group activity was added to the assessment schedule with a weighting of 5% which involved students completing an authentic bank reconciliation question in groups of four (see Appendix 16 for an example of the question used). Students in each group worked individually on the same question but were allowed to help each other while completing the answer. Students were subsequently required to submit their answer in electronic form using MS Excel via Moodle. This task was aimed at improving collaboration among students as class participation and student collaboration were areas identified for improvement during cycle one. The authentic bank reconciliation task included 'authentic' bank statements coupled with cashbook details for the previous month, which would be

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available to an accounts department employee but which is not typically made available to a college student while attempting a bank reconciliation question. This task which incorporated use of MS Excel was designed to match a real world task of professionals in practice in order to engage and motivate learners (Kearsley and Shneiderman, 1998; Herrington, Oliver and Reeves, 2003).

The ratio analysis assignment task was amended requiring students to analyse and compare the performance of two companies rather than analysing the performance of one only (Appendix 13). This increased the challenge associated with the task allowing the lecturer to assess higher level skills (Herrington, Oliver and Reeves, 2003). The weighting on the ratio analysis assignment report was increased to 15% to reflect the additional challenge associated with this task in cycle two and aimed to encourage greater communication and collaboration among peers on the discussion forum.

6.3.2 *Autonomy*

6.3.2.1 Scaffolding

An orientation process took place before the first BL topic whereby students were introduced to the online resources in a computer laboratory setting. Students were also given a resource similar to one that was to be used during the BL topics to trial at home to ensure that they could access it easily. Students were asked to reply with feedback via a discussion forum and seven students replied with many having difficulties playing the videos within the resource. Following consultation with an IT support technician within AIT, the lecturer established that some of the content may be blocked by newer internet browser versions, so students who were having difficulties were advised to revert to using Internet Explorer to ensure that the videos would play successfully.

Students were also provided with a sample online quiz during week 4 of semester 1 as a scaffolding exercise, with the aim of allaying any fears which students may have about facing online assessments. Eighteen of the students accessed the sample quiz. Students were re-assured that any problems encountered while engaging in online assessment would be dealt with fairly without any disadvantage to the student. The lecturer felt that this re-assurance was necessary as the majority of students had no

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previous exposure to BL and may feel a little apprehensive about the prospect of this new experience.

Students were provided with detailed instructions in hardcopy and softcopy format at the commencement of each BL topic, which incorporated screenshots of the Moodle page to facilitate students in locating the online learning and assessment activities (see Appendix 12).

The lecture schedule was adjusted in cycle two to include an introductory class on each topic, as will be discussed later. The introductory classes were designed to provide students with scaffolding and support in advance of embarking on independent learning online. It is anticipated that this may alleviate students' worries about being unable to ask questions while viewing the online resources, which were evident during cycle one.

6.3.2.2 *Grading rubric*

In cycle two, the grading rubric used for the ratio analysis assignment task was re-designed based on Bloom's taxonomy (Krathwohl, 2002) to reflect changes made to the task (see Appendix 9). During cycle one, students were given a list of guidelines to assist students in completing the assignment; however, the marks allocated to each element along with possible levels of achievement for each element were not provided to students. The literature advises giving students rubrics in advance so that what is required of them is clear at the outset (Sadler, 1989; Herrington, Oliver and Reeves, 2003; Hattie, 2012). Bearing this in mind, students were provided with the grading rubric in advance with specific instructions regarding report requirements, length and format along with the necessary discussion forum participation. Feedback was provided to students following completion of the assignment using the rubric headings via Moodle gradebook.

Use of the rubric will provide guidance to students when completing the assessment by offering transparency around assessment requirements and marking, hopefully contributing to students taking greater responsibility for their own learning.

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6.3.2.3 *Metacognitive awareness*

Study participants in cycle one exhibited some difficulties with learning independently and taking responsibility for their own learning. This is to be expected with the majority of students arriving in college directly from the Irish second-level education system where students primarily engage in teacher-led education. A new addition to the ratio analysis assignment task required students to complete a reflective piece designed to encourage learner appreciation of the cognitive benefits of the learning activities (Soloway *et al.*, 1996) in order to foster metacognitive awareness and promote autonomous learning while moving students towards a heutagogical approach (Wenden, 1998; Chan, 2001; Blaschke, 2012; McLaren, 2012). As many of the students had not engaged in reflective thinking in advance of this assignment, the lecturer introduced students to the idea of reflective practice during a f2f class through use of an information handout (Appendix 18) and by giving examples of reflection as applied within her own career. Cognisant of the imperative to support students in transitioning away from a pedagogical approach (Canning, 2010; Blaschke, 2012), she specified to students that the word count applicable to the assignment was exclusive of the reflective piece, so that it would not detract from the main content of the assignment and equally so that students would not feel restricted by an enforced limit while engaging in the act of reflection.

6.3.3 *Collaboration*

6.3.3.1 *Discussion forum warm-up activities*

The ratio analysis discussion forum offered a novel opportunity for students to collaborate and build knowledge in cycle one; however, many students were daunted by the prospect of posting a comment to the forum. Based on a review of the literature, it was decided to incorporate strategies such as those recommended by Salmon (2011), to familiarise students with using forums in advance of the assignment, with the aim of reducing students' anxiety around commenting on the forum.

The lecturer set up an introductory discussion forum at the commencement of semester 1 with the first topic on this forum requesting students to post a personal message about themselves in response to a message posted by the lecturer. Research

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literature highlights the importance of including non-task activities on discussion forums to encourage students to interact and familiarise themselves with one another (Kreijns, Kirschner and Jochems, 2003). Students were also exposed to discussion forum use through a forum set up to discuss the theory topics on the Financial Accounting 1A module. A number of threads were set up where queries were posted requesting students to research the topic area and post replies. This allowed the lecturer to cover the theory expediently while also giving students another opportunity to use a discussion forum as part of their learning activities, which will familiarise them further with the operation of forums. It is anticipated that these warm-up exercises may habituate students to discussion forum use and alleviate some of the feelings of disquiet which students experienced during discussion forum participation in cycle one.

6.3.3.2 Ratio analysis discussion forum changes

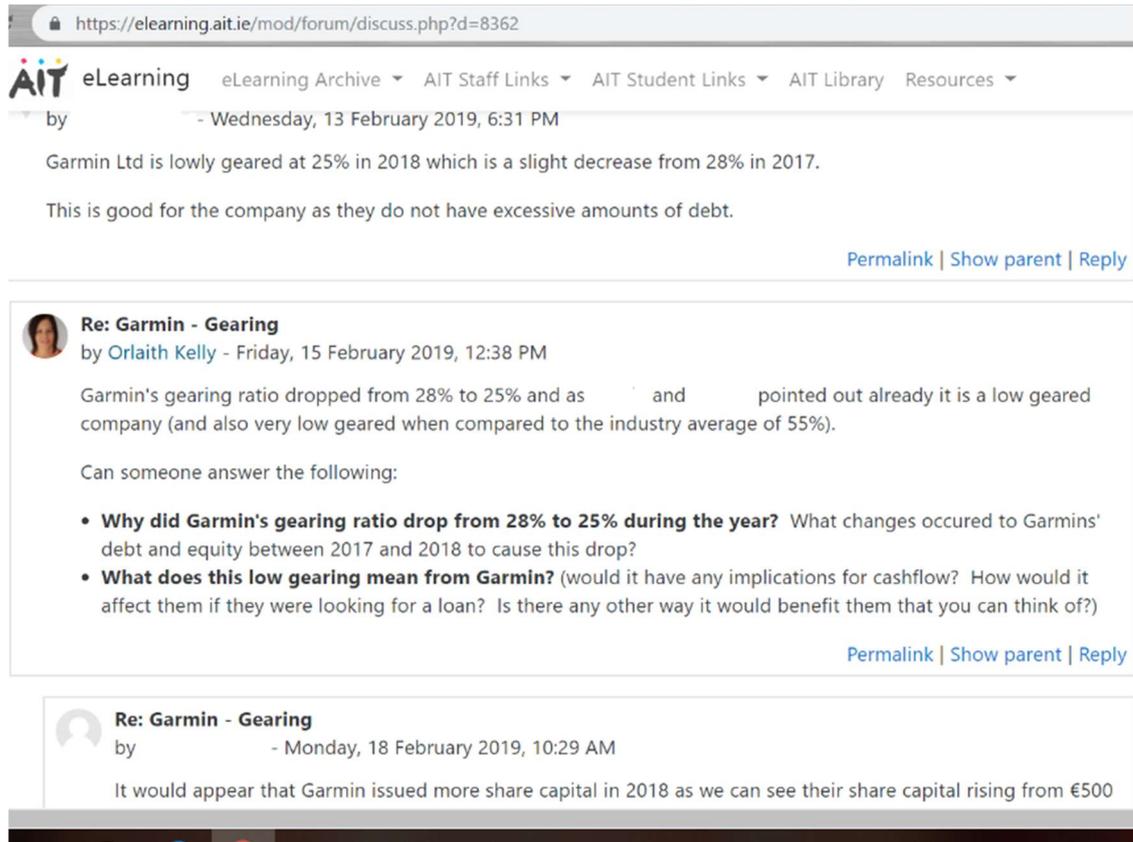
A suggestion was made during the group interview in cycle one that the inclusion of additional information in the ratio analysis assignment task would offer increased opportunities for students to post comments. It was envisaged that the increased level of challenge associated with the ratio analysis assignment task in cycle two would expand the opportunities to comment by students thereby augmenting participation levels.

Students were divided into two groups for the discussion forum element of the ratio analysis assignment task. Each group was required to discuss the performance of one company (Fitbit Ltd or Garmin Ltd) on a private discussion forum. There was evidence of lack of engagement with the discussion forum during cycle one so it was envisaged that smaller forum groups may encourage greater student participation (Salmon, 2011). The forum was introduced to students during a f2f class in the computer lab and they were each assigned a ratio to calculate and post to the forum during that class. It was hoped that this initial posting in a supportive classroom environment would stimulate further comments outside of class and pre-empt possible feelings of anxiety around forum use.

Based on the advice of Salmon (2011), the lecturer engaged in 'weaving' activities by posting comments in any section where she identified ratios had not been calculated

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and also trying to evoke additional discussion on ratios that had already been calculated, as illustrated in Figure 6.2. She identified any misconceptions students had by posting comments of clarification, while remaining as tactful as possible so as not to cause offence (Kelly, 2019).



The screenshot shows a Moodle forum thread. At the top, the URL is <https://elearning.ait.ie/mod/forum/discuss.php?d=8362>. The forum header includes the AIT eLearning logo and navigation links: eLearning Archive, AIT Staff Links, AIT Student Links, AIT Library, and Resources. The first post is by an anonymous user, dated Wednesday, 13 February 2019, 6:31 PM. The text of the post reads: "Garmin Ltd is lowly geared at 25% in 2018 which is a slight decrease from 28% in 2017. This is good for the company as they do not have excessive amounts of debt." Below the post are links for "Permalink", "Show parent", and "Reply". The second post is a reply by Orlaith Kelly, dated Friday, 15 February 2019, 12:38 PM. It starts with "Re: Garmin - Gearing" and "by Orlaith Kelly". The text says: "Garmin's gearing ratio dropped from 28% to 25% and as [redacted] and [redacted] pointed out already it is a low geared company (and also very low geared when compared to the industry average of 55%). Can someone answer the following:" followed by two bullet points:

- **Why did Garmin's gearing ratio drop from 28% to 25% during the year?** What changes occurred to Garmin's debt and equity between 2017 and 2018 to cause this drop?
- **What does this low gearing mean from Garmin?** (would it have any implications for cashflow? How would it affect them if they were looking for a loan? Is there any other way it would benefit them that you can think of?)

Links for "Permalink", "Show parent", and "Reply" are also present. The third post is a reply by an anonymous user, dated Monday, 18 February 2019, 10:29 AM. It starts with "Re: Garmin - Gearing" and "by [redacted]". The text says: "It would appear that Garmin issued more share capital in 2018 as we can see their share capital rising from €500".

Figure 6.2 Lecturer's 'weaving' comment, ratio analysis discussion forum 2018-19

Once each company was adequately discussed, the lecturer opened a 'comparison forum' which was available to all students which commenced with summaries of the performance of both companies based on information already posted by students (see Figure 6.3). The original two forums were also made visible to all students within the class group. Students were required to post comparative comments to the new forum and also complete a report evaluating performance of both companies for submission via Moodle. Many students used the discussion forum postings to assist them when completing the report.

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Comparison - Gearing

by Orlaith Kelly - Saturday, 23 February 2019, 3:57 PM

This is a summary of the comments on the gearing of Fitbit and Garmin, taken from the previous discussion forums. Please reply to this post with any comments you have comparing the gearing of both companies.

GEARING - FITBIT

	2018	2017	
Gearing ratio	54%	48%	
Interest cover	3.9 times	4.4 times	

Interest cover decreased in 2018 due to an increase of 50% in the interest payment being made by the company. The interest cover is below the industry average of 7 times, but Fitbit is still making enough money to meet its interest obligations

Gearing ratio increased due to additional debt in the business in 2018

Increase in gearing and decrease in interest cover may cause the company to encounter issues with solvency in the future

Fitbit is highly geared at 54% but is just below the industry average of 55%. Highly geared companies represent a higher

Figure 6.3 Lecturer's 'summarising' comment, ratio analysis discussion forum 2018-19

The researcher noted an increase in the level of engagement with the forum in comparison to cycle one (Kelly, 2019). The new grading rubric allocated extra marks for discussion forum participation, as the lecturer believes that this is a valuable part of the learning process (Appendix 9). The rubric, which was provided to students at the commencement of the task specifying the marks allocation for quantity and quality of comments, is likely to have been an influencing factor in stimulating discussion. When preparing the summaries for each company, the researcher noted that some points were generated by up to four students who built up the argument with their individual comments as displayed in Figure 6.4, showing evidence of 'knowledge building' (Scardamalia and Bereiter, 1994). Students were set a deadline of 11 March 2019 for report submission with all students submitting within the appropriate timeframe. Assignments were graded and feedback provided using the rubric headings in Moodle gradebook. While students were offered the opportunity to discuss their grade with the lecturer, no student availed of the opportunity with all students appearing satisfied with the level of feedback received via Moodle (Kelly, 2019).

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The screenshot shows a forum discussion on the AIT eLearning platform. The URL in the browser is <https://elearning.ait.ie/mod/forum/discuss.php?id=9475>. The forum title is "Re: Comparison - Gearing". The first post is by a user (profile picture) dated Wednesday, 27 February 2019, 11:54 AM. The text of the post reads: "When comparing the two companies we can clearly see that there is a big difference between the interest cover of the two companies. Garmin is very comfortable at meeting their interest payments at 13.3 times whereas Fit bit is less comfortable as they can only meet their interest payments 3.9 times. Both companies can make their payments but Garmin is a lot more comfortable and Fitbit is below the industry average of 7%." Below the post are links for "Permalink", "Show parent", and "Reply".

The second post is also by a user (profile picture) dated Wednesday, 27 February 2019, 12:17 PM. The text reads: "There is a huge contrast in the gearing percentages between the 2 companies. Garmin's gearing % is 25% which means the co. is lowly geared and therefore not dependent on outside borrowing. Compared to Garmins gearing rate Fitbit's one is a cause for concern. It's gearing rate is 54% which means it's highly geared and dependent on outside borrowing. This can leave the company at risk from outside investors." Below the post are links for "Permalink", "Show parent", and "Reply".

The third post is by a user (profile picture) dated Wednesday, 27 February 2019, 7:24 PM. The text reads: "It's concerning to see that Fitbits gearing ratio is increasing instead of decreasing as it is already highly geared, meanwhile Garmins gearing ratio is decreasing which has a positive impact on the overall view of the company." Below the post are links for "Permalink", "Show parent", and "Reply".

Figure 6.4 Evidence of knowledge-building, ratio analysis discussion forum 2018-19

6.3.3.3 Collaborative f2f learning activities

Research literature advocates the use of collaboration to promote learning (Vygotsky, 1978). Evidence from cycle one suggested that student collaboration would not occur unless it was intentionally designed into the learning activities; therefore group work activities were introduced during cycle two with a view to increasing collaborative learning. These included use of an authentic bank reconciliation group class activity in semester 1, a P-M-I collaborative activity where students listed plus-minus-interesting points for a company when assessing its performance and a 'think-pair-share' activity involving the use of a student response system ('clickers') to encourage class participation, both in semester 2 (see Figure 6.5). These activities were inspired by Bonk and Smith (1998) who have recommended a range of innovative instructional strategies suitable for use in accounting education. An example of a question and handouts deployed in f2f ratio analysis classes are presented in Appendix 17.

Which of the following statements do you think is true?

- ✓ A. Johnson is better at controlling its credit customer balances in 2018
- B. Johnson is better at managing its inventories in 2018
- C. Johnson is getting a shorter period of credit from its suppliers in 2018
- D. Johnson is better at controlling its expenses in 2018

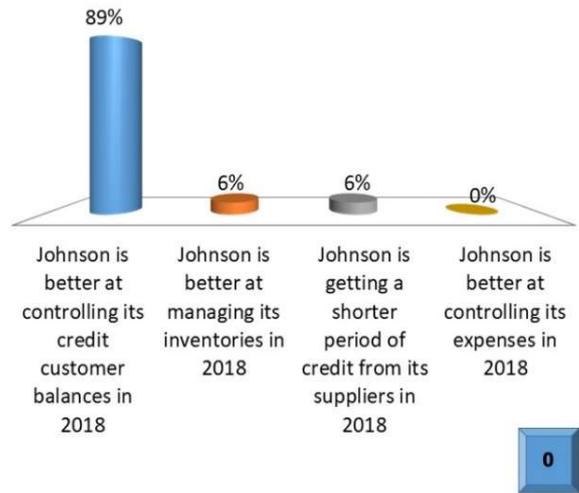


Figure 6.5 Screenshot of clicker PowerPoint quiz, 2018-19

6.3.4 Engagement

6.3.4.1 In-class participation

While many students displayed high levels of engagement during cycle one, the researcher identified in-class student participation as an area for improvement. It was decided to introduce innovative class learning activities during cycle two.

Kearsley and Shneiderman's (1998) Engagement Theory proposes that the learner must be actively engaged in a meaningful task to achieve effective learning, with three learning characteristics namely, collaboration, problem-based and authenticity. The bank reconciliation group activity introduced during this cycle was designed based on engagement theory, with students working on a real-life problem in a group setting within class. Furthermore, this activity formed part of an assessment task which was continued outside of class and submitted in electronic format via Moodle.

During the ratio analysis topic, f2f classes incorporated a number of group activities one of which introduced the use of clicker technology, which ensured that every student participated in offering answers regarding the performance of a company

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over time. These activities allowed the lecturer to play the role of facilitator with the aim of cultivating a student-led rather than teacher-led learning environment.

6.3.4.2 Worked example videos

The availability of additional worked example videos provided students with a set of graded challenges to accommodate learners as their skill levels increased, allowing students move from supported learning to independent problem-solving with the aim of promoting ‘flow’ among learners (Nakamura and Csikszentmihalyi, 2014).

6.3.5 Interaction

6.3.5.1 Learner-interface interactions

It was evident during cycle one that the absence of structure to organise comments on the ratio analysis discussion forum was one of the inhibiting factors relating to student engagement. Based on participant feedback, the lecturer decided to re-structure the forum to include one thread for each comment type so that similar comments were grouped together, allowing students to locate relevant comments easily with the aim of encouraging higher participation levels, as Figure 6.6 exhibits.

FITBIT Ltd - company performance - Discussion forum

This forum will be used to discuss the financial performance and position of FITBIT Ltd.

Visible groups: All participants

Add a new discussion topic

Discussion	Started by	Group	Replies	Unread	Last post
Fitbit - Liquidity and Efficiency	Orlaith Kelly	Group 1 - FITBIT	27	0	Tue, 26 Feb 2019, 5:11 PM
Fitbit - Gearing	Orlaith Kelly	Group 1 - FITBIT	9	0	Mon, 25 Feb 2019, 12:14 AM
Fitbit - Profitability	Orlaith Kelly	Group 1 - FITBIT	26	0	Sun, 24 Feb 2019, 10:08 AM
Fitbit - Other comments	Orlaith Kelly	Group 1 - FITBIT	7	0	Orlaith Kelly Sat, 23 Feb 2019, 2:11 PM
Ratio analysis - FITBIT Ltd	Orlaith Kelly	Group 1 - FITBIT	0	0	Orlaith Kelly Wed, 6 Feb 2019, 10:04 AM

Figure 6.6 Improved 'thread' layout for ratio analysis discussion forum, 2018-19

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Hillman, Willis and Gunawardena (1994) stress the need for high-quality course interface designs to enhance student learning. The lecturer felt that the Moodle page layout that she traditionally used was inadequate to accommodate the increased volume of resources present in the BL design. With this in mind, an enhanced Moodle page layout was provided in design cycle two, to allow for easier navigation. A short summary of each topic was presented on the module's home page (see Figure 6.7).

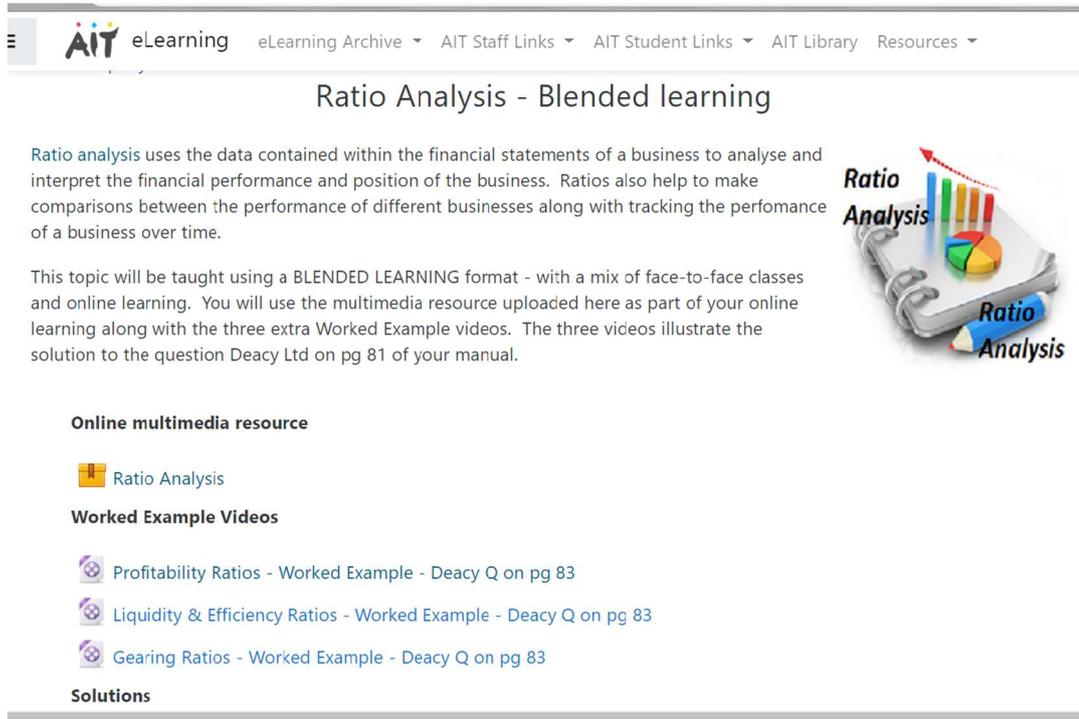
The screenshot shows a Moodle course page for 'Continuous Assessment'. The URL is <https://elearning.ait.ie/course/view.php?id=86>. The page features a navigation menu with 'AIT eLearning', 'eLearning Archive', 'AIT Staff Links', 'AIT Student Links', 'AIT Library', and 'Resources'. The main content area is titled 'Continuous Assessment' and includes a description: 'Continuous assessment for this module is available here and consists of online quizzes and an assignment as follows:'. Below this, there is a list of assessments:

Quiz 1:	Bank reconciliation topic	- worth 5%	(October)
Assignment Upload:	Bank reconciliation topic	- worth 5%	(October)
Quiz 2:	Various other topics	- worth 10%	(November)

On the right side, there is a graphic with the word 'Assessment' and a magnifying glass icon. Below the assessment list, it says 'Quizzes: 3 Files: 4 Assignment: 1'. The second section is titled 'Bank Reconciliation (blended learning)'. It includes a description: 'A bank reconciliation is performed regularly in business. It is needed when the bank balance of the business disagrees with the amount shown on their bank statement. The business will need to check why the bank statement is showing a different balance compared to the business's own records.' Below this, it states: 'This topic will be taught using a BLENDED LEARNING format - with a mix of face-to-face classes and online learning. You will use the multimedia resource uploaded here as part of your online learning along with the extra Worked Example video.' On the right side, there is a graphic with a hand holding a pen and a table of data. Below the description, it says 'SCORM package: 1 Files: 6'.

Figure 6.7 Updated Moodle course interface – home page, 2018-19

Clicking on the topic opens a new page with the resources for that topic. Within each topic, labels were added to group similar material together (eg questions, solutions, forums) so that a clear structure for each topic was evident as displayed in Figure 6.8. This was further facilitated by the updating of the AIT Moodle site to the Moodle 3.5 version which allowed additional customisation options for the instructor.



The screenshot shows a Moodle course page for 'Ratio Analysis - Blended learning'. At the top, there is a navigation bar with 'AIT eLearning' and several dropdown menus: 'eLearning Archive', 'AIT Staff Links', 'AIT Student Links', 'AIT Library', and 'Resources'. The main heading is 'Ratio Analysis - Blended learning'. Below this, there is a paragraph explaining that ratio analysis uses financial statements to analyze business performance. To the right of this text is an illustration of a spiral notebook with a bar chart and a pie chart on it, with the words 'Ratio Analysis' written on the notebook and a pencil. Below the paragraph, there is a section for 'Online multimedia resource' with a video icon and the text 'Ratio Analysis'. This is followed by a 'Worked Example Videos' section with three video icons and titles: 'Profitability Ratios - Worked Example - Deacy Q on pg 83', 'Liquidity & Efficiency Ratios - Worked Example - Deacy Q on pg 83', and 'Gearing Ratios - Worked Example - Deacy Q on pg 83'. At the bottom of this section is a 'Solutions' link.

Figure 6.8 Updated Moodle course interface – topic page, 2018-19

6.3.5.2 Interaction with content

Following a think aloud protocol undertaken during cycle one, errors and areas for improvement identified in the ratio analysis multimedia resource were addressed by returning to the source files and making all feasible changes before re-publishing the resource in SCORM format. A think aloud protocol will be carried out on the bank reconciliation multimedia resource during cycle two, which may inform possible changes to that learning resource for the final cycle.

6.3.5.3 Interaction with instructor

The BAA1 class rep had set up a Whats App group for the group with the assistance of another lecturer. She indicated that announcements for the class group could be sent directly to her and forwarded from there via the Whats App group. As participants during the previous cycle had stressed the inadequacy of email as a communication medium with students, the lecturer was happy to avail of this new method due to its ease of use and instant message delivery features.

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6.3.5.4 Face-to-face meetings

Face-to-face meetings were designed to allow greater interaction between students and increased class participation due to an absence of same noted during cycle one.

6.3.5.4.1 Semester 1 - bank reconciliation topic

The bank reconciliation topic was taught in week 9 of the semester in cycle one. It was decided to teach the topic earlier in cycle two due to college graduation and an ACCA student event potentially causing class disruption later in the semester. The reduction in f2f hours was spread out over a three-week period as before as displayed in Table 6.2.

Table 6.2 Blended topic contact timetabled hours in semester 1, 2018-19

Week	Date	Topic
Week 5	Tues 9 October 2 - 3 pm	Accruals and prepayments
	Thurs 11 October 11 – 12 pm	Bank reconciliation - introduction
	Thurs 11 October 3 – 4 pm	Conclude Accruals and prepayments
	Thurs 11 October 4 – 5 pm	NO CLASS
Week 6	Tues 16 October 2 - 3 pm	NO CLASS
	Thurs 18 October 11 - 12 pm	Bank reconciliation
	Thurs 18 October 3 - 5 pm	Bank reconciliation – learning activity
Week 7	Tues 23 October 2 - 3 pm	NO CLASS
	Thurs 25 October 11 - 12 pm	Bank reconciliation - conclusion
	Thurs 25 October 3 – 5 pm	Depreciation

Students were introduced to the bank reconciliation topic during a class in the computer lab, where LanSchool was used to demonstrate a basic bank reconciliation question and students were asked to identify areas of discrepancy between the cash book and bank statement of a business. Students became acquainted with the terminology for the topic and the structure of a question. During the ensuing days, students were requested to view the online multimedia resource and worked example videos. The lecturer was aware that a large proportion of the class had prior

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accounting experience, mainly at leaving certificate level, so some may have already been exposed to this topic. Students were also required to complete the online assessment quiz in advance of the next f2f class on 18 October 2019. During the next f2f class, the lecturer worked on a more advanced bank reconciliation question illustrating the solution while also allowing students complete small sections by themselves. In the afternoon class, students were assigned one of six different bank reconciliation questions (sample question available in Appendix 16) and were asked to form groups with those who had received the same question as themselves. This resulted in six groups containing four students in each group. Students worked individually on their questions while seated around four tables which were grouped together. They were allowed to help one another or ask for help while the lecturer also circled the room to provide assistance where necessary. The lecturer noted that students worked alone quietly at the start, but did check their answers with one another towards the end of the exercise (Kelly, 2019). Tables were grouped in fours with students seated two facing two. The lecturer felt that while students needed one table each to complete the written work involved, the seating arrangement around four tables caused quite a distance between each pair of students which was not conducive to interactive group work. Students would have to move around the table if they wished to help one of the students facing them. As the lecturer moved around she was able to identify students who were struggling with the exercise and offer assistance where necessary. Students submitted their completed answers in MS Excel format via Moodle within the allocated one-week period with no student reporting any issue. The lecturer graded the assignments and marks and individual feedback was provided to students via Moodle gradebook.

6.3.5.4.2 Semester 2 - ratio analysis topic

The ratio analysis topic commenced in week 2 of semester 2, in a similar fashion to cycle one. In the previous cycle, the reduction in f2f hours was achieved by eliminating all f2f classes in week 2. However, the f2f class schedule was amended in design cycle two in order to include an introductory class on the blended topic. It was decided to commence week 2 with a f2f class on the ratio analysis topic and spread the reduction in f2f hours over weeks 2 and 3 (see Table 6.3). It was hoped that the introductory class would address some of the main points on the topic in

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advance, thereby reducing the number of questions which may arise for students as they view the multimedia resource online. Moreover, spreading the reduction in f2f hours over a two-week period in this semester would support students by maintaining f2f contact in every week, ensuring that students' questions or misunderstandings would be addressed promptly should they arise.

Table 6.3 Blended topic contact timetabled hours in semester 2, 2018-19

Week	Date	Topic
Week 1	Tues 15 January 2 – 4 pm	Company final accounts
	Thurs 17 January 9 – 11 am	Company final accounts
Week 2	Tues 22 January 2 – 4 pm	Final accounts/Ratio analysis introduction
	Thurs 24 January 9 – 11 am	NO CLASS
Week 3	Tues 29 January 2 – 4 pm	NO CLASS
	Thurs 31 January 9 – 11 am	Ratio analysis
Week 4	Tues 5 February 2 – 4 pm	Ratio analysis
	Thurs 7 February 9 – 11 am	Depreciation

During the introductory class on 22 January 2019 on the ratio analysis topic, the different categories of ratios were outlined and students became acquainted with the learning resources which were available online. Students were required to view the online multimedia resource and complete an online assessment quiz before returning to class on Thursday 31 January. The lecturer reviewed the quiz results before the next f2f class, taking note of questions where students underperformed for review during the upcoming class. To encourage student participation and interaction which were noted as lacking during the semester 1 bank reconciliation group task, the lecturer adapted the groupwork seating arrangement. Tables were arranged in groups of four and students were allowed to sit at any table they wished, which resulted in many students sitting with their friends. Figure 6.9 illustrates the new seating arrangement with students seated around four tables in U-shape format, rather than two facing two. This allowed for easier conversation and better interaction within the groups.

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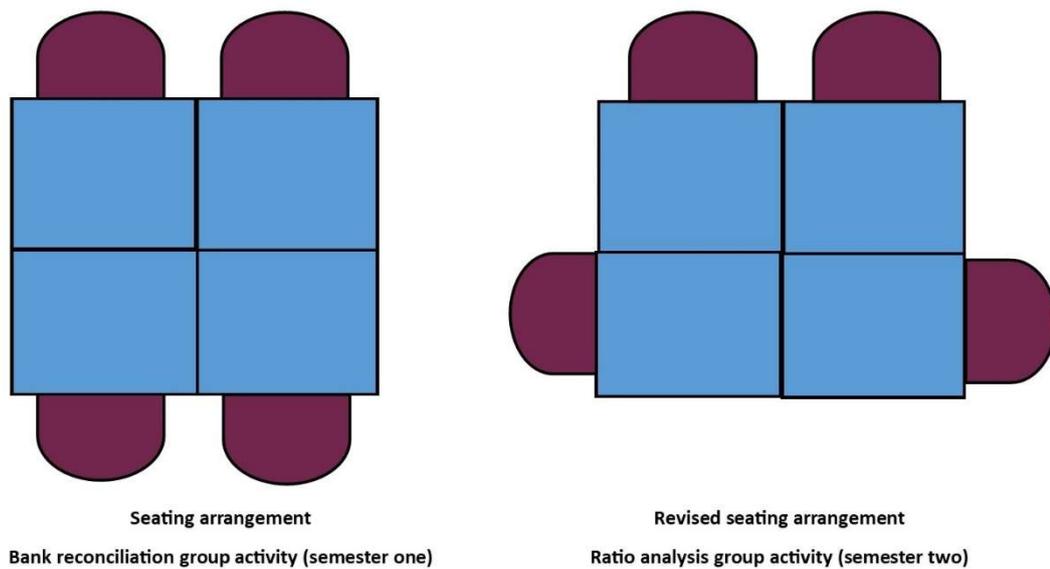


Figure 6.9 Group work seating arrangements, *f2f* classes, 2018-19

Each group was assigned the task of calculating ratios for one of two companies (Company A or Company B), with two students at each group calculating profitability and gearing ratios, and two calculating liquidity and efficiency ratios (Appendix 17). Students were asked to compare their answers with one another. The lecturer took on the role of facilitator circling the room and identifying any misconceptions which students had, noting that the International Accounting Standards (IAS) company accounts layout which is followed at third-level was confusing for some students who prepared accounts using alternative formats at leaving certificate level, evidence of the effect of students' prior knowledge on their learning. Students were required to complete a P-M-I worksheet identifying the 'plus, minus and interesting points' for the company which would later assist them in evaluating company performance (Bonk and Smith, 1998). Following completion of that task, two students at each 'Company A' table were asked to swap with two students at a nearby 'Company B' table resulting in new groups with expertise on both companies. At this point, students were asked to assess the comparative performance of both companies using the P-M-I worksheets already completed by them. This exercise allowed students to self-select the groups at the beginning so students were able to sit with those with whom they were comfortable. Later on, when students swapped groups, they moved with a peer to another table which forced them to interact with students with whom they may have been less familiar.

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The primary aim of this exercise was to confirm students' ability to calculate ratios and introduce them to the use of ratios to interpret company performance. It also aimed to offer opportunities for peer scaffolding, while promoting collaboration and interaction among students within the class group. At the end of the class the lecturer reviewed all the ratios calculated and discussed the meaning of each ratio to assist students in interpreting the company's performance based on the ratios.

The lecturer decided to use clicker technology in the next f2f class on 31 January 2019. This class took place in a traditional classroom setting and students were asked to engage in a 'think pair share' activity where they were given final accounts for a single company and required to analyse changes in performance over a two year period. For the initial task, students were asked to identify any significant changes in the figures within the accounts without calculating any ratios. These points were then shared with the entire class and discussed before they were presented with a 13 question quiz on a PowerPoint screen to which they responded using a clicker device which had been distributed to students at the start of class. The possible responses to each question were discussed after students had input their responses and then the correct answer was revealed, followed by a discussion as to why it was correct. Students were exposed to extracting information from final accounts to interpret performance without depending on ratio calculations, which apparently was a novel exercise for the class group.

Students were paired with a peer, provided with correct financial ratios for 2017, and asked to calculate 2018 ratios for the company and compare with their peers. The lecturer circled the room and noted no problems with ratio formulae or calculations during this class. Students were asked to complete a P-M-I worksheet noting the plus, minus and interesting points for the company, sharing the information with their peer. Another 17 question quiz using the clicker device ensued in which students were asked to interpret the ratios they had calculated to evaluate the performance of the company. Discussion took place after each question with some questions including more than one correct answer, with a view to evoking even greater dialogue. While some students remained quiet during the exercise, the clicker device allowed them to participate actively without the need for reticent students to express themselves vocally. Due to a problem with the technology, the

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PowerPoint quiz moved slowly towards the end of class resulting in the quiz moving at a slower pace than planned, which was exacerbated by the fact that the 'response' tab usually visible to the lecturer was unavailable, so the lecturer was unable to track the number of students who had responded to each question. However, this slow pace may have facilitated international students by allowing them extra time to read the on-screen questions before responding (Kelly, 2019).

6.3.6 Technology

The lecturer had concerns during cycle one that the pace of learning was slower during computer laboratory classes. Notwithstanding, she still believed the classes added value in terms of orienting students to online resources as well as the authenticity offered by exposing them to software which would be used ubiquitously in their future careers. In cycle two, the lecturer continued to provide students with solution templates on MS Excel so that they were not inhibited by slow typing speeds when engaging in classes within the computer laboratory. This facilitated them in completing the solution using technology without having to struggle too much if they were less experienced in using the software, and thus acted as a supporting scaffold for them. Moreover, when providing solution templates in MS Excel during this cycle, the lecturer also provided a copy of the question in Excel format. This allowed parts of the question to be illustrated to students using LanSchool and enabled them to click back and forth between the question and solution on their screens where necessary, with the aim of leading to more effective learning in classes scheduled in the computer laboratory.

However, the lecturer was conscious of the fact that the final exam would be in pen and paper format, so was eager to ensure that they were also capable of completing a solution without the use of an Excel template. This point was also stressed by cycle one participants; hence class returned to the traditional classroom setting for material unsuited to computer lab delivery, for group-work activities and as the end-of-semester exam approached.

6.4 Data analysis

Data collection and analysis were carried out using similar methods to cycle one; however modifications were implemented to attain an enriched dataset during the second cycle.

The pre-implementation survey (Appendix 6) was adapted to include a question on students' teamwork preferences as well as 24 likert-style statements to assess students' oral communication apprehension levels taken from the Personal Report of Communication Apprehension (PRCA-24) (McCroskey, 1978, 1982; McCroskey *et al.*, 1985).

Students' sense of community was measured in the post-implementation survey using Rovai's (2002a) Classroom Community Scale. The scale comprises 20 Likert-type statements which measure students' connectedness as a class group as well as student learning while providing an overall score for learners' sense of community. The post-implementation survey also incorporated additional questions in relation to the discussion forums, clicker technology and group-work activities to capture students' perceptions of the revisions to the blended design in cycle two (Appendix 7).

Twenty-four students were eligible and consented to take part in the study having been provided with participant information sheets informing them of what was involved. All 24 students completed the pre-implementation questionnaire; however, one student left the programme during semester 1, so data collection throughout the year was based on 23 students. The post-implementation survey was completed by 22 students; however one response was deemed invalid. Data analysis was conducted on 21 responses representing a 91% response rate (N=23). The online questionnaire data were downloaded and imported into MS Excel and SPSS for descriptive statistical analysis.

A think aloud protocol was carried out in October 2019 with one study participant to gather usability data on the bank reconciliation multimedia resource. A group interview took place with seven participant volunteers at the end of the BL process. A total of 182 participant statements were coded and analysed using concept

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mapping and UCINET6 software, in the same manner as in cycle one, the results of which are displayed in Appendix 22. Mixed methods data analysis was performed by ‘following a thread’ to achieve data integration (Moran-Ellis *et al.*, 2006) as in cycle one.

6.5 Design cycle two findings

6.5.1 Pedagogy

6.5.1.1 Prior knowledge

The majority of students in the group (88%) had completed the leaving certificate (LC) as their highest level of education prior to commencing on this programme (Appendix 11). While the majority of participants had studied accounting at LC level, two participants had never studied accounting previously and five participants indicated a limited level of accounting knowledge from junior certificate business studies. It was evident that, similar to cycle one, mixed levels of prior accounting knowledge existed within the group, as displayed in Figure 6.10.

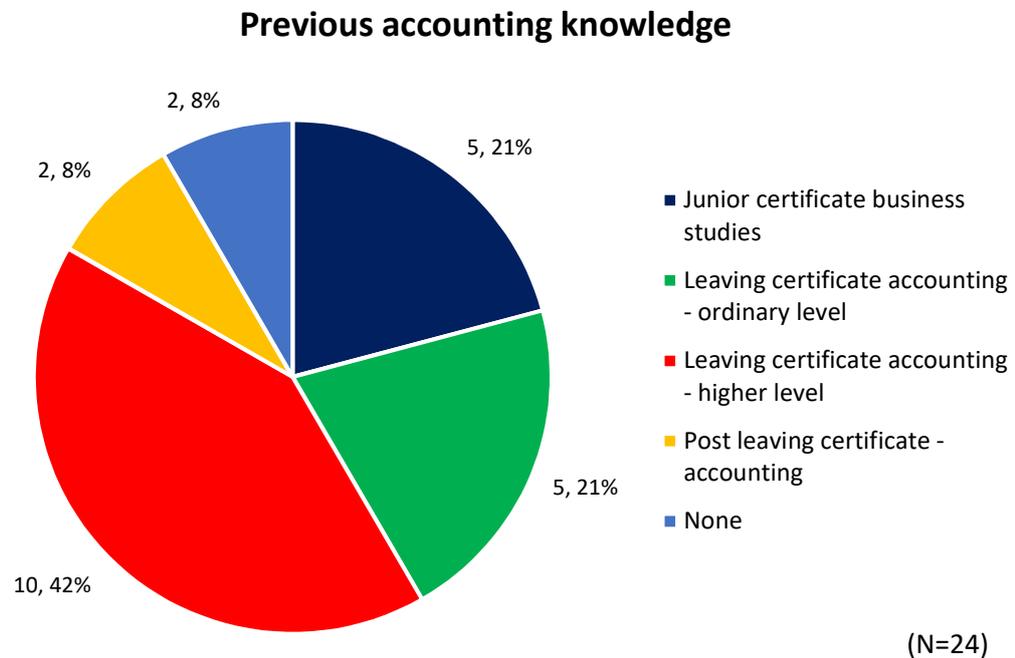


Figure 6.10 Students' previous accounting knowledge, 2018-19 questionnaire data

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6.5.1.2 Perceived effects on learning

Questionnaire respondents were generally positive with regard to the usefulness of the various BL course elements. The graphical illustration of these results in Figure 6.11 shows that a large majority of students perceived all course elements as *very useful* or *extremely useful*.

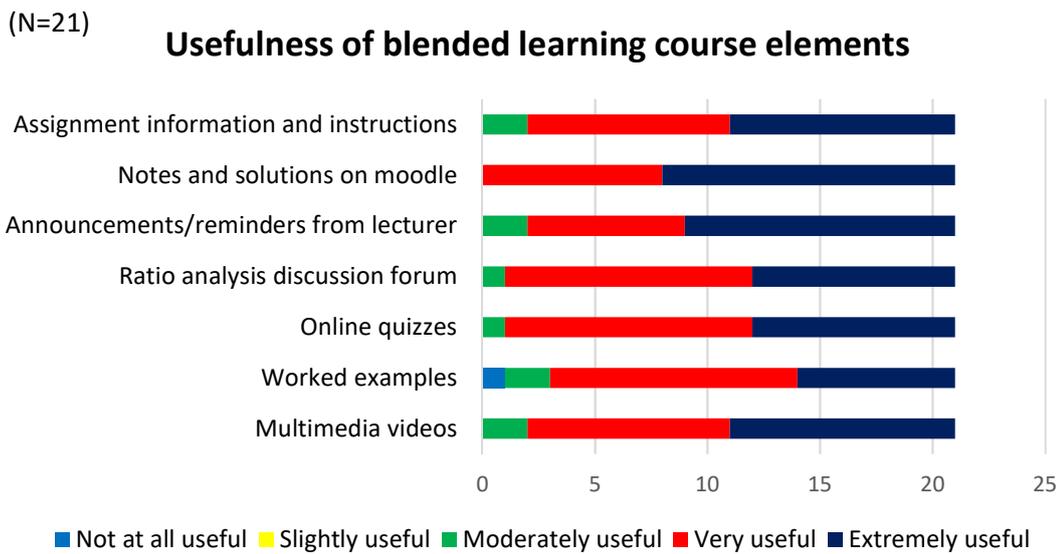


Figure 6.11 Students' perceived usefulness of BL course elements, 2018-19 questionnaire data

The most notable change related to the ratio analysis discussion forum with 95% reporting it as very useful or extremely useful compared with 42% in cycle one, with one student, who identified it as the element she liked most, remarking:

I thought the forum for the ratio analysis topic was really beneficial ... as it really helped with my understanding of the topic. (2018-19 Student 18, survey response)

The worked example videos, which were a new addition to the suite of BL resources, were rated as very/extremely useful by 86% of questionnaire respondents. One student rated the worked example videos as 'not at all useful', explaining that she did not use them due to having studied the topics previously at LC level, which contrasted with the view of another student who rated them as 'extremely useful' stating:

Because I was completely new to ratio analysis, the decay questions and ratio analysis [worked example] videos helped me to interpret the topic more. (2018-19 Student 19, survey response)

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Other students valued the way in which the worked example supported them in completing the solution to a question in their manual:

I thought it was good like. I think I relied a bit more on it than I did on the multimedia resource for the bank rec, because it was just how to do the question. (2018-19 Student 22, group interview)

It was evident that the worked example videos were used on an 'as required' basis by students who felt that their knowledge in the particular topic area was lacking.

Students' comments relating to the multimedia resource indicated that it helped them gain a better understanding of the topics:

It made it so much easier to understand the topics. (2018-19, Student 16, survey response)

Good that it went through the steps on how to do a question. (2018-19, Student 15, survey response)

I did not watch the entire video but only the parts in which I needed help with. I found it incredibly useful as reading instructions from a sheet or book can be monotonous and sometimes you can confuse yourself reading it, but the video gives a great explanation to the methods of bank reconciliation. (2018-19 Student 11, semester 1 student log)

However, one student who did not use the multimedia resource indicated that she relied on the notes provided in the student manual rather than the online videos, evidence of the importance of providing learning material in multiple formats to appeal to students' diverse learning preferences.

The researcher noted using Whats App for various reasons including change of class venue, reminders regarding quiz closing times and receiving feedback from class rep regarding any resource access issues (Kelly, 2019). Students valued the instant nature of the course reminders via Whats App with one student conveying that they motivated her to attend class. Group interview participants stated a preference for use of Whats App for reminders, stressing that email communication was unsuitable for delivery of reminder messages as email may not be checked on a daily basis.

90% of students agreed that the information provided on Moodle relating to assignments was very/extremely useful, with one student commenting:

This stopped me panicking about whether I understood the assignment or not, it explained the easiest ways to complete each assignment and honestly I found it very

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useful because I am person that panics very easily and complicates things but this prevented me from doing that. (2018-19 Student 16, survey response)

Ten of the post-implementation survey questions pertained to students' perceptions of the effects of BL on their learning, using a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). In general, participants were more positive in answering questions relating to the effect of BL on their learning in cycle two. Most notably, the respondents who agreed that BL led to an improvement in their critical thinking skills increased from 42% in cycle one to 76% and 81% agreed it led to a greater interest in the financial accounting subject, compared to 54% in cycle one. Students' levels of agreement/disagreement with each perceived effects on learning question item are displayed in Figure 6.12.

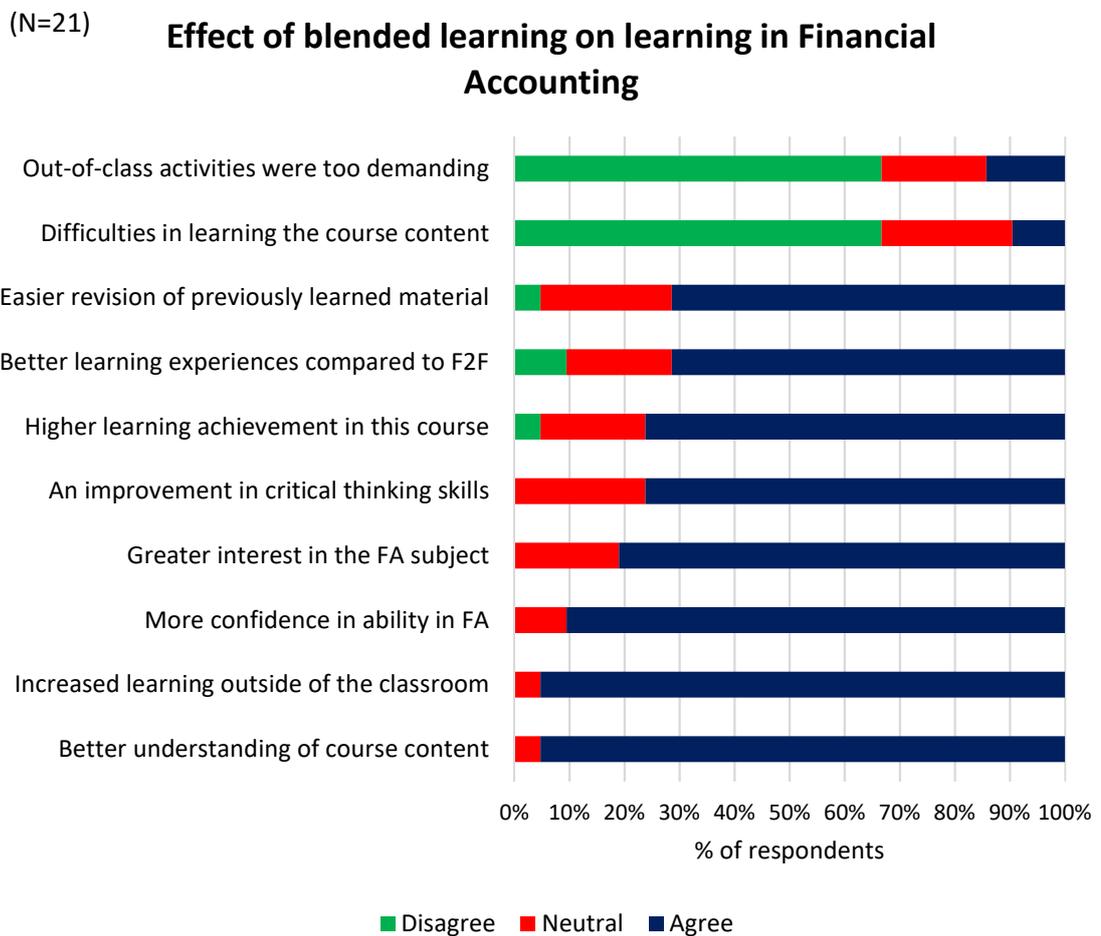


Figure 6.12 Effect of BL on students' learning in financial accounting, 2018-19 questionnaire data

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6.5.1.3 *Confidence*

During this iteration, 90% of questionnaire respondents agreed that BL led to more confidence in their ability in financial accounting. This also emerged as a theme in the group interview data analysis which was reflected in eight of the 156 coded statements.

when I have an idea when I come back to class I feel more comfortable like actually taking part in class discussions as such because at least I have the basic knowledge from the videos that I know what I'm actually talking about. (2018-19 Student 8, group interview)

You are more kind of confident to give answers or work something out and then maybe ask was that the right way to do it. (2018-19 Student 18, group interview)

Students also made references to heightened confidence levels in financial accounting within their student logs:

I found the videos really helpful and got more confident doing bank reconciliation after watching each video. (2018-19 Student 13, semester 1 student log)

I found it [worked example video] very helpful, it was reassurance I was doing the question correctly and explained if I was unsure. (2018-19 Student 22, semester 1 student log)

Overall I think blended learning has helped improve my confidence in my ability to understand accounting topics by myself, I feel more comfortable going into a formal exam. The group work especially helped my confidence as I was able to see that what I was doing was right. (2018-19 Student 8, semester 1 student log)

One student commented in the post-implementation survey that she feels confident facing the end-of-semester exam in this module, which has resulted in reduced stress levels for her:

It has kept me interested in the subject and I don't actually feel stressed about learning it for exams. I feel confident about my exam for this subject which I am thrilled about. (2018-19 Student 16, survey response)

6.5.1.4 *Understanding*

95% of questionnaire respondents agreed that BL led to better understanding of course content (see Figure 6.12 above). This was highly evident in group interview data where many participants recounted a reliance on rote learning in the past, particularly when they were learning about ratio analysis at second-level:

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I just think back then [at second-level] it was kind of just learning off the ratios, learning off the answer. (2018-19 Student 12, group interview)

I watched the online resource more than once as I had kinda forgotten how to do ratios. I had done ratios in Leaving Cert Accounting but never understood them properly. I took notes on the ratios that I really didn't understand and I found it helped me when it came to calculating the ratios. (2018-19 Student 14, semester 2 student log)

I think the assignment helped you to understand the theory relating to it because I didn't. If someone told me to do the ratios I'd do them but I wouldn't be able to explain them and then the assignment kind of forced you to sit down and learn what it all meant (2018-19 Student 22, group interview)

Group interview participants expanded on the usefulness of the various BL resources in fostering a sense of understanding:

I think the forums were helpful. Because just like seeing what people thought of the ratios and what it meant and how it affected the company helped me to understand them better as well. (2018-19 Student 12, group interview)

It [worked example video] gave more understanding for how to do the question. (2018-19 Student 5, group interview)

I find that the videos really help me when I am stuck on a certain topic. They give me a better understanding when I hear it again after being in class. (2018-19 Student 19, semester 1 student log)

I watched the bank reconciliation video multiple times in order to fully comprehend the content within the multimedia resource. I felt that the resource itself was a fantastic tool as it took into account many different forms of learning and accommodated for my own. (2018-19 Student 20, semester 1 student log)

It was apparent that the step-by-step design of the learning resources based on cognitive load theory was valued by students and is likely to have contributed to their enhanced levels of understanding:

I had never done this topic before and I found it [multimedia resource] very good at breaking down the steps to complete a question. (2018-19 Student 9, semester 1 student log)

I liked that it [worked example video] went through all the steps while the answer was being completed. (2018-19 Student 15, semester 1 student log)

Group interview participants referred to the lecturer's style of teaching where the solution to a problem is illustrated by the lecturer and completed together as a class group followed by the students attempting a question independently, with support from the lecturer if required. One student expressed how this scaffolding approach helps her to learn effectively:

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I think when you do, like, go through the examples with us, like we all do a question together for the first one and then actually try do it ourselves. Because like I think it's easier to learn it when you are doing it rather than just listening to someone say what you're meant to do, if that makes sense. (2018-19 Student 8, group interview)

6.5.1.5 *Revision*

Despite a drop from 83% in cycle one, 71% of respondents agreed that BL led to easier revision of learning material. Participants who had prior knowledge of financial accounting emphasised the usefulness of BL in revising topics that they had previously learned during the group interview and through student logs:

It was quicker to revise, like, because if you knew it already, you could kind of skip the bits that you were happy with. (2018-19 Student 22, group interview)

I used it to revise as I had done it before but couldn't fully remember how to do it. (2018-19 Student 18, semester 1 student log)

I watched the video twice I had already studied the topic in leaving cert accounting so it was a revision video for me. I liked the way the video wasn't overly long so I didn't find myself zoning out while trying to watch it. (2018-19 Student 16, semester 2 student log)

One group interview participant who had no previous knowledge of accounting stressed the value of the resources in revising for the end-of-semester exams:

I think always having the multimedia resources and being able to go through them at your own pace and then also being able to use them as revision for the exam. ... I guess it's a good way to actually like, even to use it for the exam to go back it's a good way of like summarising all the notes [the ratio analysis assignment report]. ... I plan on using it for my actual ratio notes before going into the exam. (2018-19 Student 8, group interview)

6.5.1.6 *Learning from ratio analysis discussion forum*

Responses to questions relating to the perceived effect of the ratio analysis discussion forum on student learning are displayed in Figure 6.13.

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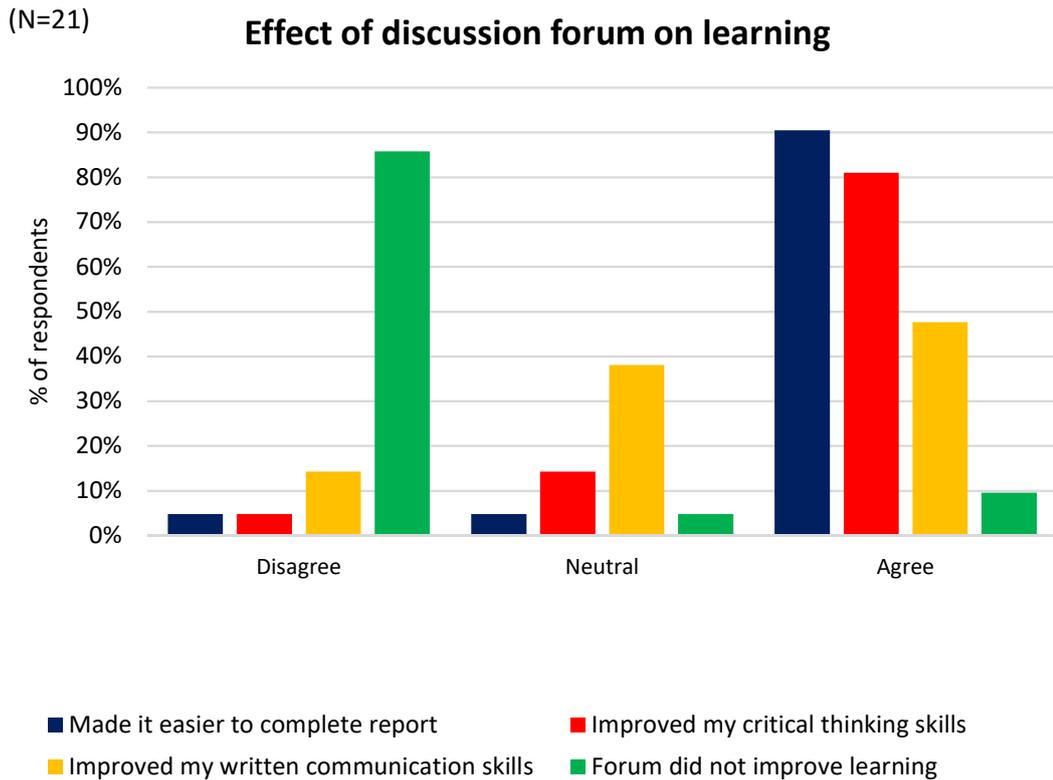


Figure 6.13 *Effect of ratio analysis discussion forum on students' learning, 2018-19 questionnaire data*

There was much stronger agreement in cycle two that the forum improved students' critical thinking skills, with 81% of students expressing agreement, while 86% of respondents disagreed with the statement that 'the forum did not improve learning' which was double the percentage response in cycle one. Notwithstanding, respondents were less strong in their agreement that the forum improved their written communication skills, with only 48% expressing agreement. Perhaps this was due to the absence of formal training around communication skills use while engaging in the forum. Communication skill training is not one of the stated learning objectives of the module; furthermore, the lecturer did not correct students for misuse of English on the forum, as it was feared that this may inhibit student commenting and result in decreased forum participation (Salmon, 2011). As a result, students may have perceived low effects on written communication skills due to forum use.

6.5.1.7 Online assessments

Mean scores were calculated for each of seven question items from the post-implementation survey which dealt with students' perceptions of online assessments

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using a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Results displayed in Table 6.4 indicate a largely positive response to the online assessment quizzes used as part of the BL process.

Table 6.4 *Students' perceptions of online continuous assessment, 2018-19 questionnaire data*

	M (N=21)	SD	% Agree or Strongly Agree
The Moodle assessment quizzes were effective in assessing my level of knowledge.	4.19	0.60	90%
I prefer continuous assessment using an in-class assessment rather than a Moodle quiz (reverse-scored).	3.62	1.16	19%
I liked being able to sit the assessment in my own time.	4.19	1.08	86%
I liked being able to have two attempts at the assessment.	4.52	0.68	90%
I liked getting instant feedback on my result once I completed the quiz.	4.57	0.51	100%
The Moodle assessment quizzes prepared me well for the end-of-semester exam.	4.14	0.73	81%
Moodle assessment quizzes result in better feedback to students than in-class assessments.	3.67	0.91	48%

While the least positive response was 48% in agreement that Moodle assessment quizzes result in better feedback to students than in-class assessments, only one respondent (5%) disagreed, with the remainder assuming a neutral stance. One student, who agreed that she preferred in-class assessments rather than Moodle quizzes, recommended use of online quizzes as practice attempts outside of class in preparation for in-class assessments. While 90% agreed that they liked being able to have two attempts at the online assessments, one respondent who remained neutral indicated she would have preferred three attempts. In the student logs, one student commented on the difficulty in transitioning to online assessments:

I like this type of assessment as you can sit down by yourself to complete it, however I find it easier to complete a quiz/assessment on paper but that is something I will try to change in the future. (2018-19 Student 14, semester 1 student log)

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6.5.1.8 Face-to-face learning and teaching experience

Seven items in the post-implementation survey addressed students' perceptions of the lecturer's integration of technological, pedagogical and content knowledge in her teaching. These questions were adapted slightly based on the cycle one survey, with the addition of a question specific to the use of authentic class problems and the adaptation of technological question items to focus on students' perceptions of the use of clicker technology in class (see Table 6.5).

Table 6.5 Students' perceptions of lecturer's integration of technological, pedagogical and content knowledge, 2018-19 questionnaire data

	M (N=21)	SD
The lecturer had a sufficient knowledge of the subject to answer students' questions.	4.52	0.98
The lecturer adjusted her teaching approaches based on the students' level of understanding.	4.57	0.68
The questions we worked on in class are similar to problems I might encounter in my future career as an accountant.	4.29	0.78
The teaching approaches used made me stay interested in the content of the accounting subject.	4.33	0.58
The assessment methods used evaluated my understanding of the accounting subject.	4.33	0.66
	M (N=17)	SD
The use of 'clicker' technology in this module made the teaching of ratio analysis more effective.	4.59	0.51
The use of 'clicker' technology increased my understanding and learning of ratio analysis.	4.35	0.70

Four of the questionnaire respondents were absent for the f2f class activity which incorporated use of clickers; therefore results displayed for those question items are based on 17 respondents.

One student who agreed that the teaching approaches made her stay interested in the accounting content attributed this to the use of clicker technology, while another stated:

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It [clicker technology] allowed students to engage in the class more. (2018-19 Student 15, survey response)

While participants were generally positive about their online learning experience, they had a sense of the importance of the f2f element of BL. Fifteen of the 182 coded group interview statements related to the f2f teaching element of BL. Group interview participants articulated that, while introductory material lends itself to online delivery, the ‘more complicated’ knowledge may be better conveyed in a f2f setting:

For some of them, you’d want to be in class for different bits that you explain properly. It would be harder to keep up with a video I think. (2018-19 Student 22, group interview)

One student who had studied financial accounting at leaving certificate alluded to this in the learning logs:

I am just not sure if I’ll like it as much when its a topic I haven't done before. I liked this one and found it easy enough as I did higher level accounting for leaving certificate and really like it. (2018-19 Student 12, semester 1 student log)

While the questionnaire respondents who agreed that BL led to better learning experiences compared to f2f only increased from 38% in cycle one to 71% in the current iteration (see Figure 6.12), the convenience of being able to ask questions easily in the f2f setting was still acknowledged:

face-to-face learning is also very important, because if I got anything that I don't understand I can ask and get the answer immediately. (2018-19 Student 4, semester 1 student log)

Two students expressed a preference for learning in class in their student logs:

I prefer to learn it in class because if I have some questions or I have some misunderstanding I can ask teacher for help. (2018-19 Student 13, semester 1 student log)

In my opinion, the way I would like it the most is the recording of the lectures so we can benefit from everything. If I am unclear on some topic I can ask straight away. If I forget about something I can easily replay the lecture at home as many times as needed. (2018-19 Student 24, semester 1 student log)

Group interview participants agreed that f2f classes also acted as a motivating factor in stimulating students to complete learning tasks:

To make sure you’re actually doing it as well, because if you’re doing it at home you might be more laid back how quick you’re doing it like, whereas if you had a class

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the next day you'd kind of be more inclined to do it. (2018-19 Student 18, group interview)

As discussed earlier and illustrated in Table 6.3, the reduction in f2f hours in cycle two was spread over two weeks with an introductory f2f class taking place at the beginning of week 2 and students returning to f2f classes at the end of week 3, having viewed the online multimedia resource. One student perceived the gap between f2f classes in semester 2 as too long, stating:

I think it would be better if we could like meet up in between ... even if it's just for half an hour, to make sure everyone is going in the right direction. (2018-19 Student 8, group interview)

The researcher has decided to review the timing of the reduction in f2f hours for design cycle three to allow students have class contact time earlier in week 3 of semester 2 which would enable student queries to be addressed promptly.

Overall, there was a greater satisfaction among students in cycle two that they received the correct number of f2f hours for each blended topic, as evident from Figure 6.14.

(N=21) **Students' views on number of face-to-face hours received per topic**

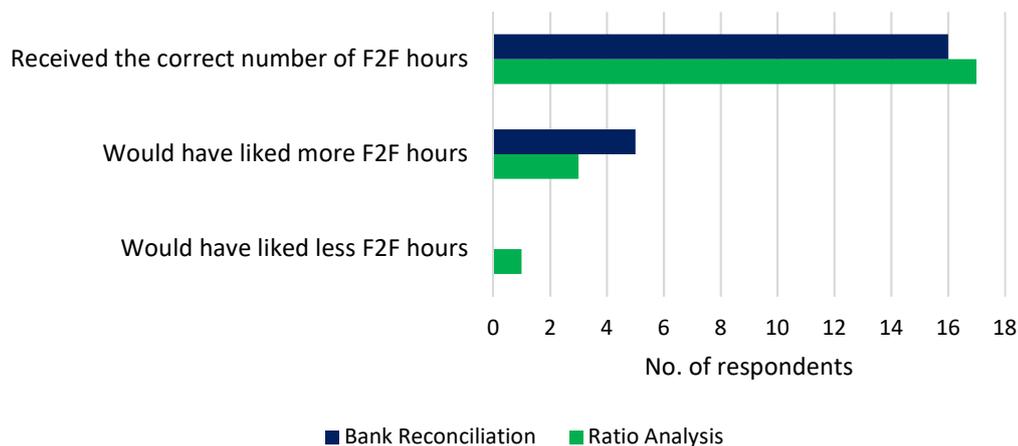


Figure 6.14 Students' level of satisfaction regarding number of f2f hours received, 2018-19 questionnaire data

One group interview participant who enjoyed the BL experience admitted that he would have liked access to the online resources without any reduction in f2f hours. Students who would have liked more f2f hours explained that they liked doing

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questions in class with the lecturer, and being able to ask questions, with one international student indicating that it allows her to improve her speaking skills. Another student valued the additional information which the lecturer may impart in the course of a f2f class:

Maybe I am an old style person, I still prefer paper work and attend face-to-face class and taking notes in class. Also sometimes lecturer will provide more important information in class rather than online. (2018-19 Student 4, survey response)

The majority of respondents, however, acknowledged that they received the correct number of f2f hours, with responses such as:

I was satisfied with the amount of time spent in class learning about bank reconciliations and felt confident in my ability in being able to do it at home by myself. (2018-19 Student 13, survey response)

I completed questions to test my knowledge myself and I knew that if I was confused at any part that Orlaith would have helped me so I was happy with how this was taught. (2018-19 Student 16, survey response)

Interestingly, one group interview participant identified the reduction in f2f hours as an incentive to work harder outside of class, evidence of achievement of learning independence:

Knowing that it wasn't going to be covered in class gave me a bit more of a push to do it at home. (2018-19 Student 8, group interview)

6.5.1.9 *Authenticity*

Seventeen students agreed that the questions worked on in class were similar to problems they would encounter in their future careers; however, four students remained neutral with some indicating that they were unsure regarding tasks that would face them in the future. They also valued the use of authentic class questions, particularly the exercise used during the bank reconciliation topic which provided an authentic bank statement and a more comprehensive cashbook which provided historical detail:

I found questions that were based around real-life scenarios aided me in understanding what it is I'm actually doing. This will help in exam situations as I will understand what I'm meant to do, I won't just be following a learned formula. (2018-19 Student 8, semester 1 student log)

Real-life question was easier as we could see the previous month and easily find which numbers are part of the opening reconciliation. (2018-19 Student 24, semester 1 student log)

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The merits of using authentic problems when teaching bank reconciliation was confirmed during placement visits by the lecturer when two employers revealed a disconnect between the ‘theory’ of the topic as presented to students in class and the ‘practical’ application of the bank reconciliation exercise in accounting practice, with one employer suggesting use of a legitimate bank statement to assist students in grasping the knowledge for easy application later in the workplace (Kelly, 2019).

However, students were cognisant of the fact that a typical exam question is less ‘authentic-looking’ and may result in some confusion for students:

I liked that we could see last months Cash book but I am unsure if it was a good idea because it is not a true representation of what we would see in the exam. (2018-19 Student 22, semester 1 student log)

I think it will be confusing in the exam when we aren't given the previous month's statement. (2018-19 Student 16, semester 1 student log)

However there was no evidence of impaired performance in the end-of-semester exam question on bank reconciliation due to the change in teaching approach, as will be discussed presently. Nonetheless, the researcher has noted that care must be taken during design cycle three to ensure that students have an ability to apply the knowledge learned during authentic class activities when transitioning to traditional formal examination questions.

6.5.1.10 Exam results

The exam paper at the end of each semester assessed topics studied, with Q1 and Q2 as compulsory questions and students having to choose one question from Q3 and Q4. The bank reconciliation question appeared as Q4 in semester one and was attempted by 20 of the 24 students sitting the exam. Admittedly students tend to favour the bank reconciliation topic over the other option, which was suspense accounts. Ratio analysis was examined as a compulsory question in semester 2. Students scored above average in both blended topics on the end-of-semester exam paper, with the mean mark on both questions above the overall mean mark for each paper. Details of exam scores by question are available in Appendix 15.

The assignment report task was completed by all 23 participants as part of their continuous assessment. This task was more demanding in cycle two as it required students to perform a comparative analysis of the performance of two companies

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while also challenging students to reflect on their learning. Marks awarded included 20% for lower-level skills (formulae calculations and presentation), 20% for discussion forum participation, 50% for use of higher level cognitive skills (analysis, evaluation and report creation) and 10% for metacognitive awareness. Students achieved a mean mark of 66.26% on the assignment (SD 14.12%) with a mean score of 63.91% achieved on the 'higher level cognitive skills' element of the assignment (SD 13.56%).

A higher level of performance achievement was evident in design cycle two relative to the previous cycle with the majority of students achieving a first-class honours grade on the assignment (see Figure 6.15) coupled with an increase in the mean assignment percentage mark (see Appendix 15). This corresponded with a stronger level of agreement that BL led to higher learning achievement in this course (76% of respondents agreed) as illustrated earlier in Figure 6.12.

There was an increase in participation levels in the discussion forum during cycle two, with only one student refraining from commenting on the forum. This caused an increase in the mean percentage mark achieved for discussion forum participation in cycle two (to 60% from 44% in cycle one) and would have contributed significantly to the overall increase in achievement on the assignment. The single student who failed to contribute to the discussion forum also failed the higher level cognitive skills element of the report obtaining an overall fail grade on the assignment report.

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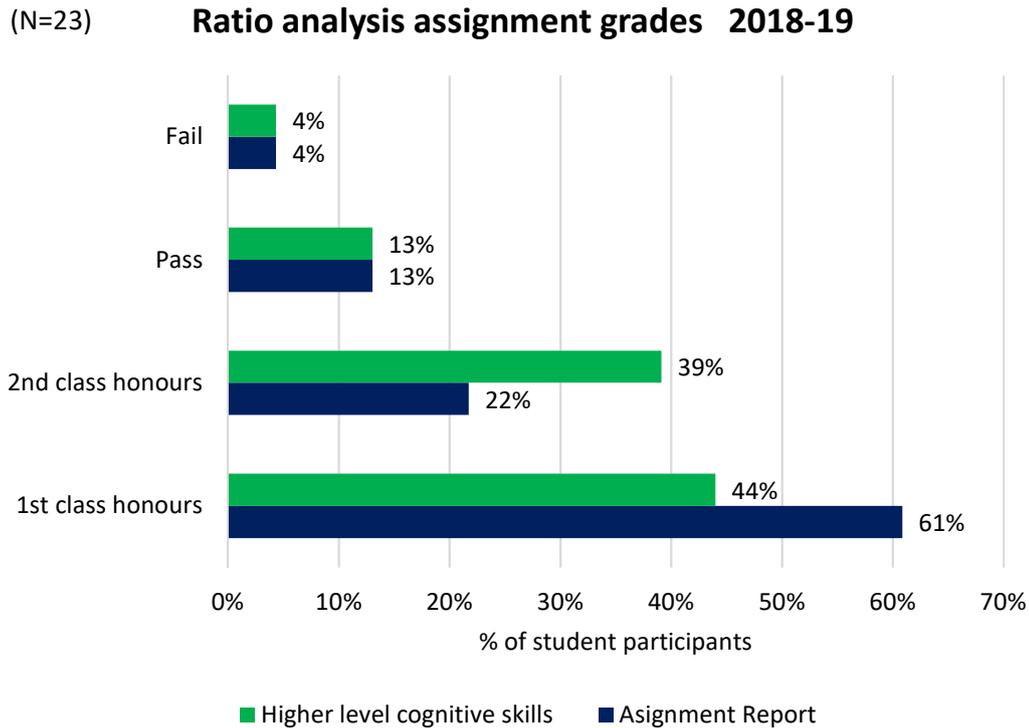


Figure 6.15 Students' grades on ratio analysis assignment task, 2018-19

Performance levels on the 'higher level cognitive skills' aspect of the report increased also with 83% of students achieving an honours grade in cycle two compared with 73% in cycle one. This was corroborated by the fact that the majority of questionnaire respondents agreed that both discussion forum participation and use of BL within financial accounting modules led to an increase in their critical thinking skills as discussed earlier, and illustrated in Figure 6.12 and Figure 6.13.

The 23 student participants posted a total of 126 comments to the ratio analysis discussion forum. Each comment was graded as per the ratio analysis assignment grading rubric (see Appendix 9) when assigning marks to students, with minimum marks allocated to comments which presented ratio information without developing it any further, and maximum marks being awarded to students who commented by building on others' ideas and challenging assumptions and perspectives.

Figure 6.16 illustrates that while many of the comments presented the ratio information, illustrated its meaning and analysed the issues involved, very few comments built upon the ideas or challenged the perspectives of other students.

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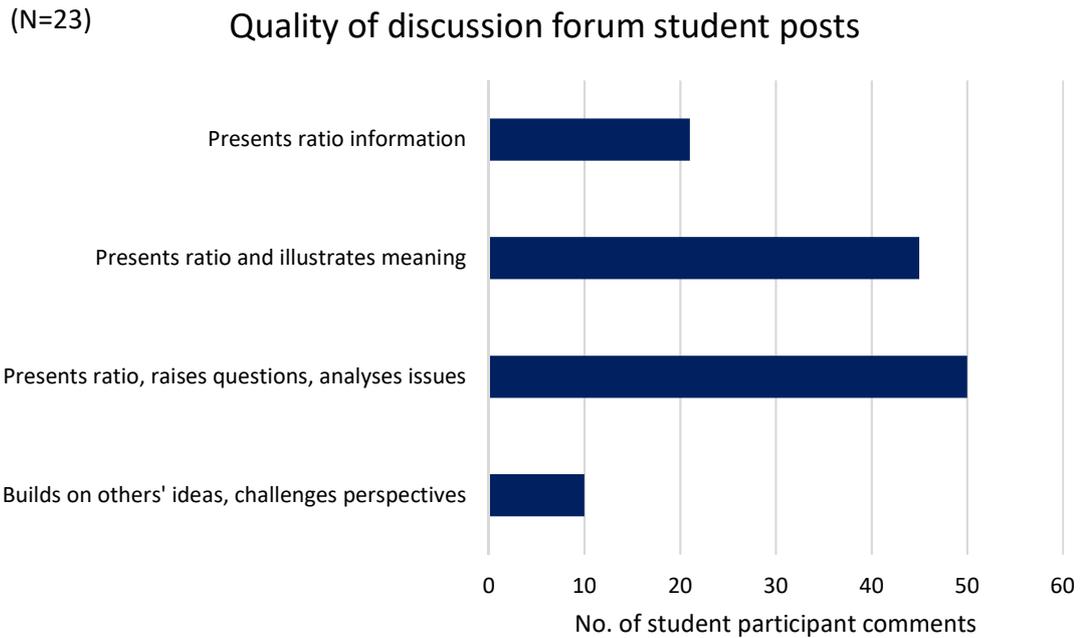


Figure 6.16 *Quality of student posts to ratio analysis discussion forum, 2018-19*

This view was echoed also by a participant in the group interview:

I think what I noticed was there instead of people replying to each other, it was more people replying to the main [original forum post] so maybe next year if you could encourage discussion amongst students. (2018-19 Student 8, group interview)

The need to facilitate higher levels of knowledge-building within the ratio analysis discussion forum has been identified as an area for improvement in design cycle three.

6.5.2 *Autonomy*

6.5.2.1 *Students' lifeload*

Students were asked to identify the time pressures in their life in the pre-implementation survey. Response data are illustrated in Figure 6.17.

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(N=24)

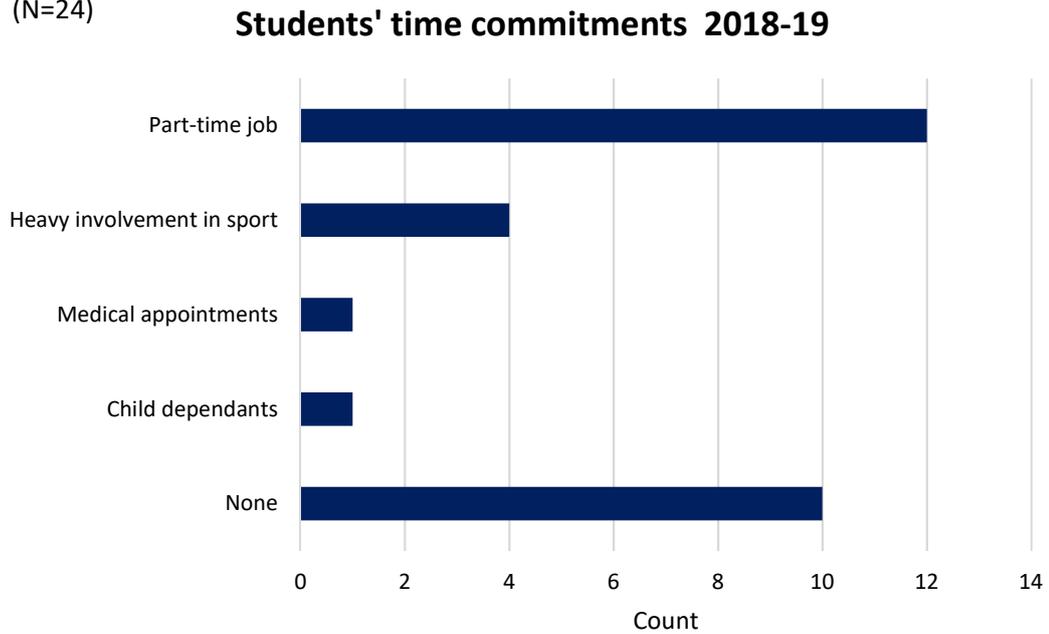


Figure 6.17 Students' other time commitments, 2018-19 questionnaire data

Students revealed various other responsibilities including sport-related, medical appointments and child dependants with part-time employment being the most common as declared by 43% (n=12) of study participants. Four students declared that they had more than one outside time commitment; nonetheless 36% (n=10) had no other obligations on their time. Students were also surveyed on their commute distances to college at the commencement of the course. While the majority of students commuted distances of less than 10 km to college each day, one-third of the group undertook daily one-way journeys of over 20 km, with seven students (29%) having a journey time of over 30 minutes each morning (see Appendix 11).

6.5.2.2 Perceived flexibility of blended learning

Mean scores for student responses to questions which solicited their views on the flexibility of the BL process are displayed in Table 6.6. Students indicated their level of agreement with five statements on a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

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Table 6.6 Flexibility scores by question item, 2018-19 questionnaire data

Blended learning allowed me to:	M (N=24)	SD
Have more flexible learning time.	3.95	0.67
Save time on unnecessary travel to college.	3.19	1.29
Better manage my other commitments outside of college.	3.62	0.74
Access lessons on Moodle on days when I am absent from class.	4.10	0.70
Save money on unnecessary travel to college.	2.81	1.33
Total flexibility score	17.67	3.41

The overall mean score for all five question items dropped from 19.54 in cycle one to 17.67 in cycle two. This was due to less positive responses from students relating to saving time and money on unnecessary travel to college due to BL. As outlined in chapter five, time and cost savings were not achievable due to blending taking place on a small scale within financial accounting modules, rather than across the entire programme. Respondents who disagreed with these two question items explained that they were travelling to college anyway to attend other timetabled lectures, therefore BL had no impact on travel cost or time. This was confirmed by group interview participants, who also acknowledged the ‘space’ they obtained from the reduction in f2f hours:

It didn’t really make any difference in semester 2 like. You still had to travel up the days that we had college because we had more classes after. You’d just find your breaks were longer here. (2018-19 Student 8, group interview)

It can be very long days like this semester I wouldn’t finish until like 5 or 6 and just to have that bit of breathing space because even on the breaks during the day you need to go to the library or you need to do something. (2018-19 Student 18, group interview)

I like that you can go home and watch it [online video resources]. It cuts down the hours of college and I like that as we have long days. (2018-19 Student 12, semester 1 student log)

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Group interview participants recognised the value that could be obtained from a reduction in timetabled hours to allow for shorter days or a four-day week in college:

I had a 5 day week last semester but I have a 4 day week this semester so I get to go home a day earlier and I'm so much more relaxed ... I don't feel as stressed. Like I feel I've more time to catch up. (2018-19 Student 8, group interview)

We used to have 4 days for semester 1 so I used to go home on a Thursday and you feel more like happier coming back Sunday then because you know it's only 4 days whereas this time it feels so dragged out like (2018-19 Student 14, group interview)

It would give you more time to do things in your own time at home as opposed to like travelling and being home late and then you're more inclined not to do anything when you're home late. If you were home earlier because you had less classes, it would be better. (2018-19 Student 18, group interview)

A total 'flexibility score' was achieved for each student, by summing an individual's scores on each flexibility question item, and subsequently classified as low (5-11), medium (12-18) or high (19-25). Results displayed in Figure 6.18 denote that the majority of respondents perceived the BL process as offering high or medium flexibility. While two students achieved a low level of flexibility score, this was due to the lack of cost and time savings associated with blending a small element of their entire programme, as discussed previously.

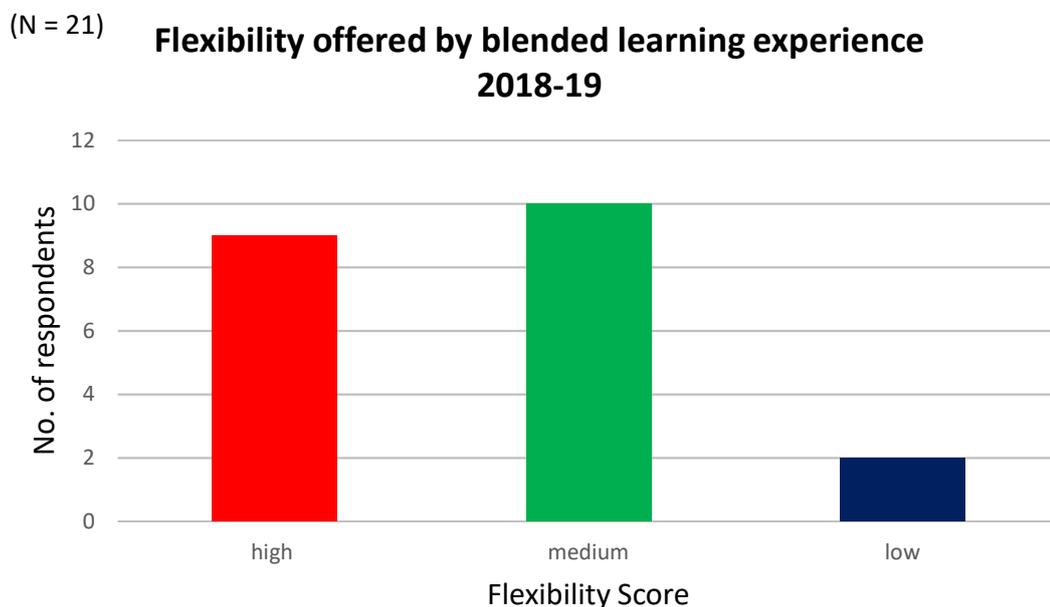


Figure 6.18 Flexibility scores from 2018-19 post-implementation questionnaire data

Furthermore, 57% of respondents revealed that they would like to see BL offered across more financial accounting topics and 71% agreed that they would like to see

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BL offered in more modules in their programme, which was confirmed by one student's comment during semester 1 within her student log:

I think more modules should be like this. I prefer this way of learning as I don't like learning pages and pages of notes. (2018-19 Student 12, semester 1 student log)

While these levels of agreement are reduced on cycle one, this was due to an increase in the number of respondents selecting 'Don't know' as their chosen response. Students clarified their uncertainty by disclosing that the suitability of the BL delivery mode may depend on the specific topic being studied:

I like a mix of blended learning topics, some are easier to learn in face-to-face classes and others are easier through videos on Moodle. (2018-19 Student 14, survey response)

I personally think it depends on the topic you are learning, some topics are easier learned with less face to face class time than others but other topics require more in-class learning time. (2018-19 Student 18, survey response)

This view was also corroborated during the group interview where participants contemplated the necessity of f2f classes to cover more advanced learning material, as discussed earlier. Another student alluded to difficulties which may be encountered when forced to take responsibility for her own learning while engaging in BL:

I don't know because although I enjoyed it, the lack of class may cause a lack of motivation or interest to keep going with the course work. (2018-19 Student 22, survey response)

Two students indicated that they would not like to see BL offered across more financial accounting topics or more modules. One student, who was from abroad, indicated that she found f2f teaching to be more helpful while the other had an overall negative view of BL indicating that she does not like BL and does not feel that students benefit from it. Interestingly, she was the only student who indicated a preference for 'almost always working alone' in the pre-implementation survey, so this may have contributed to her overall opinion on the BL design.

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6.5.2.3 Independent learning

84% of respondents who viewed the multimedia resource agreed that it allowed them to work at their own pace, as displayed in Figure 6.19.

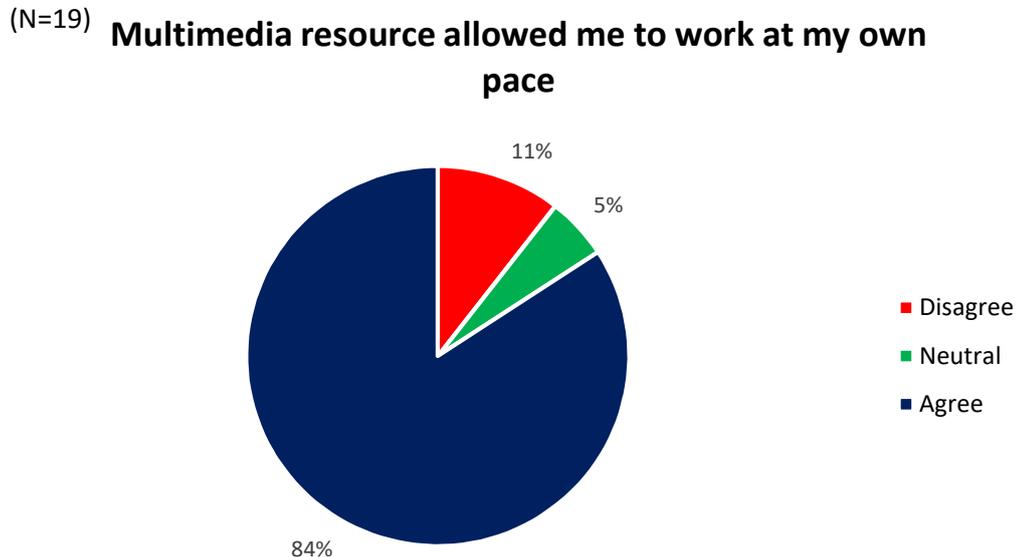


Figure 6.19 Students' views on multimedia resource allowing them to work at own pace, 2018-19 questionnaire data

This was endorsed by group interview participants who stated that:

If I didn't understand something I could play it as many times as I needed, and I could always play it on my convenient times like so let's say in the evening I had like a half an hour so I could play it or before sleep and just watch it over and over again to get it into my head whereas I wouldn't have got the chance at the lecture because the lecture is only once and that's it. (2018-19 Student 24, group interview)

I liked how I was able to watch the videos a number of times to make sure I understood it, and I could also take as long as I needed to make sure I knew all the information that I needed to know. (2018-19 Student 14, survey response)

It was obvious that the ability to work at one's own pace contributed to an enhanced understanding for many students:

I watched the online worked example once and paused it after each section to help myself to process the information and remember what happens in the bank account and how to prepare the opening and closing reconciliation statement. I found this helpful as it was easy to understand where each figure goes and where it came from. (2018-19 Student 14, semester 1 student log)

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Students who had not previously studied accounting before particularly appreciated the ability to work at their own pace.

I found it hard at the beginning to follow along with the videos just because I had never done bank reconciliation before. After I kept watching the videos a couple of times I got a better understanding of it. (2018-19 Student 13, semester 1 student log)

I enjoyed the blending learning process as it allowed me to move at my own pace with the subject. I haven't studied accounting before and this allowed me to take my time and ensure I understood the topic before moving onto the quiz. (2018-19 Student 8, semester 1 student log)

I enjoyed the multimedia ratio analysis resource that we had to complete online. I have never come across ratios before as I did not undertake accounting for the leaving cert so by using this resource I was very much able to understand how to calculate them and grasp an understanding of why they are applied to a company. Being able to pause the video was a huge advantage to me as I could take notes any time and not be rushing to take them down. (2018-19 Student 19, semester 2 student log)

Similarly, group interview participants who had previously studied accounting recounted that they “zone out” or “fall asleep” as the lecturer presents material of which they have substantial prior knowledge. Therefore, the online resources allowed them move through familiar learning material at a quicker pace than might have occurred in class.

Students expressed their appreciation for the online availability of learning material which allowed them ‘catch up’ in the event of missing a class:

If someone was not in here, or can't make it they can always watch it online and just go through it. (2018-19 Student 24, group interview)

They [solutions available online] are brilliant because I didn't fall back on work because I was absent. I was keeping up to date and checking my questions online from the solutions that were put up. (2018-19 Student 16, survey response)

In the post-implementation survey, 90% of respondents agreed that BL allowed them to take more responsibility for their own learning, with no respondent expressing disagreement (see Figure 6.20).

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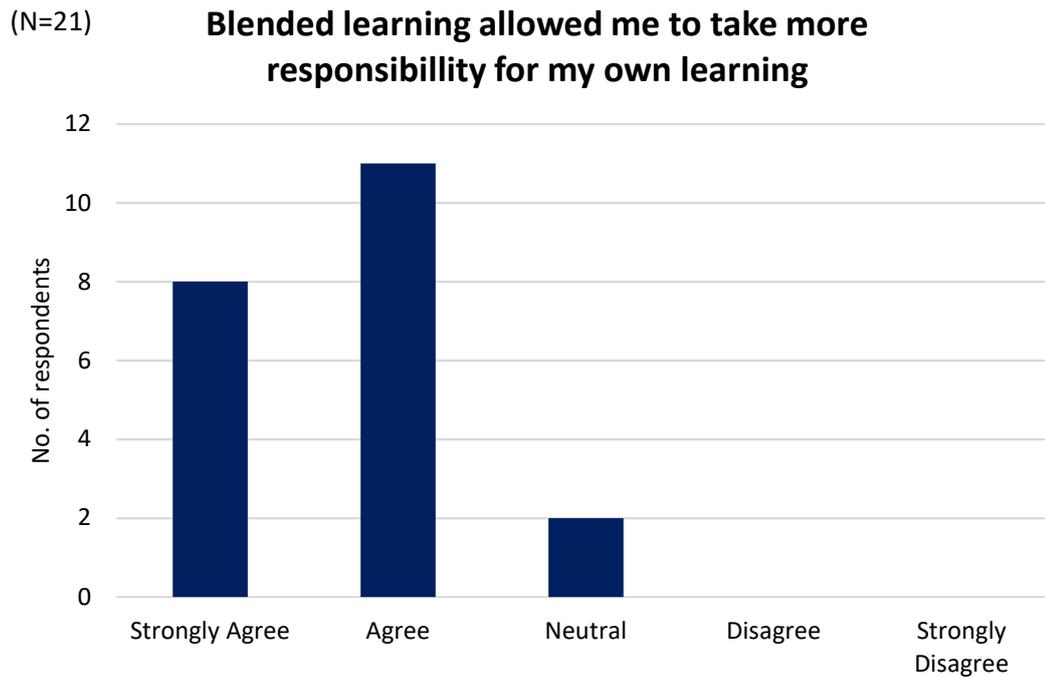


Figure 6.20 Effect of BL on students' independent learning, 2018-19 questionnaire data

Students who strongly agreed elaborated on their responses noting:

You have to work independently in your own time to get the work done. (2018-19 Student 18, survey response)

I found myself more responsible for my learning and knowing that I could look at the solutions if I got stuck made me want to complete questions to test my knowledge. (2018-19 Student 16, survey response)

Strong preferences were revealed by many students for working independently in their own time, with 33% of post-implementation survey respondents identifying it as what they liked most about the BL process. Students remarked:

Well I'm not a big fan of being in class and like listening to a lecturer for 2 hours so I like going home and like getting an [online quiz] attempt and then going to study and then doing a second attempt and that try to get a better result. (2018-19 Student 12, group interview)

You knew you had to do it, like it was up to you to do it. You weren't going to just sit in class without the answers or anything. You knew you had to go home and you had to do the questions yourself and have to have it done for like the following class. (2018-19 Student 18, group interview)

[I liked having] the chance to go away, learn everything and come back with one or two questions to clear up all your knowledge on it and feel comfortable with what you have learned. (2018-19 Student 22, survey response)

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It was obvious that the responsibility placed on students to learn independently also acted as a motivating factor in encouraging a more productive work rate for some students:

Having the quiz at the end, it counts towards your grade so you have to go off and do it by yourself, to like learn it by yourself. (2018-19 Student 8, group interview)

I think when we had these class activities like you come prepared you need to know what's going on so you went through the multimedia online resource before you come into the class so in the other subjects if you're just listening to the lecturer for 2 hours so you don't care you just come to the class and have the class. (2018-19 Student 24, group interview)

I love the way that we are responsible for our own learning and it motivates me to want to learn and do well in the subject. (2018-19 Student 16, survey response)

The reduction in f2f hours gave students some added flexibility:

We've a lot of lectures, I think like cutting down them hours kind of gave us a space in between lectures to breathe and catch up on other modules that maybe we were a bit behind in (2018-19 Student 12, group interview)

I was able to go to work a few days which was great. I could do it in the evening then. (2018-19 Student 22, group interview)

For me living in Meath a good hour bus journey, having the online source of learning has really benefitted me because I can learn at home and know that I'm not missing out because the solutions are online. (2018-19 Student 16, survey response)

However, concerns were expressed about taking responsibility for learning on one's own, for example, while balancing family commitments at home or when meeting deadlines:

When we are given time off to do learning at home, I find that I put other commitments first eg homework with my daughter, household duties etc. This is why I prefer face to face learning as it makes me come to class. (2018-19 Student 19, survey response)

I found that sometimes you were leaving things to last minute if you had deadlines online. As you weren't in class you were forgetting to do things and then putting pressure on yourself to finish things by the deadlines. (2018-19 Student 18, survey response)

Despite a number of concerns expressed in cycle one about an inability to ask questions while viewing the online resources, this was mentioned by only one student within student logs in cycle two:

The main thing I liked about this learning process was that you could do it within your own time when it suited me best. I didn't like the fact if there was something you were struggling with it was awkward enough to find out about it. (2018-19 Student 2, semester 1 student log)

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The addition of introductory classes on each blended topic, and the provision of extra worked examples as supplementary learning material, may have averted the need for students to ask questions in class in the current cycle.

6.5.2.4 Metacognition

The ratio analysis assignment task was amended in cycle two requiring students to complete a reflective piece with a view to promoting autonomous learning by fostering metacognition and self-awareness among students (Soloway *et al.*, 1996; Wenden, 1998; Blaschke, 2012; McLaren, 2012). Students were awarded a maximum of 10 marks for the reflective section of the ratio analysis assignment task with a mean of 6 marks (SD=2.41) achieved by the group. Table 6.7 displays the breakdown of marks achieved by participants as per the grading rubric. Two students who failed to address the reflective element of the assignment received an unacceptable grade, whereas the majority of students, expressed good awareness of their individual processes of thinking and learning and were awarded six marks or above.

Table 6.7 Marks achieved on metacognition element of ratio analysis assignment task, 2018-19

	Marks	No. of participants (N=23)
Excellent to supreme	8 – 10	7
Good to very good	6 – 7	9
Satisfactory	4 – 5	5
Unacceptable	0 - 3	2

While students were informed that they may reflect on any aspect of their learning experience during BL, reflections were dominated by experiences pertaining to the ratio analysis discussion forum, indicative of its impactful nature. Students revealed details of initial fears around divulging their own ideas on the forum, as well as insights gained from exposures to the ideas of others, increased confidence levels, and enhanced understanding. This student revealed how the profusion of comments on the ratio forum, spurred her towards a deeper investigation of the topic at hand:

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I was confident in the comments I had prepared, however was frustrated to find many of the comments I had prepared had already been posted. At first, this discouraged me from the assignment however I begin exploring new areas of the topic I might not have, had this not happened. The most valuable thing I have learned from this assignment in terms of self-reflection is that it is important to get out of your comfort zone in topics during continuous assessment in order to gain a better understanding of them. (2018-19 Student 8, assessment task reflection)

One student reflected on how she changed the way in which she approached ratio analysis questions as a result of the learning and teaching approach deployed, while another contemplated the multiple benefits he gained from engaging in f2f group activities with students from diverse educational and cultural backgrounds:

I felt a bit nervous and uncomfortable as I was moved into the group where I did not know the people. However, after few minutes of talking and exchanging ideas and results I started to feel much more relaxed as it all went very well. This exercise was a very good experience because it approached two different things at same time. My knowledge in ratios has improved and I broke the barriers with some people which I have never talked before. It was very interesting to hear different opinions and see various angles on the same problem as there were people with different cultural and educational backgrounds. ... With the group exercise I got chance to speak and hear opinions of my classmates which I am normally not talking to. I developed my team-working ability and improved communication and interpersonal skills. (2018-19 Student 24, assessment task reflection)

However, from in-class discussions with students, it was evident that engaging in reflective practice was a novel activity for them. While most students showed good awareness of their thinking and learning processes, there was less evidence of a consideration of ways to improve among students. This was corroborated within the group interview, where students observed that they found it difficult to reflect; however, they were mindful of the learning gains involved:

I think it's useful as well because you need to know how to criticize and you want to get better at it (2018-19 Student 8, group interview)

6.5.3 Collaboration

Based on design cycle one findings, it was decided to provide greater opportunities for student collaborative learning in the second iteration.

6.5.3.1 Team-work preferences

Students were surveyed on their preferences for working in teams at the commencement of the programme, results of which are displayed in Figure 6.21.

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The majority of students (75%) indicated that they enjoyed both team work and working alone, with only one student stating that she almost always preferred working alone.

(N=24)

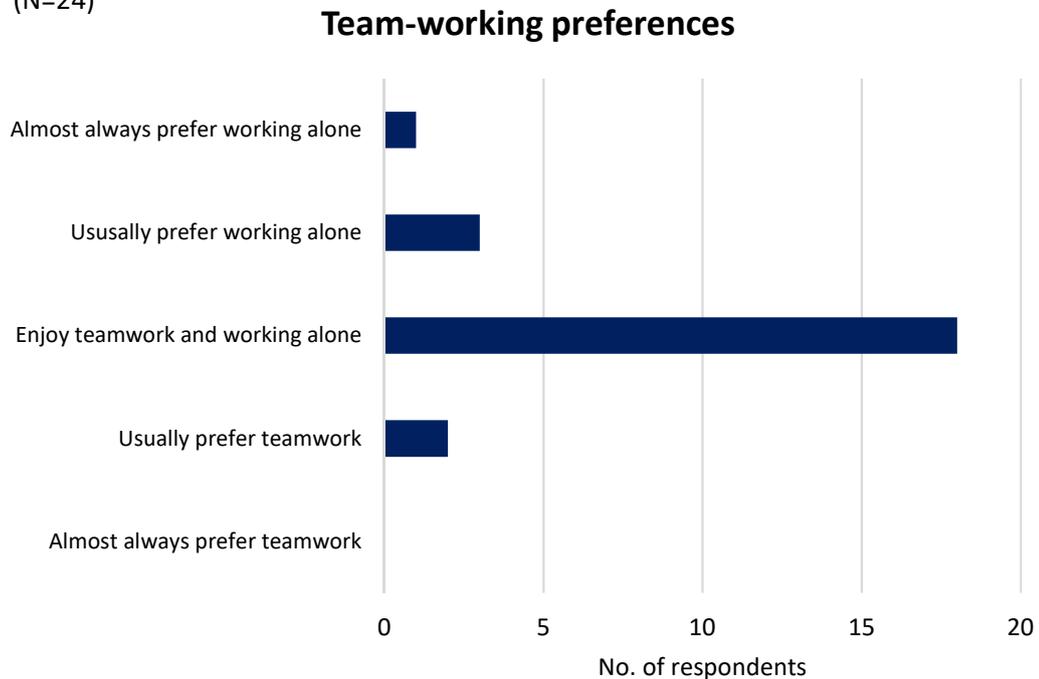


Figure 6.21 Students' team-working preferences, 2018-19 questionnaire data

When surveyed at the end of the programme, 71% of post-implementation survey respondents agreed that BL led to an improvement in their team-working skills, while no respondent expressed disagreement.

6.5.3.2 Oral communication apprehension (OCA)

In light of evidence that accounting students exhibit higher than average OCA levels, Byrne, Flood and Shanahan (2012) recommend that business and accounting educators should measure students' OCA levels in order to discern the presence of communication apprehension within the class group. Based on this and evidence of student reticence to communicate in class and on forums during cycle one, the researcher decided to measure students' OCA levels at the commencement of the programme using McCroskey's (1978) Personal Report of Communication Apprehension (PRCA-24) which measures students' scores in four communication contexts – group discussions, meetings, interpersonal conversations and public

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speaking. Scores on each sub-construct can range from 6 to 30, with scores above 18 indicating some degree of apprehension according to McCroskey, (1978). An overall communication apprehension score can be computed by totalling the scores on the four sub-constructs (see Appendix 10). Results are displayed in Table 6.8 which illustrates comparative results from a study undertaken in Dublin Institute of Technology (DIT) with business and accounting students (Shanahan, 2013).

Table 6.8 Mean OCA levels for study participants (questionnaire data) and comparative information from DIT study (Shanahan, 2013)

	AIT BAA & BALAW Mean (N=24)	DIT Business & Accounting Mean (N=368)
Group discussion	15.54	15.77
Meetings	16.96	17.01
Interpersonal conversations	16.12	14.78
Public speaking	20.67	20.10
Total	69.29	67.67

A maximum total score of 120 may be achieved, with Shanahan (2013) classifying students scoring 85 or above as highly apprehensive. Using this benchmark, 13% of the current study participants demonstrated high OCA, compared with 18% classified as highly apprehensive in the DIT study. However, the overall mean score for study participants was higher at 69.29 relative to the DIT study participants, and also above the US national norm of 65.60 as identified by McCroskey (Byrne, Flood and Shanahan, 2012). Furthermore, while results in the current study were similar to the DIT study findings with students expressing greatest levels of apprehension regarding public speaking (mean 20.67), surprisingly students' apprehensions pertaining to engaging in interpersonal conversations were somewhat higher (mean 16.12) than expressed in DIT. Based on the findings and recommendations by Byrne, Flood and Shanahan (2012) the lecturer has decided to remain cognisant of OCA levels in interactions with and between students in her classes, while using pedagogical approaches which foster a non-threatening supportive environment, particularly in relation to collaborative activities.

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Wegerif (1998, p. 48) asserts that “forming a sense of community where people feel they will be treated sympathetically by their fellows, seems to be a necessary first step for collaborative learning. Without a feeling of community people are on their own, likely to be anxious, defensive and unwilling to take the risks involved in learning”. Sense of classroom community in online courses can be enhanced through educator use of interactive teaching approaches involving innovative course design and continual facilitation of online discussions (Rovai, 2001). Rovai (2002a) presents a framework which can be used to understand sense of community in both online and traditional teaching settings, positing that members of robust classroom communities have feelings of connectedness and that a sense of community can foster interaction in a class group. The researcher measured students’ sense of community at the end of the programme using Rovai’s (2002a) Classroom Community Scale as Question 28 on the post-implementation survey (Appendix 7). The scale, consisting of 20 Likert-type statements, was incorporated within the post-implementation survey questionnaire and participants expressed agreement on a 5 point scale from *Strongly Disagree* (scored at 0) to *Strongly Agree* (scored at 4) with items reverse-scored where appropriate. Possible scores range from 0 to 80, with higher scores manifesting a deeper sense of community. The scale can be broken down into two subscales – connectedness and learning – with a maximum score of 40 achievable on each subscale. The connectedness subscale measures students’ feelings in relation to trust, spirit, cohesion and interdependence within the class group, while the learning subscale reflects their feelings regarding learning quality and the degree to which their learning needs are being met. Table 6.9 illustrates mean scores for questionnaire respondents for the classroom community scale and subscales.

Table 6.9 Classroom Community Scale – descriptive statistics, 2018-19 questionnaire data

	Mean (N=21)	SD
Connectedness subscale	22.52	4.77
Learning subscale	27.00	5.10
Classroom community	49.52	8.09

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Students scored less highly on the connectedness subscale, compared to the learner subscale, indicating greater student satisfaction relating to learning needs being met. One student on the BALAW1 course clarified her expression of a low level of connectedness due to having stronger associations with the students in her law modules as she only joins the accounting students for financial and management accounting modules. During the group interview she described how she “feel[s] a lot closer with that group” due to social events organised by the law class group (2018-19 Student 8, group interview) while other group interview participants disclosed that they socialise in small groups outside of class and never socialise together as a class group. As 67% of questionnaire respondents indicated that they commute over 10km to college each day, it appears a high number of students live at home and may have a greater sense of attachment to their home communities expressing less of a desire to form bonds within the college community. In addition, the presence of eight nationalities within the group may bring with it cultural differences which may be prohibitive to classroom community formation.

Rovai (2002b) posits that team-building activities and facilitation of group interaction can help develop a sense of community among learners. While collaborative activities were enhanced in cycle two, an even stronger focus on interaction within the group needs to be emphasised in cycle three.

6.5.3.3 Collaboration through in-class group activities

Due to evidence of lack of engagement and collaboration among students in cycle one, the researcher introduced a number of collaborative group activities for use within blended f2f classes, some of which were inspired by Bonk and Smith (1998).

Students were asked questions on their perceptions of engaging in group-work activities in the post-implementation survey and results are displayed in Figure 6.22.

Design Cycle Two

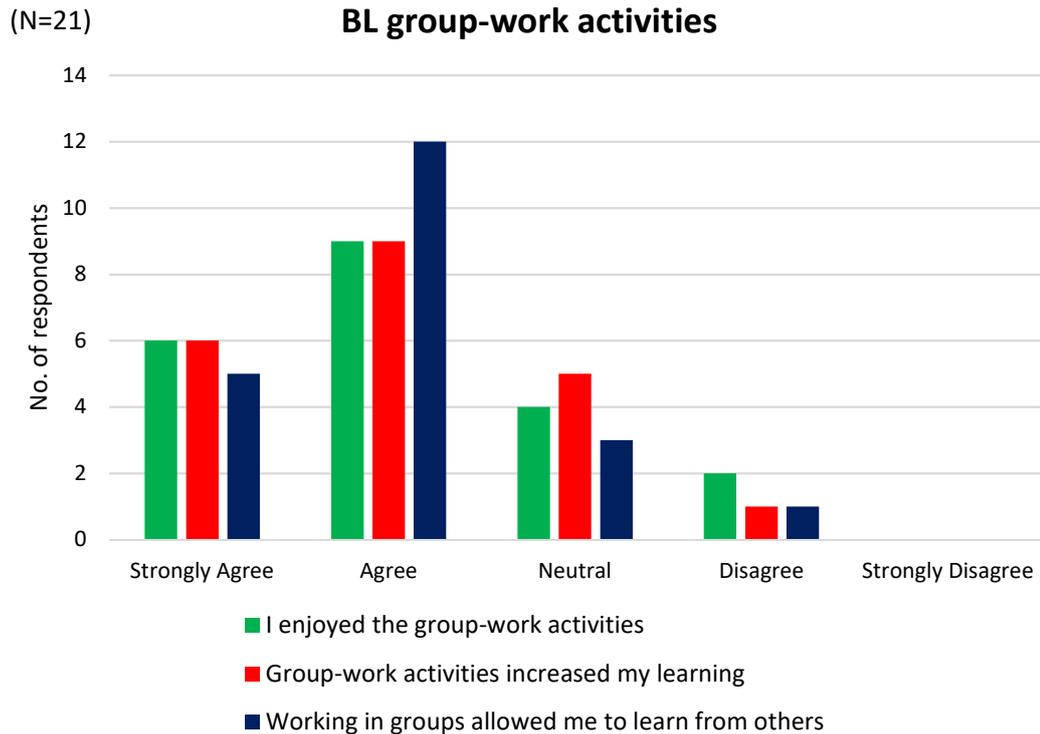


Figure 6.22 Students' perceptions of in-class group-work activities, 2018-19 questionnaire data

The majority of respondents replied positively regarding f2f group activities, with 81% agreeing that it allowed them to learn from others. This was further reflected in student logs and the group interview where students emphasised the benefits of being able to check answers with one another.

I liked the group work and how you could work alone and then join the group or do it all together, I worked alone at the beginning and then used the group for clarification and to help others. (2018-19 Student 22, semester 1 student log)

I found doing the work in class handy as we could learn and teach one another in the group. (2018-19 Student 10, semester 1 student log)

I really liked the group activity because I could check my answers with the other partners to make sure that I was doing everything right. I also liked it because I got help from my team members in the parts that I didn't know. ... Overall the activity was very enjoyable. (2018-19 Student 23, semester 1 student log)

I liked comparing answers with other students in the group as it showed how others calculated ratios. To improve classroom activities I would suggest we do more group work in the future. (2018-19 Student 2, semester 2 student log)

Group interview participants mentioned the advantages of group work in giving you an insight into how others think while another student recognised the benefits of a deepened understanding as a result of teaching someone else in her student logs:

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Especially with the ratios I think there was a lot of stuff that other people would think about that I wouldn't know. (2018-19 Student 8, group interview)

I found that the classroom activity very helpful, I liked working in a group and being able to check my answer against other members in my group, I also liked the fact that we could help other team members because it showed me I understood what I was doing. (2018-19 Student 22, semester 1 student log)

One student valued the assistance from the lecturer acting as facilitator during the f2f group activity:

For the classroom activity on bank reconciliation, I found it to be very useful. I didn't have a great knowledge doing these and I felt that after completing the assignment I felt I knew a lot more and feel comfortable attempting another question. Sitting with other students didn't bother me, I did feel that they knew how to do these and I did not so I felt like I didn't want to ask them questions on it. I didn't want to make out I was stupid and couldn't do it. Without the help of yourself [lecturer] I wouldn't have been able to complete it. If we had more classroom activities I may feel more comfortable to ask questions if I was stuck. (2018-19 Student 19, semester 1 student log)

Students also reported lower stress levels when engaging in the f2f group activity, which formed part of their continuous assessment for the Financial Accounting 1A module:

This type of assessment [class group activity] was enjoyable. It was a lot more relaxed and there was no stress or pressure that I related to it. (2018-19 Student 22, semester 1 student log)

I felt that this assignment was good as I didn't feel as if I was doing an assignment so I didn't feel stressed. (2018-19 Student 16, semester 1 student log)

I like this type of assessment [class group activity] as it puts less pressure on people and its better and easier than a 2-3 hour exam. (2018-19 Student 17, semester 1 student log)

6.5.3.4 Discussion forum 'warm-up' activities

The researcher was dissatisfied with the level of student collaboration on the ratio analysis discussion forum in cycle one. In response, a number of 'warm-up' forum activities were introduced by the lecturer in semester 1 of cycle two to familiarise students with forum use with the aim of promoting a higher engagement level with the ratio analysis discussion forum in semester 2.

An introductory discussion forum was opened by the lecturer on 13 September 2018 where the lecturer introduced herself to the class and invited replies from students. All students in the semester 1 class group (N=24) contributed to the forum, apart from one student who was late joining the class group, with the majority of students

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posting two comments. Posting ceased on 20 September 2018; however seven students returned to view the forum over the ensuing three-week period. Group interview participants agreed that “it was nice to get to know everybody” using the forum (2018-19 Student 12, group interview).

The lecturer decided to further incorporate discussion forums within the Financial Accounting 1A module by including forum use as an exercise for discussion of accounting theory topics during semester 1. The forum opened on 8 November 2018 and 54% of students (n=13) posted to the forum in reply to two questions posted by the lecturer which lent themselves to succinct rather than discursive comments. In addition, 67% of students (n=16) viewed the forum with six students accessing the forum in the period prior to the end-of-semester exam.

Responses to survey items relating to the perceived effects of discussion forum use during semester 1 are displayed in Figure 6.23.

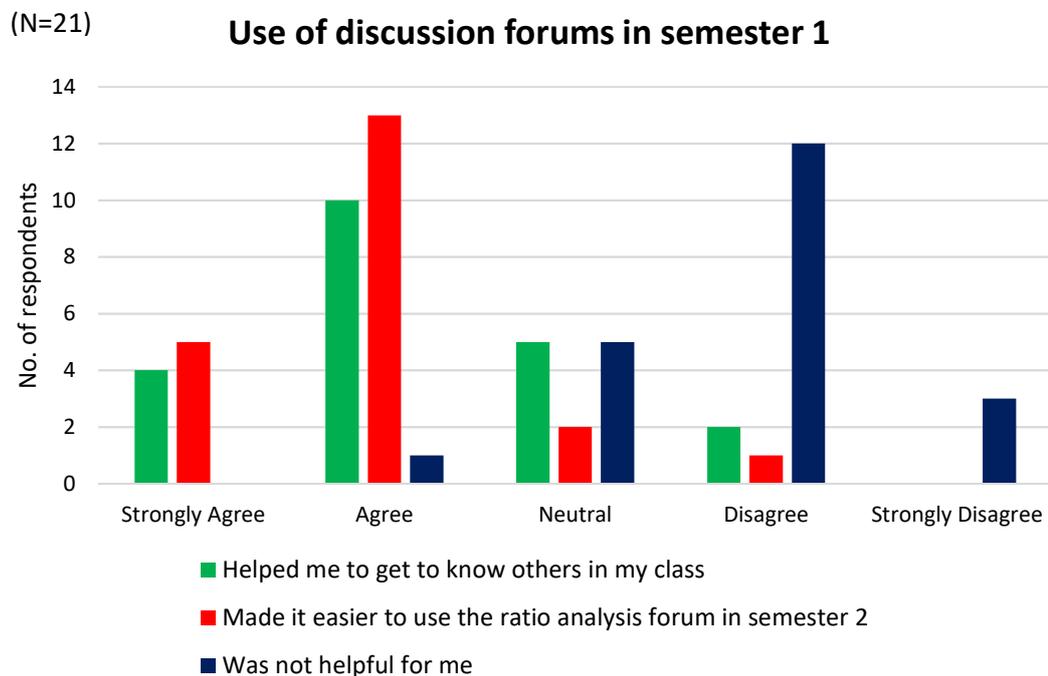


Figure 6.23 Perceived effects of semester 1 discussion forum use, 2018-19 questionnaire data

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Participants responded positively to the use of discussion forums in semester 1, with 86% of respondents agreeing that it helped them to partake in the ratio analysis discussion forum in semester 2. Only one student (5%) indicated that the forums were not helpful, while 67% of respondents (n=14) agreed that the introductory forum at the commencement of the programme helped them to get to know others in the class. These ‘warm-up’ activities were considered essential to promote discussion forum engagement as 81% of questionnaire respondents (n=17) stated that they had no previous experience of posting comments to a discussion forum.

6.5.3.5 Collaboration through ratio analysis discussion forum

The researcher decided to amend the ratio analysis assignment task, including discussion forum, based on feedback obtained during cycle one (Appendix 13). There was a dual purpose associated with discussion forum inclusion within the task - to extend the discussion of the topic outside of the classroom while also allowing students to take a different perspective by exposing them to the opinions of others. It was anticipated that this would lead to an enhanced student understanding when interpreting financial ratios. Students were provided copies of the assignment in hard and soft copy format on 7 February 2019 and divided into two separate groups commenting on two different companies on private forums (Fitbit and Garmin) for the initial period of the task with an aim of improving forum participation through use of smaller groups (Salmon, 2011). Subsequently, a ‘Comparison forum’ was opened allowing students to post comparative comments on the performance of both companies before submission of a written report via Moodle by Monday 11 March, 2019. Once the Comparison forum opened, the Fitbit and Garmin forums were made available for review by all students within the class group. For ease of writing and interpretation, the three elements of the amended forum in cycle two will be referred to collectively as ‘the ratio analysis discussion forum’ within this document. There was an increase in the level of participation and engagement with the ratio analysis discussion forum during cycle two, as evident from Table 6.10.

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Table 6.10 Ratio analysis discussion forum usage, 2018-19

	Fitbit Forum	Garmin Forum	Comparison Forum	Total
	No.	No.	No.	No.
Students subscribed for posting	12	11	23	23
Students who posted to forum	11	11	12	22
Posts to forum by students	47	50	29	126
Posts to forum by lecturer	25	24	12	61
Posting period dates (2019)	6/2 - 26/2	6/2 – 9/3	23/2 – 5/3	
Students who viewed the forum	21	17	22	23
Forum views	145	144	215	504
Viewing period dates (2019)	6/2 – 11/3	6/2 – 2/5	26/2 – 9/4	
Students accessing the forum before end-of-semester exam	0	1	1	

The majority of students accessed all three forums and all students accessed at least one of the forums. While the Comparison forum had the lowest number of posts, it had the highest number of views, with all students except one accessing this forum. This reduced posting level on this forum may be due to the fact that it opened after the initial Fitbit and Garmin forums and students were concentrating on completing the written report element of the assignment at this stage. Furthermore, students may have felt they had made a sufficient number of postings on the initial forums to meet the grading criteria as per the rubric. Nevertheless, the Comparison forum had the highest number of views, with group interview participants revealing that they referred to the forum for assistance in completing the report. As displayed earlier in Figure 6.13, 90% of questionnaire respondents indicated that the forum made it easier to complete the report and one student reported informally to the researcher that “the ideas just flowed” once she looked at the forum for inspiration (Kelly, 2019).

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The grading rubric awarded maximum marks for ‘more than five relevant and useful contributions to the discussion forum’ (Appendix 9) with 10 students (43%) achieving the maximum grade. Posting rates increased in cycle two to an average post per student of 5.7 times, compared to 2.9 times in cycle one, likely due to the advance provision of a grading rubric awarding marks for discussion forum participation. One student failed to comment in the forum, despite being awarded marks to do so as per the grading rubric; however he did access the forum at five different times during the days preceding the ratio analysis report due date. Another student, who posted only once, indicated that he left it too late to comment at which stage he failed to add anything extra to the forum.

The use of two separate forums in this cycle afforded an opportunity for students to make additional comments, as suggested by one student within his log:

I find the forum very helpful. I can double check my results with others and find some inspiration for my final report. I also like idea of having two separate companies so we can have more opportunity to say something different without repeating the same thing. (2018-19 Student 24, semester 2 student log)

Similar to cycle one, students were surveyed to establish if they had feelings of anxiety while commenting on the ratio analysis discussion forum. Results displayed in Figure 6.24 illustrate that while a level of anxiety existed, it had reduced slightly based on cycle one.

(N=21) **Felt anxious while commenting on forum**

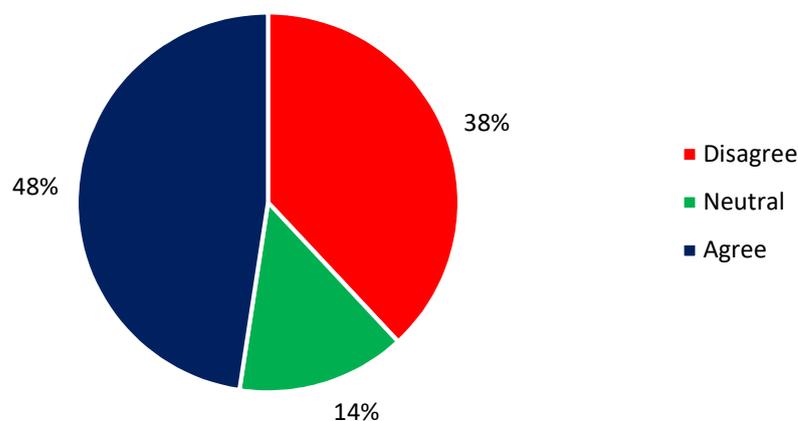


Figure 6.24 Anxiety about commenting on discussion forum, 2018-19 questionnaire data

Design Cycle Two

When student logs were examined, it became apparent that while students experienced anxious feelings at the start, they became more comfortable as they became accustomed to posting comments:

At the beginning I was unsure about the discussion forum activity but as time progressed I began to understand what was being asked and became more comfortable with the task. (2018-19 Student 22, semester 2 student log)

I felt nervous about writing in the forum as my knowledge I felt was not up to the same standard as the other students so I was afraid of writing something that was incorrect on the forum. After receiving feedback from my lecturer and also seeing everyone else posting on the forum, I felt more at ease and more comfortable to continue writing on it. I would still prefer not to write on the forum as its out of my comfort zone. This is due to lack of confidence that I really need to improve on. (2018-19 Student 19, semester 2 student log)

Students who admitted feelings of anxiety, also acknowledged the learning benefits of partaking in the forum:

I found the forum very daunting as if what you write is wrong everyone can see. I also found it hard to find things to write as by the time I got the chance to do it everyone had talked about pretty much everything. It was hard to think of new material to write ... I liked the fact that we had to go off by ourselves to do it and it was up to us the quality of what we post, yes it was hard thinking of good things to say to get more marks but it's good to make us think and put us under pressure. (2018-19 Student 9, semester 2 student log)

I felt anxious when starting the discussion forum. I was worried about posting to the forum in case my answer was incorrect or did not make sense. As the time progressed I felt more comfortable posting as the majority of people were posting comments. I learned how to communicate with people through writing. I learned from other people's comments and the way they interpret ratios. (2018-19 Student 15, semester 2 student log)

I felt very strange when using the forum as I wasn't very confident with people being able to see my answers especially if they were wrong. I learnt to try my best to have the correct answer and as much information as possible in my answer to help others learn too. I found reading other comments very useful as it helped me understand other people's views on the ratios and what they meant. (2018-19 Student 14, semester 2 student log)

One student referred to the scaffolding effects of posting her first comment to the forum during a f2f class introduction exercise, believing it augmented student participation:

I found the discussion forum to be a unique way of learning. At first, I was hesitant to post but when we all made a post in class this helped me to be more comfortable. I think starting the forum in class ensured everyone posted more comments. (2018-19 Student 8, semester 2 student log)

Design Cycle Two

When asked about the learning benefits of using the ratio analysis discussion forum, the majority of respondents agreed that it increased study time outside of the classroom and offered opportunities for student collaboration and sharing of ideas, with no respondent expressing disagreement (see Figure 6.25).

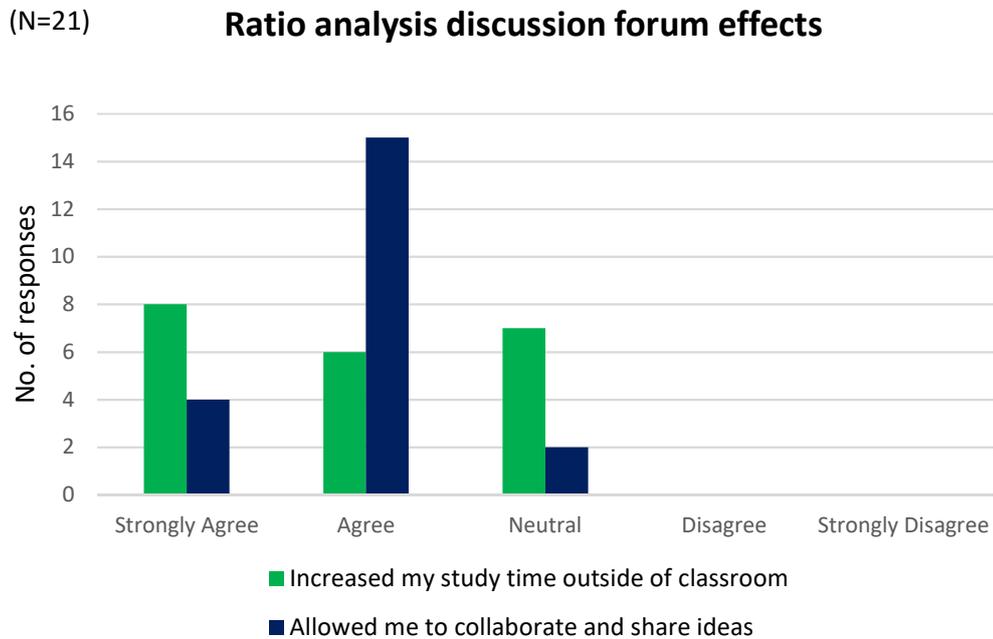


Figure 6.25 Student perceptions of learning benefits of ratio analysis discussion forum, 2018-19 questionnaire data

This was reflected also in the student logs and group interview where many referred to their ability to collaborate and learn from the ideas of others through the forum:

I liked the fact that we were all in the same boat commenting on the same topic. It felt like we were all a team. (2018-19 Student 19, semester 2 student log)

I liked using the discussion forum as it helped me to put together points about the ratios that I wouldn't have thought of before. I also liked how we could compare our answers to others while doing the question. (2018-19 Student 14, semester 2 student log)

Especially after seeing other people's ideas ... the more different opinions you see about something the more likely you are to actually analyse it more. (2018-19 Student 8, group interview)

Reference was also made to use of the forum to enable students to extend their study outside of the classroom echoing the views of Scardamalia and Bereiter (1994):

Another great thing about the forum was that we could do it from home, college or anywhere from our phones. (2018-19 Student 11, semester 2 student log)

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It [ratio analysis discussion forum] also forced you to do outside class work as it made you comment at home and do research and answer questions. (2018-19 Student 20, semester 2 student log)

While the researcher noted seeing evidence of knowledge-building, where an argument was built-up by a number of students within the forum (Kelly, 2019), this was alluded to within the student logs also:

I thought the forum was quite helpful. It helped me learn more about ratios as I didn't like it in leaving cert. I liked that people could elaborate on my comments and I could learn more about what I commented on and vice versa. It is a different way of learning and I really liked it. (2018-19 Student 12, semester 2 student log)

6.5.3.6 Overall effects of blended learning on collaboration

Figure 6.26 displays student responses to survey items on the effects of BL on collaboration, specifically the opportunities it afforded them to share ideas and contribute to course materials. Responses to these question items were more positive in cycle two with 81% of respondents agreeing that BL allowed them to contribute to course materials and 71% agreement that it enabled them to collaborate and share ideas.

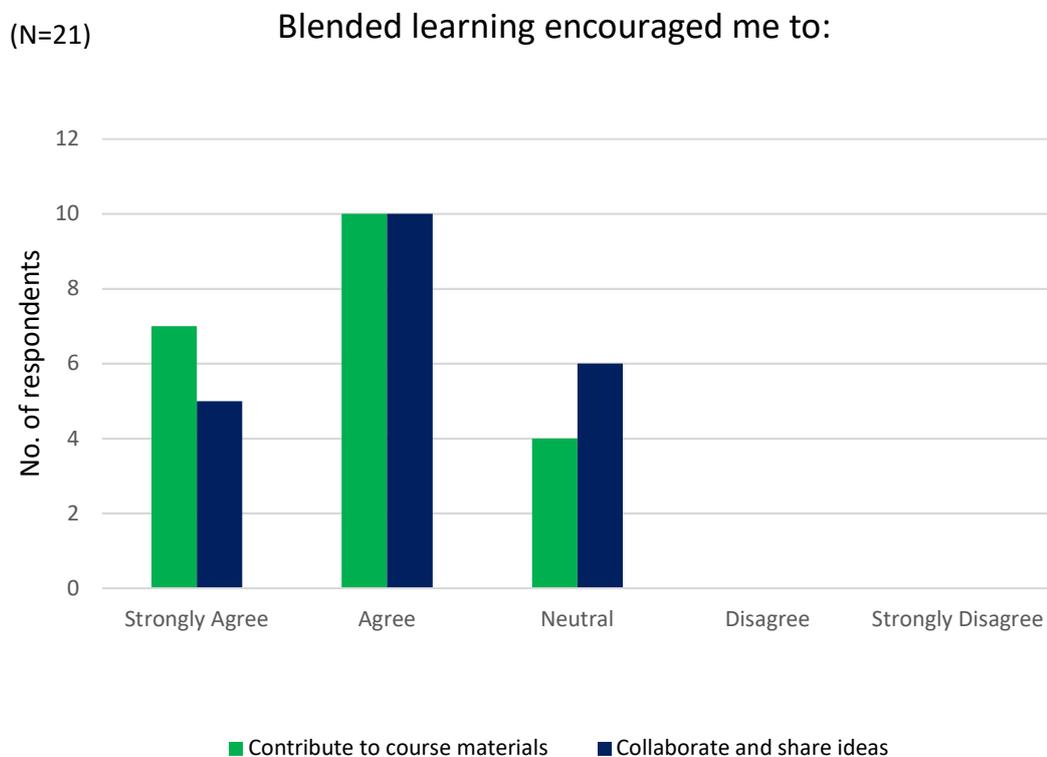


Figure 6.26 Effect of blended learning on student collaboration, 2018-19 questionnaire data

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Increased positivity was also evident in relation to student responses to a survey item regarding the opportunities afforded by BL to students to learn from one another, with 67% in agreement and no respondent expressing disagreement, in stark contrast to findings from design cycle one (see Figure 6.27).

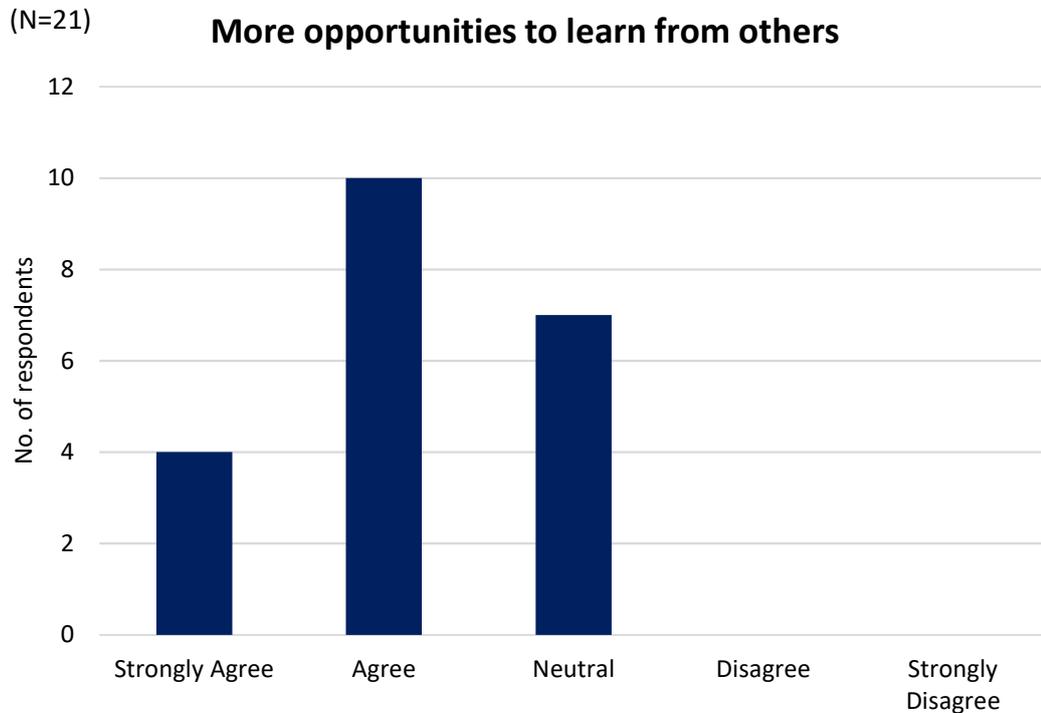


Figure 6.27 *Students' perceptions of opportunities provided by blended learning to learn from others, 2018-19 questionnaire data*

The increased participation level on the ratio analysis discussion forum coupled with the addition of in-class collaborative activities are likely to have contributed to this heightened sense of collaboration among students.

6.5.4 Engagement

6.5.4.1 Engagement with online multimedia resource

Level of engagement with the online multimedia resource was measured using ten Likert scale type items adapted from The User Engagement Scale (O'Brien and Toms, 2008). Total mean scores based on the nineteen questionnaire respondents who viewed the multimedia resource were calculated using four subscales – aesthetics, focused attention, perceived usability and reward factor – and are presented in Table 6.11 below.

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Table 6.11 Mean engagement scores by sub-scale item from 2018-19 post-implementation data

	M (N=19)	SD
<p>Aesthetics</p> <p>The screen layout of the resource was visually pleasing.</p> <p>I liked the graphics and images used in the resource.</p>	4.00	0.69
<p>Focused attention</p> <p>I blocked out things around me when I was using this resource.</p> <p>I was so involved in using this resource that I lost track of time.</p>	3.18	0.90
<p>Perceived usability</p> <p>I felt frustrated while using this resource (reverse-scored).</p> <p>Using this resource was stimulating.</p> <p>Using this resource was difficult (reverse-scored).</p>	4.04	0.64
<p>Reward factor</p> <p>Using this resource was worthwhile.</p> <p>I would recommend that others use this resource.</p> <p>I continued to use this resource out of curiosity.</p>	3.93	0.65
<p>Total Mean Engagement Score</p>	15.15	1.94

In addition, total engagement scores were calculated for each individual student by summing each student's mean score on the four sub-scale items. Scores were subsequently classified as low (4 – 9.33), medium (9.34 – 14.66) or high (14.67 – 20) with all students displaying medium or high levels of engagement, as illustrated in Figure 6.28. Scores on all four sub-scales were at higher levels relative to cycle one findings, while 63% of questionnaire respondents who viewed the multimedia resource exhibited high levels of engagement, evidence of increased engagement also.

Design Cycle Two

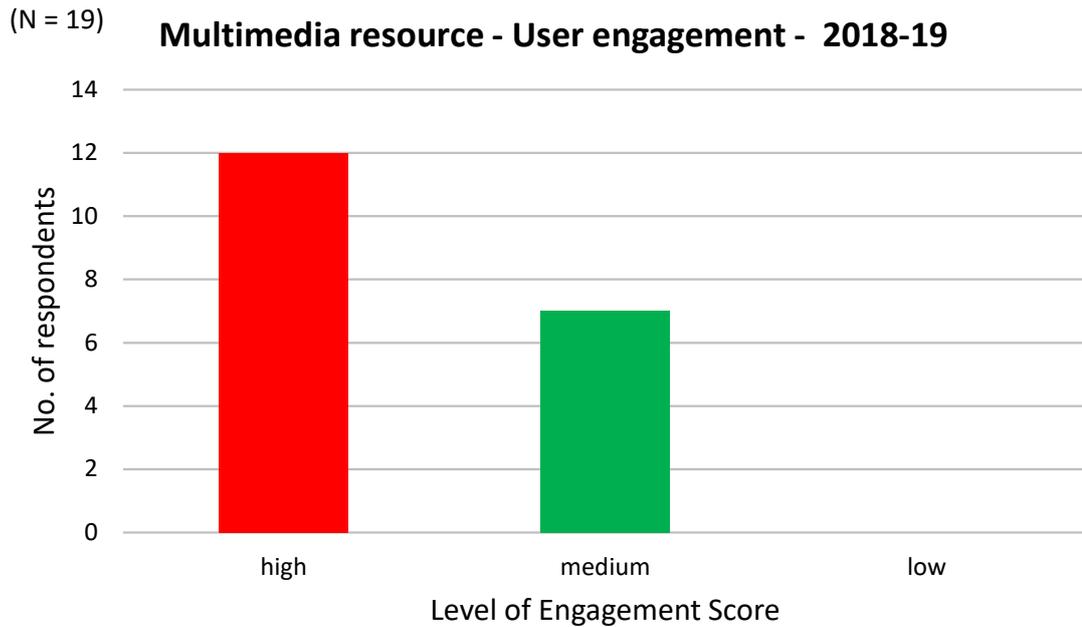


Figure 6.28 Level of engagement scores from 2018-19 post-implementation questionnaire data

Students expressed their level of agreement with six statements taken from the *Intrinsic Motivation Instrument (IMI)* using a Likert scale from *Strongly Disagree* (1) to *Strongly Agree* (5). Mean scores for each question item are displayed in Table 6.12.

Table 6.12 Mean motivation scores by question item, 2018-19 post-implementation survey data

	M (N=19)	SD
Interest/Enjoyment		
Using this resource was quite enjoyable.	4.00	0.82
Using this resource was a boring activity (reverse-scored).	4.26	0.73
This resource was fun to use.	3.74	0.65
Pressure/Tension		
I was anxious while using the resource (reverse-scored).	3.95	1.08
Value/Usefulness		
This resource helped to improve my knowledge of bank reconciliation / ratios.	4.21	0.86
This resource is useful for revision of a topic before the final exam.	4.26	0.81

Design Cycle Two

There was an increase in all mean scores relating to interest and enjoyment, with no student expressing agreement that using the resource was a boring activity. A mean score for all six question items was calculated for each individual student and classified as low (1 – 2.33), medium (2.34 – 3.66) or high (3.67 – 5), results of which are displayed in Figure 6.29, where the majority of respondents (84%) viewing the resource displayed high motivation scores.

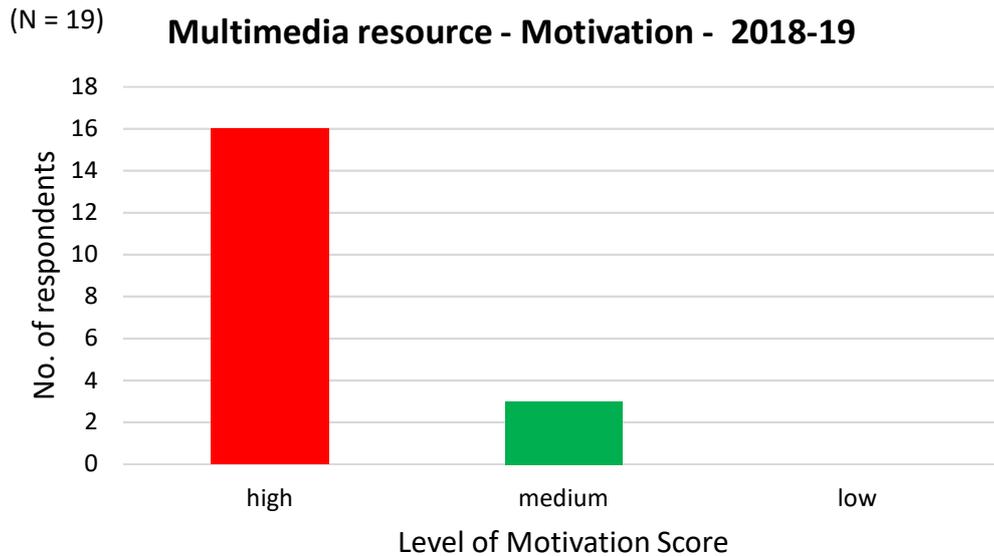


Figure 6.29 Level of motivation scores from 2018-19 post-implementation questionnaire data

Respondents' comments within the post-implementation survey described the resource as "simple" and "helpful". One student indicated she preferred BL, as the online resources acted as a source of motivation:

I find I learn a topic better using online resources as I am given the task of having to motivate myself to use the online resource and I find the online resources very easy to follow. (2018-19 Student 13, survey response)

Student comments referred to the 'enjoyment' they derived from use of the online resources:

I enjoyed learning the new topic of ratio analysis and all of the resources and videos you had online for us. (2018-19 Student 19, survey response)

I related the information on the resource back to the notes in the manual. I think it consolidated the information I had read through in the manual. I enjoyed using it but when making mistakes I found it harder to identify where I had gone wrong compared to finding my errors in class. I don't think it could be improved as there was lots of information provided for us to practice on. (2018-19 Student 22, semester 2 student log)

Design Cycle Two

6.5.4.2 *Variety of learning activities*

Students emphasised the variety of learning activities incorporated within the BL design as well as the freedom extended to them to learn in different ways:

I think learning in different ways makes it easier and more effective. (2018-19 Student 12, semester 2 student log)

It's much easier when you're learning things than most other classes. It's kind of explained to you more and then you have different ways that you can actually learn, using the blended learning and that, it makes it easier whereas in other classes you don't have anything like that. (2018-19 Student 18, group interview)

This contributed to an enhanced confidence level in financial accounting, according to one group interview participant:

I think you're just more confident in the subject. You'd be more happy to sit down and do a question in financial accounting than you would in other subjects because you've done it in different ways, like you've learned in all the different ways. (2018-19 Student 22, group interview)

Students enjoyed the opportunity offered by BL to engage in novel learning activities, such as the discussion forum and clickers:

I enjoyed working on the discussion form for various reasons. It was something I haven't done before so it was nice to complete a different type of learning. I found it useful as it allowed me to compare my ratio figures with other students in the class to see if they were correct. It was also very useful as you get to see how other students analyse the performance of a company. (2018-19 Student 2, semester 2 student log)

I think this activity [group work with clickers] did give me a greater understanding of the analysis aspect of ratios because I now understand a little more how to complete my own analysis. I found that the activity was good but it was hard to concentrate at times, I enjoy working alone but this was a nice kind of different for me. (2018-19 Student 22, semester 2 student log)

The diverse BL activities seemed to promote an enhanced understanding among students, perhaps due to the fact they appealed to different learning styles. This led to a heightened sense of enjoyment, motivation and enthusiasm towards the subject:

You were kind of more inclined to do the questions because you knew why you had to do the ratios and like you kind of understood them better, so it was easier to do the questions. (2018-19 Student 18, group interview)

I didn't like ratios for leaving cert. I avoided that question, but I actually really like it now. (2018-19 Student 12, group interview)

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6.5.4.3 Engagement with online assessment quizzes

Similar to cycle one, three online assessment quizzes formed part of the continuous assessment for the financial accounting modules over both semesters. Data obtained from Moodle activity logs are presented in Table 6.13.

Table 6.13 Online assessment quiz participation, 2018-19, Moodle activity logs

	Quiz 1 Oct 2018 (semester 1) N = 24	Quiz 2 Nov 2018 (semester 1) N = 24	Quiz 3 Jan 2019 (semester 2) N = 23
No. of students who submitted the quiz	24	23	23
Total number of attempts	45	54	35
No. of reviews following completion	19	45	8
No. of students who reviewed the quiz prior to end-of-semester exam	1	3	0
Mean mark achieved	83%	63%	91%
Quiz open	13 – 17 Oct 2018	21 – 30 Nov 2018	25 – 30 Jan 2019

Students demonstrated high levels of engagement with the online quizzes, contributed to by the fact they formed part of their continuous assessment grade. The quizzes were attempted by all students in each semester, apart from one student who neglected to attempt Quiz 2 and subsequently left the course at the end of semester 1.

Moodle tracking statistics displayed evidence of online quiz use for revision purposes with four students (17%) accessing the online quizzes in the period prior to the end-of-semester exam. Additionally, 57% of questionnaire respondents agreed that they used the Moodle quizzes as a revision aid before the final exam. The higher percentage may be due to students printing or saving quiz attempts for off-line access.

Design Cycle Two

Quiz 1 and Quiz 3 assessed the introductory learning material delivered via the online multimedia resource for each of the two BL topics, bank reconciliation statements and ratio analysis respectively. Quiz 2 examined a range of topics which had been completed fully during f2f classes and due to its high level of complexity relative to the other quizzes on the modules, it was decided to offer a 9 day period for quiz completion and allow students an additional third attempt, resulting in a higher total number of attempts. A lower mean mark was also attained on this quiz, most likely due to the higher level nature of the learning material involved. Despite high performance levels in the other two assessment quizzes, group interview participants admitted that they would have preferred a third attempt at all of the online assessments

Respondents expressed resounding agreement that they studied in between quiz attempts to attain higher scores on subsequent attempts (see Figure 6.30) indicative of enhanced engagement with learning material due to use of online assessments.

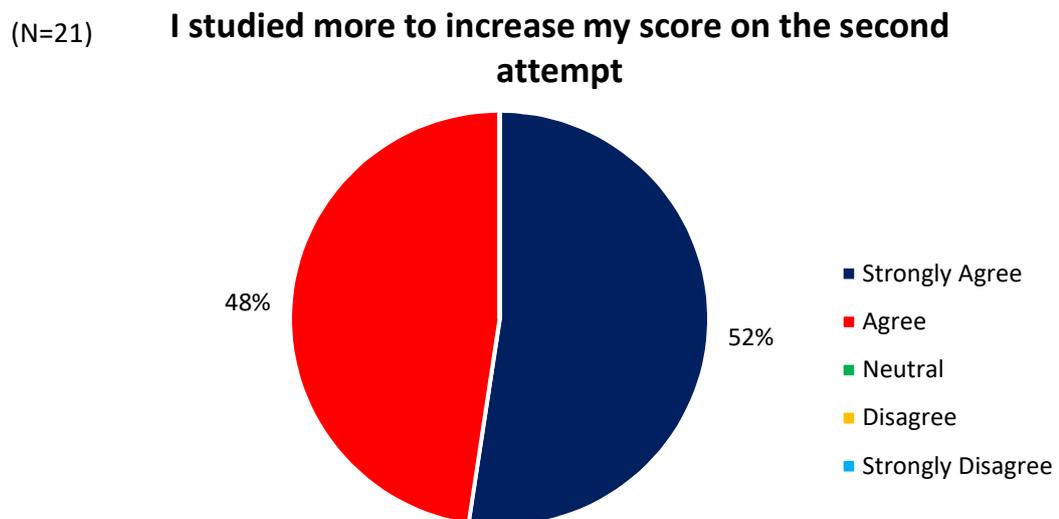


Figure 6.30 Study effort for online quizzes, 2018-19 questionnaire data

This was corroborated by student log entries and group interview findings which indicated that the online quizzes motivated students to increase their study efforts:

I wanted to improve my grade for my second attempt at the quiz so I watched the worked example video twice which I found really helpful. After watching the worked example video I felt I had a better understanding of bank reconciliation and was more

Design Cycle Two

confident when doing my second attempt of the quiz. (2018-19 Student 13, semester 1 student log)

I revised the theory and revised my first attempt to understand where I went wrong before I completed my second attempt. (2018-19 Student 14, semester 1 student log)

In particular, students utilised the correct answers provided after the first attempt as a learning tool in preparation for the next attempt:

The quiz was also another fantastic idea, I was able to test my knowledge of the ratios and any incorrect answer I got, I was able to learn from the correct answer provided afterwards. (2018-19 Student 19, semester 2 student log)

I studied in between the attempt. ... This was my first time taking a quiz like this as part of my assessment. I liked that it told the correct answers after I got a question wrong. This allowed me to figure out where I went wrong by myself. (2018-19 Student 15, semester 1 student log)

I really believe that showing me the incorrect answers was very helpful as it allowed me to backtrack my mistakes and fix any faults in my methodology. This technique allowed me to correct my answers on my second attempt and allowed me to improve my grade. Overall I believe that this type of assessment was beneficial for me to gain further knowledge on a topic and I would be quite happy to use this method of assessment again. (2018-19 Student 20, semester 1 student log)

Online assessment was a novel experience for the majority of students on the programme, therefore some may have fretted over them initially:

This was my first time taking a quiz as part of an assessment and did not know what to expect the first time but the second time I was more comfortable and more relaxed. (2018-19 Student 9, semester 1 student log)

One student expressed a preference for information on the various question types making up the online quiz, despite being provided with instructions and a level of detail on question types in advance of each assessment. The researcher must ensure that student attention is drawn to the instructions file in relation to the online assessments during cycle three.

Overall, students reported that while the online assessment was a new experience, it was less stressful than a formal written exam:

I took the online quiz and found it different in some ways than to a written test. It didn't feel any easier than a written exam but it was a lot less stressful. Written exams can often have a lot of pressure with them but I found that the online quiz was a lot more calming and easy-going. (2018-19 Student 11, semester 1 student log)

I like the online quiz very much, as I can do it at anytime that I free and anyplace that I feel comfortable and I will not feeling too stress as I am doing it alone. (2018-19 Student 4, semester 1 student log)

Design Cycle Two

6.5.4.4 Time invested in online activities

Design cycle two questionnaire respondents displayed similar internet and Moodle usage patterns to those in cycle one, showing higher frequency of access to internet over Moodle. All respondents accessed the internet at least once per day, apart from one individual who accessed internet 4 – 6 times per week. Nonetheless, there was recurrent access to Moodle also, with a majority of respondents (n=14) accessing Moodle at least once per day, while the others logged on at least once per week.

As Figure 6.31 illustrates, despite two respondents indicating that they did not view the online multimedia resource (corroborated by data from Moodle usage logs) view time was between one and three hours for the majority of respondents. All respondents engaged with the online quiz, evidenced also by Moodle logs, with the majority participating in the quiz activity for a period of one to three hours also. Three respondents specified that they spent seven hours or more engaged in either the multimedia resource or quiz activity.

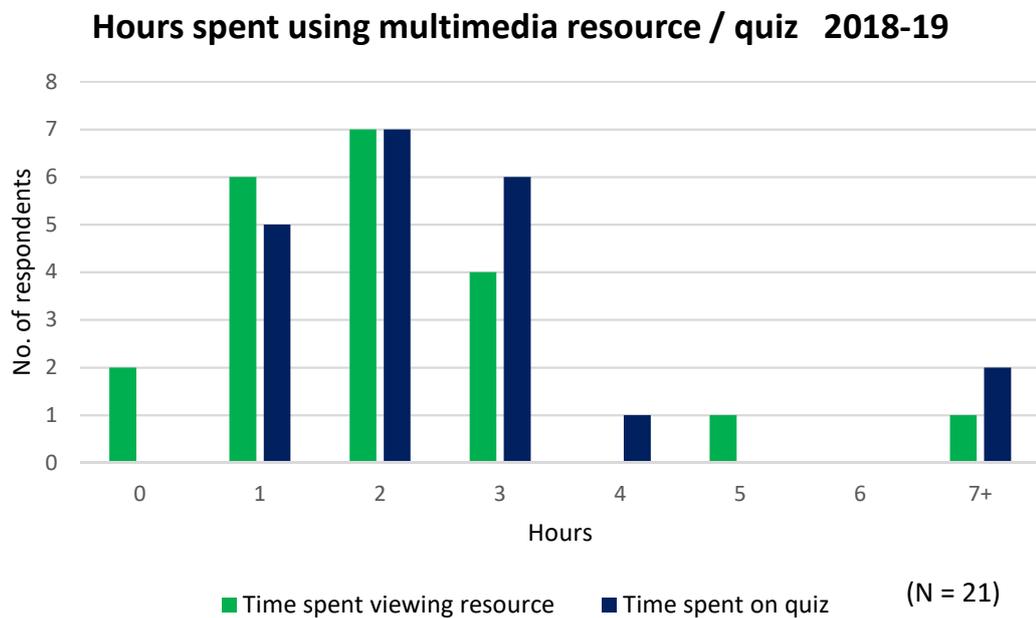


Figure 6.31 Hours spent using multimedia resource and quiz, 2018-19 questionnaire data

Due to students having various levels of prior accounting knowledge at the commencement of the course, the researcher expected that online resource usage would demonstrate diverse usage patterns. Overall respondents reported spending a

Design Cycle Two

mean time of 4.7 hours viewing one multimedia resource and completing one online quiz, which remains in line with cycle one data.

6.5.4.5 Engagement in face-to-face class activities

Respondents exhibited greater levels of agreement that BL encouraged them to engage in learning activities and participate in class activities during cycle two, as demonstrated in Figure 6.32.

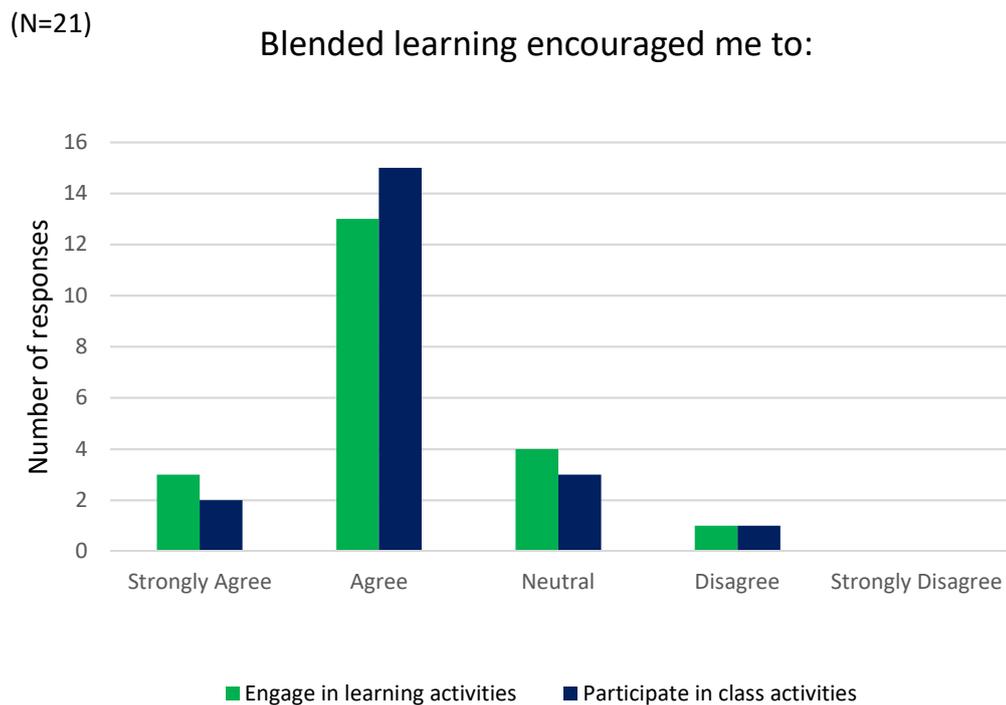


Figure 6.32 Survey response regarding participation in face-to-face class activities, 2018-19

81% of respondents agreed that BL encouraged them to participate in class activities, a considerable increase from 33% in cycle one, most likely due to the addition of collaborative and interactive learning activities during this iteration. However, three students, two of whom were international students, did report that BL decreased their productivity in class, despite 67% of respondents expressing disagreement.

Clicker technology was introduced as a new addition to f2f classes during the ratio analysis topic with the aim of increasing student participation and engagement. Responses to three question items relating to the effect of clickers on students' class participation and enjoyment levels were extremely positive as illustrated in Figure

Design Cycle Two

6.33, with one respondent indicating that the “class with clickers was amazing” (2018-19 Student 24, survey response).

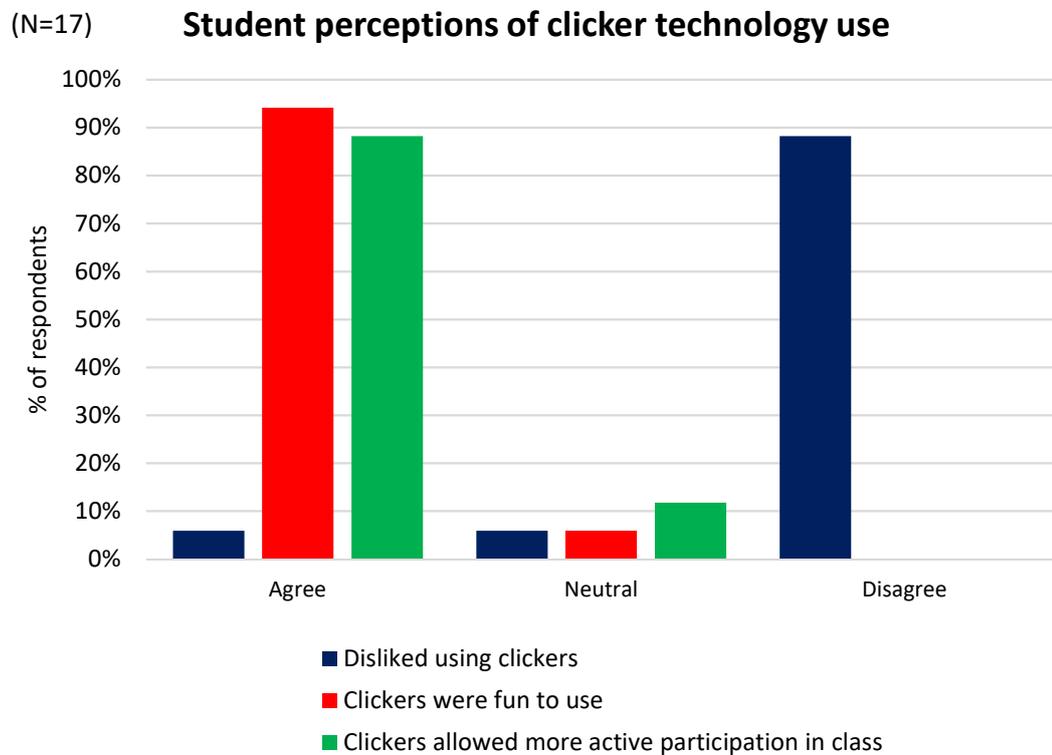


Figure 6.33 Perceptions among students of clicker technology use, 2018-19 questionnaire data

Many students indicated within their logs that they found the activity involving use of clicker technology really engaging:

I really liked the activity done in class with the clickers as you could not get distracted which I easily do in class. It made me realize how much I know and how much I don't know. It really makes you think about the reasons why things happen in the accounts and what affects what which I haven't really thought about before. (2018-19 Student 9, semester 2 student log)

I found the clicker activity very useful. I think interactive learning activities such as this that encourage discussion while adding an element that's not usually used in the classroom are an excellent way of engaging. It ensures the content discussed will be remembered as it was discussed in a unique way. I also think group work encourages new ideas allowing you to gain an insight you may not have had before. (2018-19 Student 8, semester 2 student log)

Working in pairs helped to promote a higher level of engagement:

I liked using the clickers as it was another way of learning ratios and also learning with your friends. I like working in groups as it helps me learn and it less boring as well. (2018-19 Student 12, semester 2 student log)

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A sense of enjoyment was gained from using the clickers while it was apparent that student learning was also enhanced:

I enjoyed using the clickers in class I felt like it was a good way of interacting and seeing other people's opinions and views and the different ways in which a question can be answered correctly. I found this a good learning experience because you got to see straight away your errors or the other possible answers while discussing the reasons why with other class mates, (2018-19 Student 22, semester 2 student log)

I enjoyed using the clickers as it was a new activity. I feel like I learned more about the narrative of ratios. (2018-19 Student 13, semester 2 student log)

I enjoyed the classroom activities that we had learning the ratios, I found answering the questions with the clicker very beneficial because it was making me think about some things I would never think to put in my report. It also helped me understand the topic a lot better than I did before we did it as we were thinking about the reasons for the company being like this. (2018-19 Student 16, semester 2 student log)

Only one student expressed that she disliked using clickers during class in the post-implementation survey, despite agreeing that they were fun to use. Her response was also in contradiction to a student log entry earlier in the semester:

I liked the class activity with the clickers as I believe I learned a lot about the ratios and it made me think of the ratios in a different way. (2018-19 Student 15, semester 2 student log)

This student had stated a strong preference for working alone at the commencement of the module, so perhaps the pair work element of the activity influenced her response to the survey question.

Due to a technical problem during the 'clicker class', the PowerPoint slides moved at a slower than normal pace, which was recorded by the researcher as an issue to investigate and resolve in advance of cycle three (Kelly, 2019). This slow pace was noted by one of the students also:

I feel that maybe the activity should have moved on faster we spent a lot of time on some questions that I didn't think was necessary but other than that I thought it was a very positive learning experience. (2018-19 Student 22, semester 2 student log)

While 88% of respondents agreed that the clickers allowed them to take part more actively in class, two respondents remained neutral on this. This may be due to the fact that students worked individually while answering the clicker questions for the majority of the class, although they had engaged in a think-pair-share exercise at the start. Some students may have perceived a lack of participation due to the silent nature of the quiz activity. However, despite some hesitation on the students' part,

Design Cycle Two

the researcher observed a heightened level of dialogue with more student input and less reliance on the lecturer for answers than traditionally would be the case (Kelly, 2019). The researcher believes that assigning one clicker between two students so that they work in pairs throughout the entire class may evoke greater discussion and allow more active participation while stimulating student-student interaction also. This is a change that will be considered for design cycle three.

6.5.4.6 Student satisfaction with BL design

When asked within the post-implementation survey what they liked most about the BL process as an open-ended question, the majority of respondents cited the flexibility of being able to work at their own pace or in their own time (see Figure 6.34). A number of students made reference to more than one 'like' while some mentioned specific features of the BL design such as the online quizzes, discussion forum or video resources. Two respondents referred to opportunities offered for interaction with other students, which coincided with efforts made by the researcher during the current cycle to promote student interaction and participation.

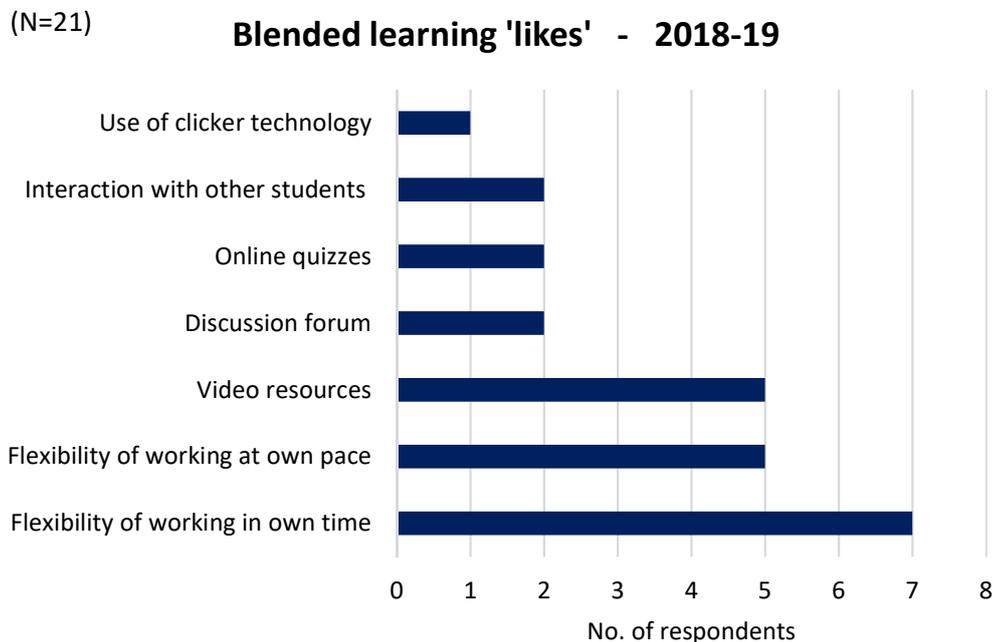


Figure 6.34 What students liked about blended learning, 2018-19 questionnaire data

Design Cycle Two

When asked about overall impressions of BL, one group interview participant described it as a “more engaging” learning approach which motivated her to work harder.

Students were also asked what they liked least about the BL process, results of which are displayed in Figure 6.35. Two respondents disliked using the ratio analysis discussion forum and two others disliked having a reduction in f2f hours.

Respondents exhibited a greater confidence in learning on their own in this cycle, as only one respondent identified struggling with taking responsibility for her own learning. The majority of respondents (62%) stated that they did not dislike anything about the BL process.

(N=21)

Blended learning 'dislikes' - 2018-19

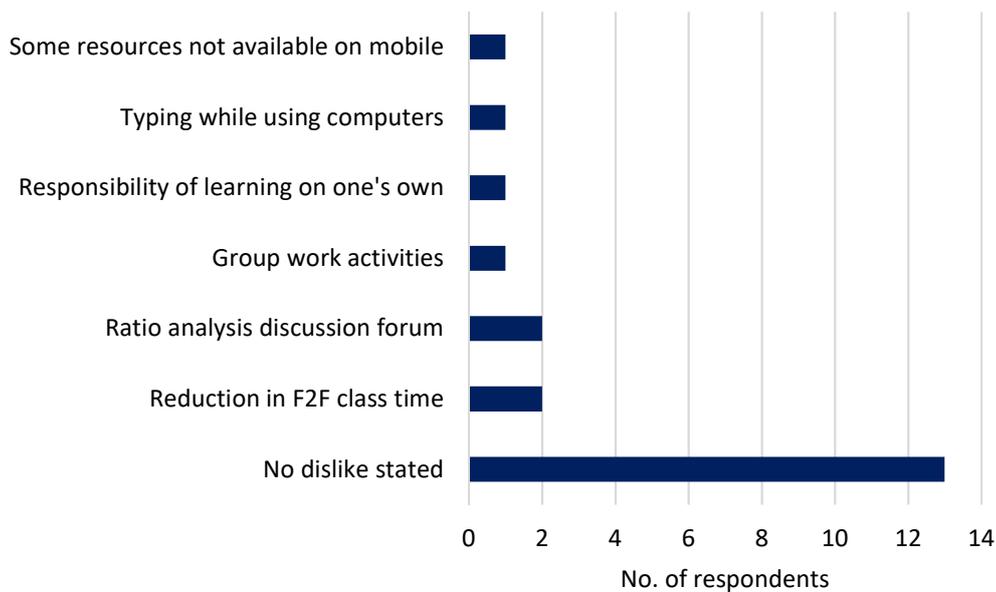


Figure 6.35 What students liked least about blended learning, 2018-19 questionnaire data

A majority of respondents (62%) recommended no change to the BL design based on their experience during the year, while 14% proposed extending BL across more financial accounting topics, indicative of a general sense of satisfaction with the BL design in its current format.

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6.5.5 Interaction

6.5.5.1 Interaction with content

Similar to cycle one, two multimedia resources were provided for viewing outside of class containing learning material pertaining to the blended topics. Usage statistics for each resource are displayed in Table 6.14.

Table 6.14 Online multimedia resource usage, 2018-19 Moodle activity logs

	Bank Reconciliation multimedia resource (semester 1, N=24)	Ratio Analysis multimedia resource (semester 2, N=23)
Number of students who accessed resource	16	20
Number of hits/views	44	32
Average views per student	2.8	1.6
No. of students who accessed resource prior to end-of-semester exam	2	1
Viewing period	10 Oct – 10 Dec 2018	17 Jan – 2 May 2019
End-of-semester exam date	11 December 2018	2 May 2019

Overall, of the 23 students who completed the course (both semesters), 21 of them viewed one of the multimedia resources (91%). Two students chose not to view any of the multimedia resources. One of these students, for whom English was not his first language, showed an overall lack of engagement in the course and performed poorly in the ratio analysis assignment task and end-of-semester exams. Three students viewed one of the multimedia resources in the period prior to the end-of-semester exam. In addition, 79% of questionnaire respondents who viewed the multimedia resources acknowledged that they took notes while doing so.

Based on feedback from cycle one, and further review of the literature, a set of worked example videos illustrating solutions to a topic question were provided during this cycle, in addition to the original multimedia resources. One worked example video was supplied for the bank reconciliation topic with the ratio analysis

Design Cycle Two

solution being illustrated over three separate videos. A summary of student usage is presented in Table 6.15.

Table 6.15 Worked example video usage, 2018-19 Moodle activity logs

	Bank Rec Worked example video (semester 1, N=24)	Ratios Worked example videos (semester 2, N=23)
Number of students who accessed worked example videos	16	12
Number of hits/views	31	47
Average views per student	1.9	3.9
No. of students who accessed videos prior to end-of-semester exam	2	5
Viewing period	10 Oct – 8 Dec 2018	17 Jan – 2 May 2019
End-of-semester exam date	11 December 2018	2 May 2019

It was evident that students accessed the worked example videos on an ‘as required’ basis. However, 20 of the students who completed the course (87%) had viewed at least one of the worked example videos. It was apparent from survey responses that some students with previous accounting knowledge did not feel the need to access these additional resources. Nonetheless, worked example videos proved valuable for students with no prior accounting knowledge and related student feedback was very positive, as discussed earlier and as evident from this student’s comment:

I also attempted the question after I watched the worked example videos and I found that I can do it myself already so I am feeling awesome because it's very helpful for me to study. I liked it very much because these worked example videos explain the formulae and steps of ratio analysis very well. (2018-19 Student 4, semester 2 student log)

Furthermore, 84% of questionnaire respondents disagreed with the statement that “after viewing the multimedia resource there was no need to attend class”. Level of disagreement with this statement was considerably higher than in cycle one, possibly due to the addition of collaborative activities during f2f classes contributing to greater student involvement leading to perceptions of more effective learning.

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Students during this cycle greatly emphasised the value of question solutions which were available in Moodle for each topic, with students remarking:

This was the most helpful thing, while doing questions something confusing can pop up very regularly and to be able to go online and check what the lecturer had done was so helpful and really has contributed greatly to my learning. (2018-19 Student 16, survey response)

If you told us do something for homework, if you weren't too sure on something, just to refer the answer to. For last semester, like in the exams like, it was good to do extra questions and check them off. (2018-19 Student 18, group interview)

I think it's handy when you have the solutions to like the questions in the manual, because at least if we do it at home, we have something to know whether it's correct. (2018-19 Student 12, group interview)

Students emphasised the support offered by the provision of exam question solutions, particularly as first-year students when the prospect of exams can be “really daunting because you've no idea what to expect” (2018-19 Student 8, group interview). Furthermore, there was unanimous agreement during the group interview that the availability of problem solutions online acted as a motivating factor for students:

You'd kind of prefer to do your financial [accounting] because you know that you've got something there to go back on and refer back to. (2018-19 Student 18, group interview)

We don't have any sample solutions for law and I found it much so easier to study accounting because it's like a reassurance. (2018-19 Student 8, group interview)

It's discouraging [when solutions are not readily available] because you're kind of like why would I bother because I don't know how to do it. Like I don't want to do it if I'm going to do it wrong. (2018-19 Student 22, group interview)

6.5.5.2 *Interaction with instructor*

Many students were positive about the effects of BL on interaction with their instructor, as evident from Figure 6.36. In particular, 76% of questionnaire respondents agreed that good communication channels existed with their lecturer. However, one student who was negative overall regarding BL, disagreed the there was more interaction with the lecturer outside of class and that good communication channels existed.

Design Cycle Two

(N=21) Effect of blended learning on interaction with lecturer

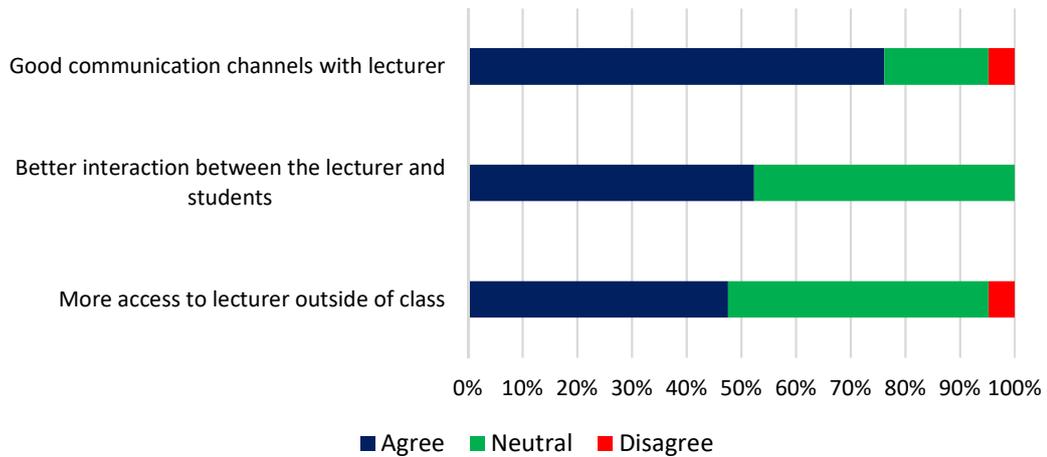


Figure 6.36 Student perceptions of effect of blended learning on interaction with lecturer, 2018-19 questionnaire data

Nonetheless, 48% remained neutral that there was better interaction between the lecturer and students due to BL. There was similar evidence of mixed feelings on another survey item, where 48% again remained neutral that BL provided less opportunities to interact with the lecturer with 28% expressing agreement (see Figure 6.37).

(N=21) Blended learning provided less opportunities to interact with lecturer

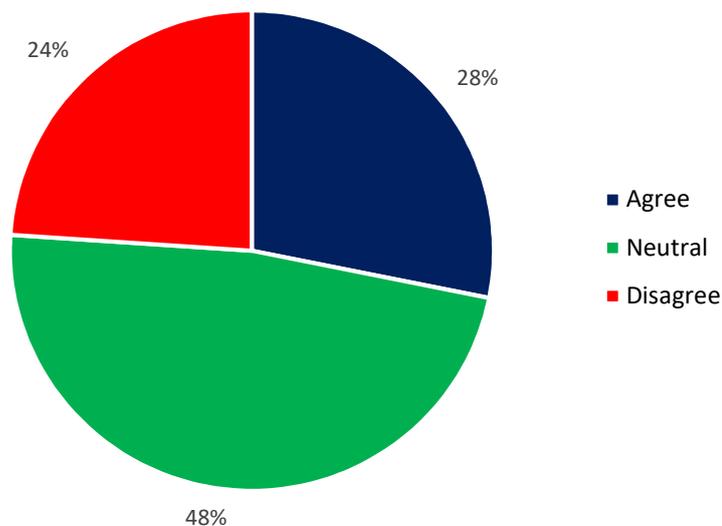


Figure 6.37 Blended learning effect on opportunities to interact with lecturer, 2018-19

Design Cycle Two

The reduction in f2f hours that occurs as a result of BL may have contributed to these neutral feelings relating to interaction with the lecturer, which was obvious from one student who agreed there were less opportunities to interact with the lecturer, but clarified by stating that while there were less opportunities due to reduced f2f hours, there were other opportunities to interact outside of class. Another student, who remained neutral in her response regarding increased access to the lecturer commented:

She's there any time and I don't think she becomes more available. (2018-19 Student 14, survey response)

Furthermore, student log and group interview remarks showed evidence of student satisfaction with lecturer availability and approachability:

I felt I was still interacting with the lecturer because she was there whenever I needed help. (2018-19 Student 16, survey response)

You felt more comfortable to ask you questions. (2018-19 Student 18, group interview)

No matter what time of the day I could email the lecturer and she would be back to me within a few hours which was so helpful. (2018-19 Student 16, survey response)

One student, who strongly agreed that BL led to better interaction between the lecturer and students, attributed this to use of discussion forums commenting:

The forums helped with this, I don't think people were afraid to give personal opinions or ask questions in the forum. (2018-19 Student 18, survey response)

Group interview participants spoke positively of the 'summarising' and 'weaving' comments posted by the lecturer to the ratio analysis discussion forum and their role in promoting interaction:

It was handy how like after a few comments, you'd comment back with like an extra question and it would start up a new discussion. (2018-19 Student 14, group interview)

There was a reduction in the percentage of respondents stating that they disliked not being able to ask questions while viewing the multimedia resource to 16% (n=3) compared with 33% in cycle one (Figure 6.38). While this featured to some extent in cycle one as a response to an open-ended survey item which asked students what they liked least about the BL process, it was not even mentioned as a dislike in cycle two.

Design Cycle Two

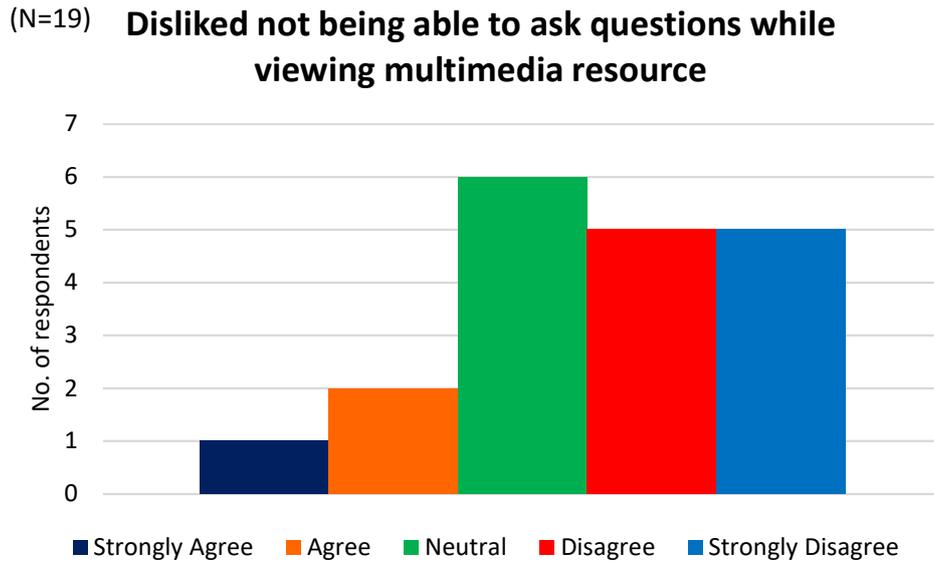


Figure 6.38 Student feelings on inability to ask questions, 2018-19 questionnaire data

The addition of an introductory class on the BL topic in advance of students viewing the online resources is likely to have been an influencing factor here. Furthermore, maintaining a consistent level of f2f contact by ensuring that the reduction in f2f hours is spread over more than one teaching week may also have alleviated student concerns regarding asking questions. Survey and group interview evidence demonstrated that ample opportunity is provided in class to ask questions:

During each lecture our lecturer always asks have we any questions and says if we have problems understanding certain topics etc to address her about these issues and always ask questions if we are unsure on certain things. (2018-19 Student 18, survey response)

I think that you were more inclined to ask questions to make sure you understood the blended, like the multimedia correctly. (2018-19 Student 8, group interview)

6.5.5.3 Interaction among peers

Two students identified interaction with other students as the element they liked most about the BL process. A majority of respondents (52%) agreed that BL provided better interaction with classmates, as illustrated in Figure 6.39. This contrasted sharply with data from cycle one where only 17% expressed agreement. The collaborative f2f class activities along with increased participation levels on the ratio analysis discussion forum are both likely to have contributed to this transformation.

Design Cycle Two

(N=21) **Blended learning provided better interaction with my classmates**

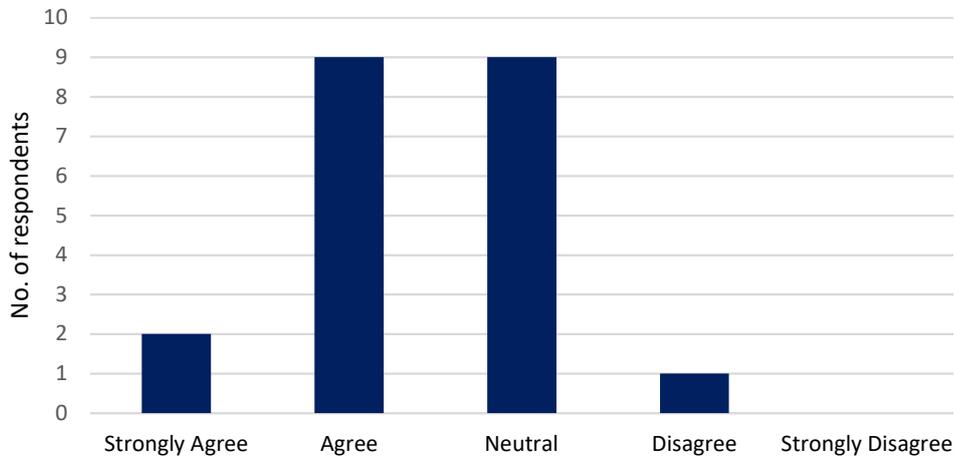


Figure 6.39 Effect of blended learning on interaction with classmates, 2018-19 questionnaire data

Similarly, students made numerous references in their student logs to their interactions with classmates through group work activities, which were seen as a way of fostering interaction among students, remarking:

Although I do prefer working alone, I found sitting with other students also contributed to understanding the topic more. And encouraged more interaction within the class. (2018-19 Student 18, semester 2 student log)

I found the class activities good as it helped to interact with other classmates and learn how they think about the ratios. (2018-19 Student 14, semester 2 student log)

The class activities helped me learn more about the analysis of accounts. It made me interact with people I would not talk to on a daily basis. I preferred working as part of a team than working alone. (2018-19 Student 17, semester 2 student log)

As mentioned earlier in this chapter, the researcher observed that students worked alone for a large part of the f2f group exercise in semester 1, due to the seating layout which forced a considerable distance between students and hampered communication within the groups (Kelly, 2019). This was alluded to by one of the students in the learning logs:

I personally prefer working on my own until I have completed my work then I like to compare answers and refer with others. I didn't find the group work particularly helpful as we all worked on our own and there wasn't much communication until the end. (2018-19 Student 18, semester 1 student log)

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However, a considerable improvement in student-student interaction was noted by the lecturer in semester 2 when an amended seating layout was employed during group activities (Kelly, 2019).

Students also recognised the merits of group-work in getting to know others in the class:

Overall I thought this assignment was a good learning experience that succeeded in furthering my knowledge with bank reconciliation as well as providing a social environment for us to learn a little more about our classmates and their form of working. (2018-19 Student 20, semester 1 student log)

I found the class activity very helpful, I enjoyed working with my classmates to figure the answer. It left less pressure on me individually as we worked together and figured out the answer. If we got confused we spoke about it as a team and found it easier to answer the question. By doing this assignment I got to talk to people in my course that I haven't spoken to before. (2018-19 Student 16, semester 1 student log)

I enjoyed taking part in the group activities I wasn't put in a group with my friends so I got talking to people I don't usually talk to. I enjoyed all the class activities and think it definitely does benefit students while learning this topic because it makes us think more about the reasons behind the ratios meaning. (2018-19 Student 16, semester 2 student log)

Six students (29%) did agree that they felt uncomfortable during group-work activities in financial accounting class, with one student indicating she is normally a “self-learning person” and another stating she feels uncomfortable in groups with people with whom she does not normally speak.

This was also reflected by two of the students in their learning logs:

I really liked doing the question in groups as if you are not sure how to handle one of the items you could talk to someone and discuss it. It would have been better being beside people I knew so I would have been more comfortable to ask questions. I would not have preferred working alone for this as I feel I would not have realized my mistakes and learned from them. (2018-19 Student 9, semester 1 student log)

I didn't enjoy the activity in class with different people as I wasn't as inclined to discuss the answers as I didn't feel as comfortable as I would have with my friends.. (2018-19 Student 9, semester 2 student log)

I was happy to take part in the group activity as I knew all the people in my group but I would prefer to have completed this task with the people I was sitting beside at the start of the class rather than being assigned groups ... this resulted in us having to work together as a team and help people who found it difficult. (2018-19 Student 15, semester 1 student log)

In contrast, group interview participants suggested that they feel indifferently regarding group composition in informal class group work when they are not reliant

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on group members for an overall assessment mark. They admitted a lack of interaction among their class group in general:

It's like we all kind of have our own little groups and we kinda talk outside our groups and in class but other than that, there's not much interaction, no. (2018-19 Student 12, group interview)

Sentiments were expressed that working in groups with unfamiliar people encourages interaction among students:

It's easier to interact with ones you wouldn't normally talk to, when you're put with them moreso than picking your own, because you kinda just pick the people you're sitting beside that you're with all the time. (2018-19 Student 14, group interview)

I think it kinda pushes you to talk to different people that you wouldn't really talk to in the class. (2018-19 Student 12, group interview)

A crosstabulation was run in SPSS to compare students' reported enjoyment levels during f2f class group activities with their stated teamwork preferences. The crosstabulation results are displayed in Figure 6.40.

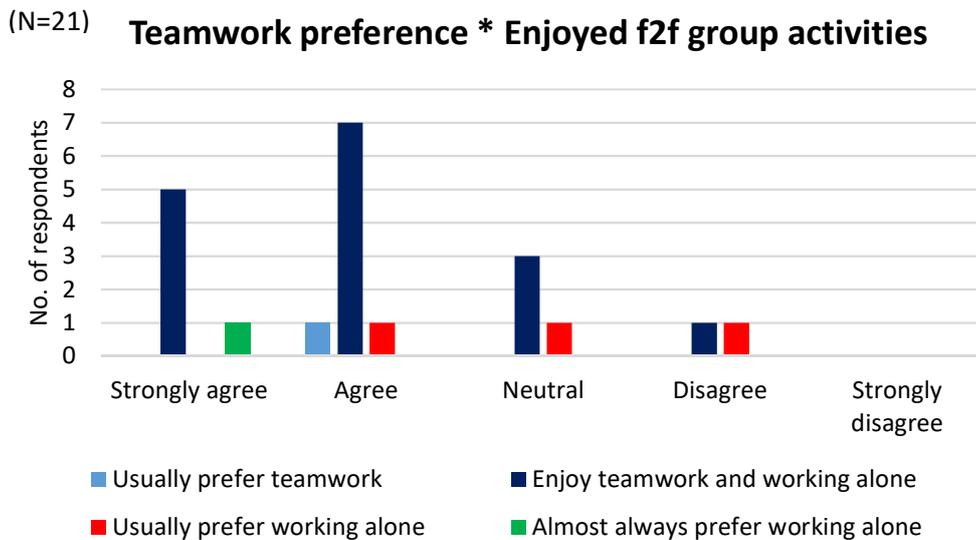


Figure 6.40 Crosstabulation of teamwork preference with students' expressed enjoyment of f2f group activities, 2018-19 questionnaire data

Results show that the majority of respondents who expressed agreement that they enjoyed f2f group work activities also stated that they enjoyed both teamwork and working alone. Only one respondent had expressed a preference for 'almost always working alone'; nonetheless, she expressed strong agreement in relation to her enjoyment of group work. However, another respondent who had indicated enjoying

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both teamwork and working alone, indicated that she did not enjoy the f2f groupwork activities. This student was a student from abroad studying in Ireland, so it is possible that she may not have enjoyed the activities due to feelings of incompetency around her spoken English proficiency.

6.5.5.4 Learner-interface interactions

Orientation activities took place as in the previous cycle with more detailed instructions provided to students in advance of each blended topic. Students appeared very comfortable with use of the resources and no issues were reported regarding interaction with online resources. The Moodle site for the financial accounting modules was enhanced in advance of cycle two and students remarked favourably during informal conversations in relation to the enhanced layout (Kelly, 2019). During design cycle two, a think aloud protocol was carried out with one participant to obtain data on the usability of the bank reconciliation multimedia resource. A similar process had been carried out on the ratio analysis resource during cycle one. During the protocol the researcher identified that the quiz at the end was somewhat incompatible with the content presented within the resource, which could result in difficulties for students while attempting the quiz. This was reflected further in a number of student comments within their logs:

I didn't feel there was much theory in the multimedia resource to help with the quiz. (2018-19 Student 9, semester 1 student log)

When it comes to quiz (in resources), it was more theoretical however resources were more focused on calculation. (2018-19 Student 24, semester 1 student log)

I would say the resource was very helpful however the sample quiz within the resource was much more in depth as opposed to the content given to us within the resource. In saying that I liked the resource except for the quiz. (2018-19 Student 20, semester 1 student log)

Based on the above findings, the researcher has decided to adapt the quiz questions to bring them in line with the learning material presented within the resource and re-publish the resource in advance of design cycle three. Two group interview participants articulated a preference for being able to access the multimedia resources using their phones, with one stating:

You probably would watch them more if you could get them on your phone. (2018-19 Student 18, survey response)

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The researcher has also decided to investigate the feasibility of making the resources mobile-compliant in advance of design cycle three.

Changes to the structure of the ratio analysis discussion forum in cycle two which employed separate threads for different comment types proved successful with no issues reported and only one student admitting to typing into the wrong section of the forum until she “eventually got used to it” (2018-19 Student 16, survey response). This new adapted structure will be retained in cycle three.

6.5.5.5 Vicarious interaction

The researcher decided to investigate students’ perceived learning effects from reading comments on the discussion forum in addition to effects from posting their own comments. Figure 6.41 displays students’ responses to two new questions which were added to the post-implementation survey addressing these areas, which would also help identify learning attributable to vicarious interaction on the forum.

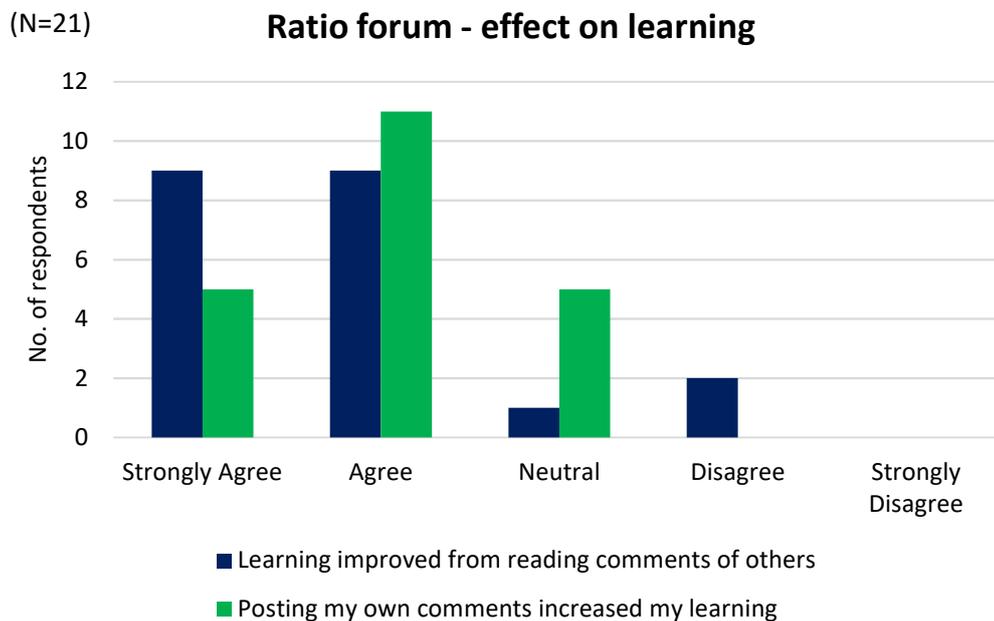


Figure 6.41 *Effect of ratio analysis discussion forum comments on learning, 2018-19 questionnaire data*

76% of respondents agreed that they learned from posting their own comments on the forum, with no respondent expressing disagreement. Students also observed within their logs regarding the rewards of making their own comments on the forum:

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I think that I have learnt a lot when making my own comments. (2018-19 Student 5, semester 2 student log)

Having to make comments into the forum also helped with understanding exactly how the company was performing and also the additional information provided helped with this also. Posting in the forum meant you had to go through every aspect of the company and analyse it yourself. (2018-19 Student 18, semester 2 student log)

Furthermore, 86% of respondents agreed that they learned from reading the comments of others, which was supported by convincing arguments made within student logs and during the group interview:

I found that by reading others comments I learned something new that I didn't know before and I learned how to comment more on ratio analysis. I liked that everyone was able to contribute to the forum so work was spread out evenly. (2018-19 Student 13, semester 2 student log)

I just thought it was nice to see like what other people thought about the ratios and like what they meant and what they did for the company and it kind of made you look at the ratios from a different aspect. (2018-19 Student 12, group interview)

I can get lots of amazing ideas from other people. (2018-19, Student 4, survey response)

Some students complained in their student logs about the dominance of a few individuals on the forum, which led to students posting comments similar to those posted before, stating:

I found that some individuals wrote way too many answers to all the areas and did not really give anyone else a chance to discuss the different ratios ... I think this was unfair and maybe a limit should be put on the amount of comments for each individual. (2018-19 Student 22, semester 2 student log)

I disliked that there was alot of repetition in the forum as sometimes it was hard think of comments to make. (2018-19 Student 18, semester 2 student log)

I did not contribute as much as other people, however many comments are repeating same ratios and quality of comments is poor, just to achieve huge number of comments and show activity ... maybe 3 longer and relevant comments could satisfy the needs for our CA. (2018-19 Student 24, semester 2 student log)

While the researcher observed that some comments were similar to those posted previously, nonetheless she felt they often added something new which contributed effectively to the discussion. Moreover, some students identified a positive element in this situation in that it forced them to 'dig deeper' in their analysis of the companies:

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So you really had to go through the company thoroughly to try find specific information that hadn't already been said by another member of the group. (2018-19 Student 18, semester 2 student log)

By the time I went to post I found most of the points I wanted to make had already been posted ... however, this turned out to be a positive as it encouraged me to comment in areas I wasn't as comfortable with and may not have commented on otherwise, which helped me gain a better understanding. ... To improve I would suggest finding a way to encourage people to comment on topics they may not be as comfortable with to encourage further research. (2018-19 Student 8, semester 2 student log)

I felt that it allowed your classmates to jump in ahead of you with answers leaving others stumped. I do not know if there is a way to fix this but I wouldn't consider this an entirely bad thing either as it forces even more learning and study to be done by constantly finding new answers. (2018-19 Student 20, semester 2 student log)

Seven of the coded group interview statements related to commenting on the discussion forum with some students stating “there should have been a limit per person commenting on it” (2018-19 Student 12, group interview). While the researcher is reluctant to impose any restrictions on student participation, she feels that this is an area which warrants attention in design cycle three.

In total during cycle two, there were 126 student posts to the ratio analysis discussion forum and the forum was viewed 504 times by 23 students. Students viewed the discussion forum on average 21.9 times, which was a considerable increase above the cycle one average per student of 8.4 times. Figure 6.42 illustrates a comparison of forum posting and viewing patterns by student.

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(N=23)

Comparison of Discussion forum posts and views by student

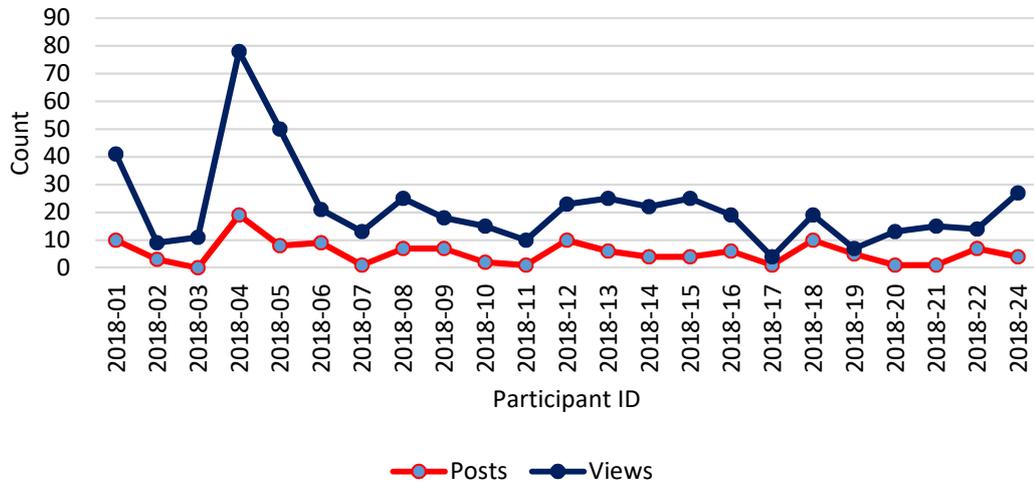


Figure 6.42 Students' ratio analysis discussion forum posting and viewing patterns, 2018-19

It can be seen that student access and posting patterns were very similar with students viewing the discussion forum posts more frequently than actually posting comments. One student made 19 posts and viewed the forum 78 times.

The fact that forum views were higher than forum posts for the majority of students may demonstrate that students benefitted from vicarious interaction or ‘witness learning’ on the forum (Fritsch, 1997 as cited in Goldman *et al.*, 2005).

Furthermore, learners who exhibit characteristics of oral communication apprehension (in f2f or online discussions) displaying reluctance to interact directly, should still benefit from interacting vicariously (Sutton, 2000).

6.5.5.6 Language barrier

At the commencement of the programme, 33% of students identified themselves as students from abroad studying in Ireland. Therefore, a large proportion of the class would not have English as their first language. Evidence from student logs suggested that in some instances this inhibited interactions with content, instructors and peers. One student indicated difficulties understanding the video resources due to lack of English language proficiency. However, another international student remarked that the online multimedia resource was beneficial as it overcame English language difficulties by allowing him work at his own pace:

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It is very useful because I can watch it as much as I can (as sometimes lecturer is talking too fast and I can't follow his or her steps). (2018-19 Student 4, semester 2 student log)

The researcher observed an international student using Google Translate during a computer lab class to translate the question wording so that he could understand it (Kelly, 2019). This student struggled also when completing assessments and in the final exam, affirming how the lack of English language competence can impede student performance on the programme.

The researcher had noted a reluctance to communicate between international and non-international students generally in the class group and also when placed in groups together (Kelly, 2019). There were indications of difficulties during group work activities recorded in student logs, where one international student felt apprehensive speaking with other students due to lack of confidence in her spoken English capability:

Actually I am not good at talking with students I am not familiar with, sometimes I feel very nervous. I think its because my poor English. I am afraid that I speak slow that they will not talk with me. I prefer learning from Moodle alone to talking with other students. (2018-19 Student 7, semester 1 student log)

This was also implied by an Irish student who sensed that English language difficulties may have impeded full group participation within his group:

My group was good however I felt that some students within the group worked as individuals and did not really put an input into the group so it felt that we were a person down. This may have been due to a language barrier. (2018-19 Student 20, semester 1 student log)

Nevertheless, another international student reported a positive experience with group work and appreciated the opportunity offered to meet new people:

Even though I am sitting with some people that I am not familiar with, all of them are very friendly and helpful if I face any difficulties such as numerical calculations, explain and if I can't follow the steps of lecturer they will repeat it to me slowly until I understand it. I liked it very much because it give me the chance to make new friends and realise the importance of teammates. (2018-19 Student 4, semester 2 student log)

One international student reflected on the value of the discussion forum in terms of English language improvement:

It was not until the teacher held a discussion group on the Internet that I found it really helpful. I found a lot of comments from my classmates in the discussion group. They were all very good. I learned a lot from the discussion group and also had a different understanding of many new words. (2018-19 Student 6, assessment task reflection)

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Mindful of the challenges faced by these students, as first-year students studying in a foreign country, the researcher has recorded the importance of ensuring ease of interaction for students for whom English is not their first language during cycle three.

6.5.6 Technology

Seven students used more than one device to access the multimedia resources with laptops being the most popular device used, as illustrated in Figure 6.43. All students had an internet connection at home, but the majority (81%) accessed the internet at college also.

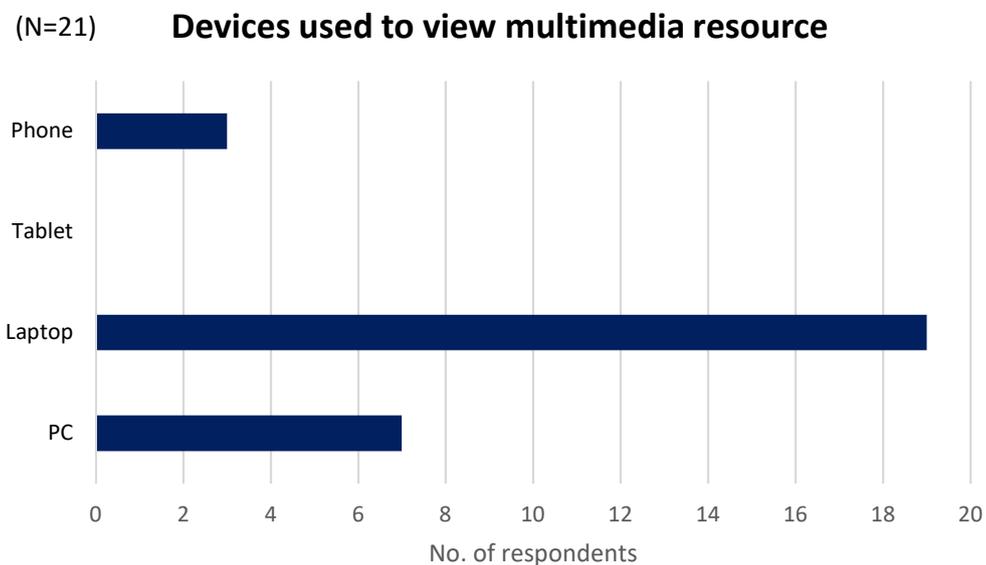


Figure 6.43 Devices used to access multimedia resources, 2018-19 questionnaire data

Only 14% of students agreed that they would have liked access to technical support while engaging in the BL process, as evident from Figure 6.44. The lecturer gave students an opportunity to trial use of a similar multimedia resource in advance of the first BL topic and they were advised to use the Internet Explorer browser should they encounter any issues following reports from some students of difficulties playing the in-built videos using other browsers. Students were also provided with a sample online quiz for use in advance of their online assessments. This may have contributed to the fact that 81% denied having difficulties accessing the online

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resources and only two students admitted having problems. These students did not elaborate on the problems they had encountered, nor had they approached the lecturer at any stage. Albeit, one student who remained neutral in her response indicated that she sometimes had problems with internet connectivity and gaining access to a home PC, leading her to rely mainly on college infrastructure.

(N=21)

I would have liked access to technical support

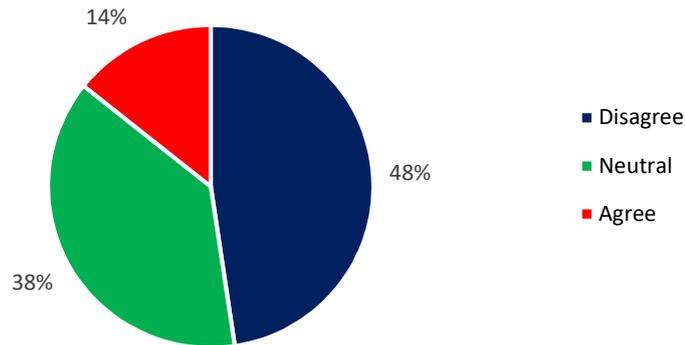


Figure 6.44 Students' preferences for access to technical support, 2018-19 questionnaire data

There was reduced evidence of difficulties for students accessing materials online due to broadband connectivity problems in cycle two (see Figure 6.45).

Furthermore, only 16% agreed that slow internet speed reduced the effectiveness of the online multimedia resource, a reduction from 50% agreement in cycle one which may be due to the increasing availability of fibre broadband over the past year. This would also be affected by students' home locations, which would vary from year to year. However, three students did agree that they had broadband connectivity problems at home, with one indicating she only had a 2G signal and another stating she always used the college library to view online materials.

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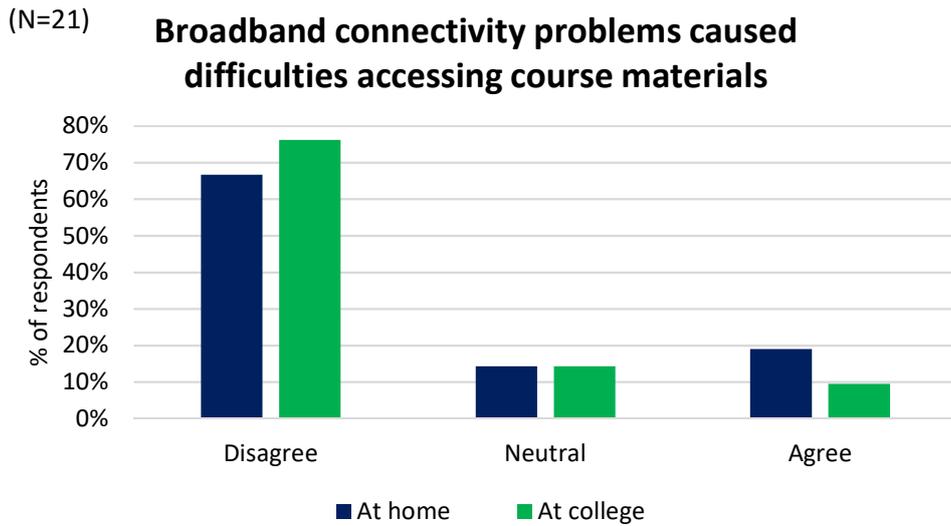


Figure 6.45 Difficulties accessing course materials due to broadband connectivity problems at home or in college, 2018-19 questionnaire data

6.5.6.1 Technology self-efficacy

Students' previous experience of blended and online learning was measured at the commencement of the programme (see Figure 6.46).

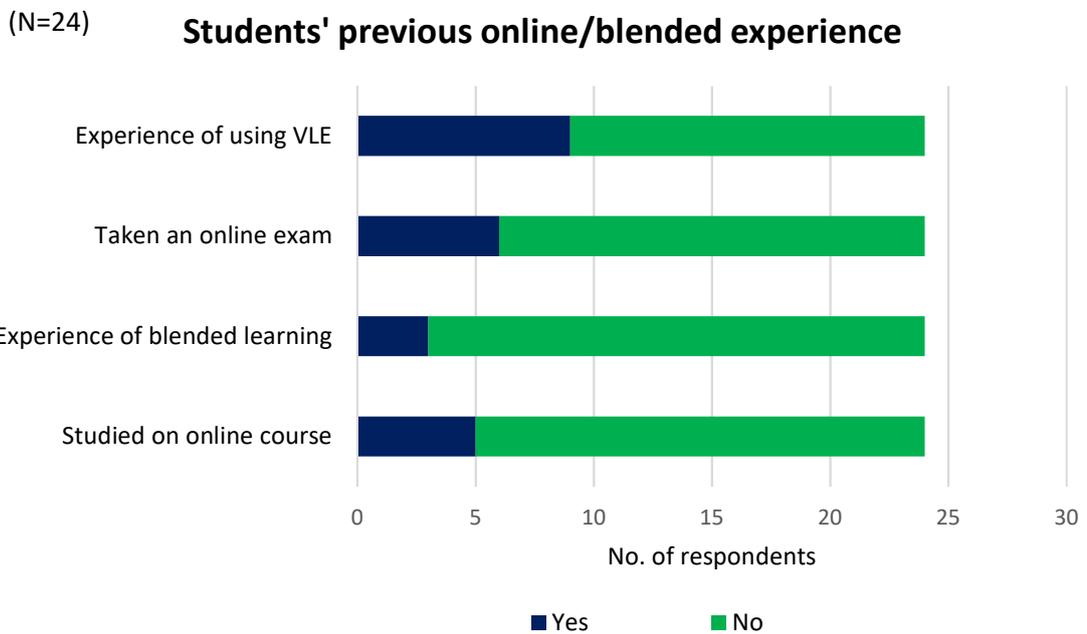


Figure 6.46 Students' prior experience of blended and online learning, 2018-19 questionnaire data

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While some students indicated previous experience, 11 students (46%) answered 'No' to all four question items. The researcher noted that many of the students with previous experience were those who classified themselves as 'students from abroad studying in Ireland'. VLE use has increased in prevalence in the secondary education sector and the driving theory test exam is delivered in online format, both of which would explain the higher response rates on those two items.

Students were asked to rate their perceived skill level as a computer user both at the beginning and end of the programme. Despite the fact that no respondent rated themselves as 'extremely highly skilled', response data illustrated in Figure 6.47 show evidence of an apparent increase in skill level.

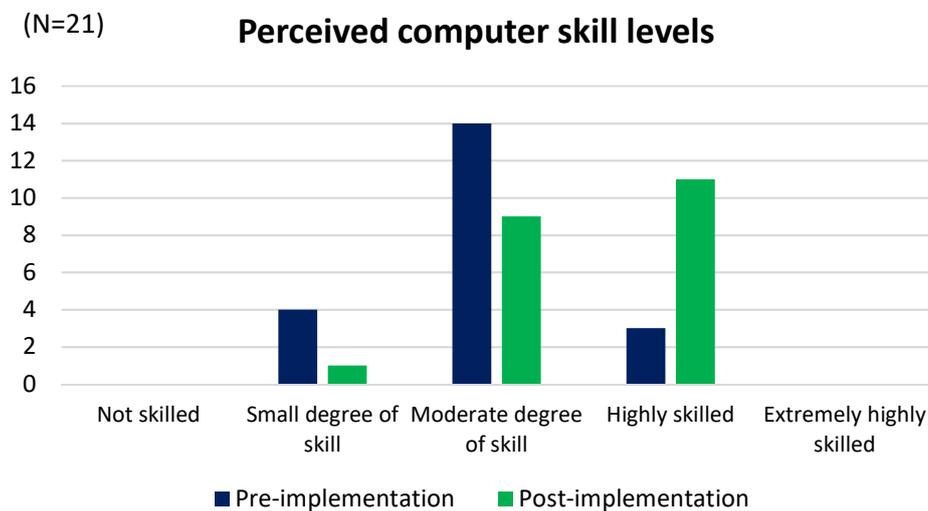


Figure 6.47 Students' perceived skill levels as computer users, 2018-19 questionnaire data

This was further substantiated when 76% of questionnaire respondents identified that they experienced a moderate to very high improvement in their computer skill after taking part in this BL course (see Figure 6.48). While three students identified there was no improvement in their computer skill, they elaborated stating that this was due to having a high previous skill level at the commencement of the programme.

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(N=21) **Perceived improvement in computer skill**

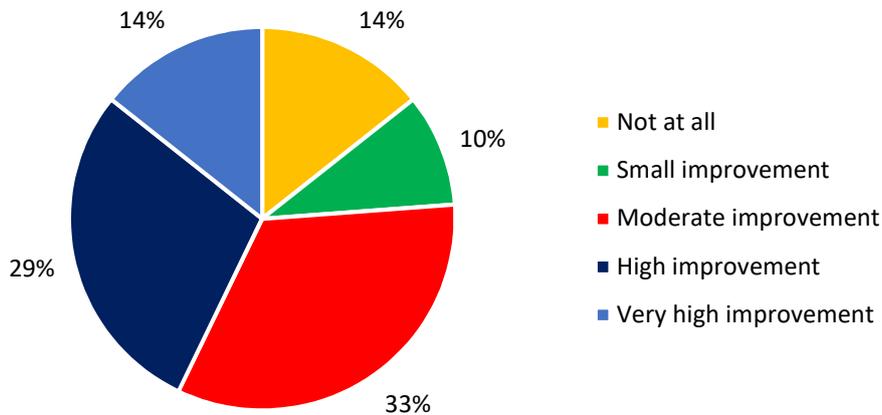


Figure 6.48 Students' perceived improvement in computer skill, 2018-19 questionnaire data

Similarly, it appears plausible that partaking in this course led to perceptions of higher MS Excel skill levels, with 71% of students classifying themselves as moderately to extremely highly skilled at the end, compared with 43% at the beginning of the programme (see Figure 6.49).

(N=21) **Perceived Microsoft Excel skill levels**

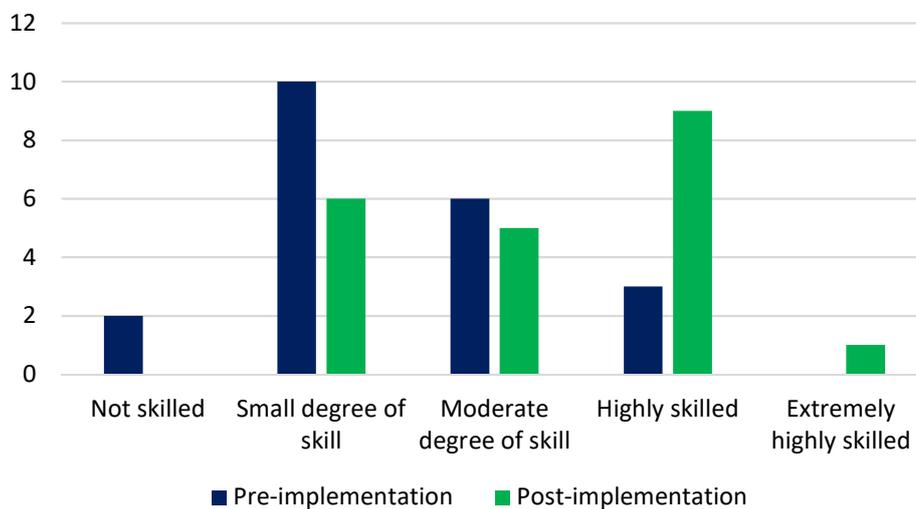


Figure 6.49 Students' perceived skill levels in using MS Excel, 2018-19 questionnaire data

Furthermore, in response to a separate question item, a majority of respondents indicated their MS Excel skill level made a high or very high improvement, as

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illustrated in Figure 6.50. Again, respondents stating no improvement indicated that they had a previously high level of MS Excel skill.

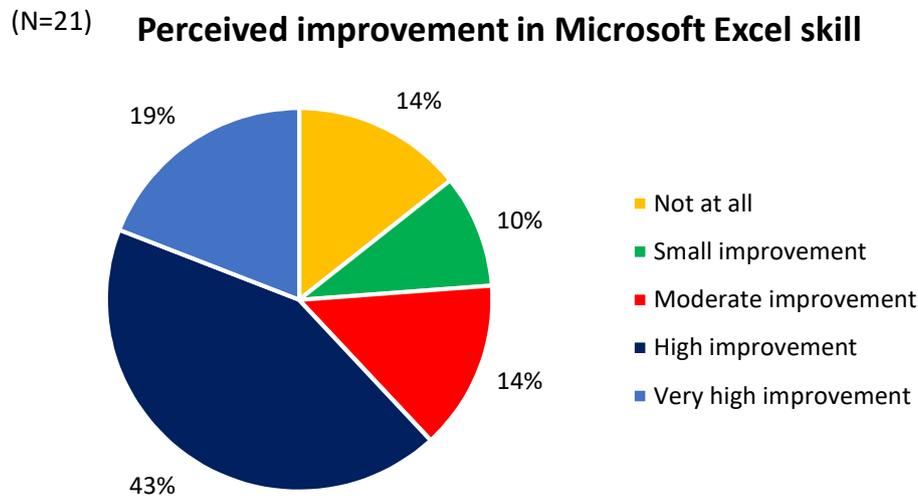


Figure 6.50 Students' perceived MS Excel skill improvement, 2018-19 questionnaire data

The researcher observed that a large number of students in the group used Excel formulae when submitting the bank reconciliation assignment in Excel format during semester 1, despite that this was not a requirement of the task. When surveyed at the end of semester 1, 95% of respondents (N=19) agreed that they benefited from classes in the computer lab. Respondents pointed out that it augmented their IT skills, increased their familiarity with Moodle and introduced them to MS Excel which will be of benefit in their future careers. At the time of post-implementation survey completion, students were just commencing the MS Excel element of their IT and computer applications module, so exposure to MS Excel was mainly attributable to their financial accounting modules.

One student elaborated on her answer stating:

I wasn't able to use Excel half as well as I can now. (2018-19 Student 16, survey response)

Furthermore, many references were made to MS Excel within the group interview and six students mentioned having little or no previous experience of Excel in their logs:

I haven't used Excel before but after using it a few times in class I found it easy to use to upload my assignment. (2018-19 Student 12, semester 1 student log)

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I liked the assignment. I am just not very familiar with using Excel and need more practice. (2018-19 Student 9, semester 1 student log)

I didn't know how to use Excel before I came to college and now I feel really comfortable using it. (2018-19 Student 8, group interview)

One student mentioned the scaffolding effect of the templates provided by the lecturer during classes in the computer lab:

I had never used Excel before but it is not difficult as the template is already there. Once you get used to Excel it is very easy and practical to use. (2018-19 Student 17, semester 1 student log)

Students expressed no difficulties when uploading bank reconciliation assignments to Moodle during semester 1, with only one student approaching the lecturer for assistance with this task. Many students stated that this was due to having experience in other modules with uploading to Moodle:

I don't mind using Excel but I've never used it before so its very new to me, I find it easy to use and I like using it for these assignments. I find it easy to upload my assignments on Moodle as we've uploaded a few different things through our module Learning and Development. I think it's really weird not handing the homework to the lecturer and instead uploading it on a computer. (2018-19 Student 14, semester 1 student log)

Another student, who believed her skill level improved as a result of the bank reconciliation assignment, recommended use of a tutorial class on MS Excel at the commencement of the programme:

I also feel I have a greater knowledge of the Excel program from this activity, but I think having 1 tutorial on all aspects of Excel at the start of the year would be highly beneficial for many students. (2018-19 Student 8, semester 1 student log)

This is something that the researcher will consider as an addition in design cycle three, which may act to further enhance learning benefits within computer laboratory classes.

A majority of questionnaire respondents (81%) disagreed that a lack of technology skills made the financial accounting subject difficult for them, with only two students expressing agreement. Both students had acknowledged small perceived skills levels in computer and MS Excel use at the commencement of the programme. However, one student perceived improvements in both skills levels by the end of the cycle. During the group interview, participants indicated that the use of technology

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in the modules did not place any major demands on them, despite many not having any previous MS Excel knowledge:

Students were asked four questions relating to their technology self-efficacy. Mean responses to four questions adapted from an instrument developed and validated by Torkzadeh and van Dyke (2001) are illustrated in Table 6.16. Questions responses were based on a Likert type scale, from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Table 6.16 Mean self-efficacy scores by question item, 2019-18 post-implementation data

	M (N=21)	SD
The use of blended learning has increased my confidence in using technology.	3.71	0.90
Accounting classes in the computer laboratory have increased my confidence in the use of MS Excel.	4.00	0.95
I feel confident using MS Excel during financial accounting classes.	4.05	0.81
My lack of technology skills made this subject difficult for me (reverse coded).	4.05	1.07
Total Self-Efficacy score	15.81	2.27

A total ‘self-efficacy score’ for each student was obtained by the summation of all four item responses. Scores for each student were subsequently coded into low, medium or high self-efficacy categories (low 4-9; medium 10-14; high 15-20). As Figure 6.51 illustrates, all respondents displayed medium to high levels of self-efficacy at the completion of the BL experience.

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(N=21) Technology self-efficacy scores - 2018-19

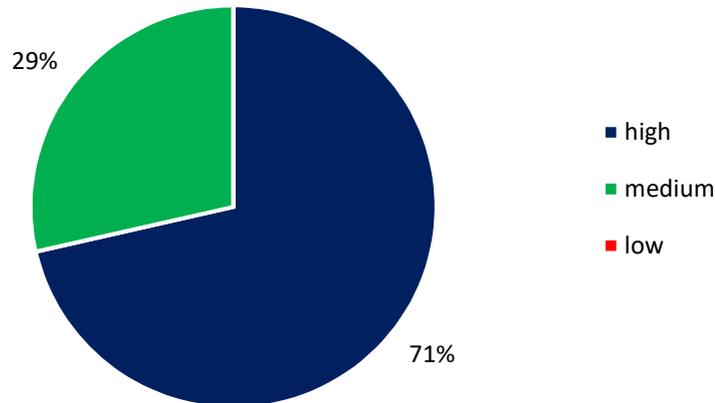


Figure 6.51 Technology self-efficacy scores, 2018-19 questionnaire data

The lecturer provided templates in MS Excel during the year for use in the computer laboratory class which contained both the question and a template into which they typed the solution. The template provided a layout for the solution, with some headings already input with the aim of speeding up solution preparation for students who may be slow at typing. A couple of group interview participants indicated a preference for writing out the full layout, rather than working from an Excel template:

You'd prefer to be writing out the layouts of them because you're going to need to for your exam. (2018-19 Student 18, group interview)

I prefer to have the question in front of me rather than on the computer as I feel it takes longer to complete. (2018-19 Student 18, semester 1 student log)

Contrasting views were presented by others who valued the authenticity offered by using a digital tool employed in the workplace:

I think it's helpful doing it on Excel though, because if you think about it like when you go on to be an accountant, everything is done on computers really. You're not going to be writing it out. (2018-19 Student 12, group interview)

I liked the fact that after completing the question we brought it one step further and used the computer because it made it more relatable to the work we will be doing in the future. (2018-19 Student 22, semester 1 student log)

Working out in Excel is a very good opportunity as most of accounting related things are computerized. (2018-19 Student 21, semester 1 student log)

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The researcher introduced the use of LanSchool in design cycle two for demonstrating solutions to problems in computer lab classes. This was noted by the researcher as a successful change (Kelly, 2019) reflected also in this student's comment:

I particularly like when the screen is taken over as I can look at what you are showing us and taking in what is being said at the same time. (2018-19 Student 19, survey response)

The researcher plans on retaining this design feature going forward into cycle three.

6.6 Changes for design cycle three

6.6.1 *Pedagogy*

The introduction of authentic learning activities in cycle two was commended by many students. However, it was mentioned that the information provided in an authentic bank reconciliation question was more comprehensive than the minimal detail available in an exam-style question, which may cause later confusion for students. Albeit students performed favourably in this question in the end-of-semester exam, the researcher plans on adapting questions used in the bank reconciliation blended topic to scaffold students in transitioning from partaking in authentic class activities to completing traditional formal examination questions during cycle three.

6.6.2 *Autonomy*

Changes to the timing of f2f classes were implemented in design cycle two which ensured that students did not experience a week where there was no f2f contact hours. Students were less apprehensive about the inability to ask questions while learning on their own in cycle two, which may have been due to this adjustment in the f2f class schedule. Nonetheless, while it was not a major concern, disquiet was expressed during the group interview about the long gap between f2f contact hours during the blended topic in semester 2. For this reason, the researcher has decided to implement a further change to the timing of f2f contact hours in design cycle three to reduce the gap between classes. Consequently, the reduction in f2f hours will be spread over weeks 2 and 3 as before, but students will have a f2f class early in each

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week. This should act to further alleviate any concerns students may be having about learning on their own and address any questions which may arise. It is anticipated that this change will support students in becoming autonomous learners and taking increasing responsibility for their own learning.

6.6.3 Collaboration

There was an elevated level of participation on the discussion forum during the ratio analysis topic in cycle two relative to the previous cycle, partly due to the improved forum structure, use of introductory scaffolding activities as well as the provision of a grading rubric in advance. While there was some evidence of knowledge-building on the forum, it was observed that student-student interaction on the forum could be improved. In cycle three, the researcher plans on specifically drawing students attention to the grading rubric which awards maximum marks where a comment ‘presents ratio information, raises thoughtful questions, analyses relevant issues, builds on others’ ideas and appropriately challenges assumptions and perspectives’ (see Appendix 9). Furthermore, a ‘knowledge-building’ task will be incorporated within existing f2f class exercises so that students are better positioned to collaborate successfully on the forum.

While a number of students reported that they felt the discussion was taken over by a couple of individuals who posted incessantly leaving fewer areas for comment by those who delayed, the researcher is hesitant to impose a maximum number of posts in fear of curbing the discussion. She has decided instead, in line with the advice of Salmon, (2011) to draw students’ attention to discussion forum netiquette at the commencement of the module to ensure that they know what is acceptable and unacceptable about their postings which will hopefully prevent individuals from monopolising the discussion.

The researcher has also noted a lower than desired ‘sense of community’ among learners based on cycle two data analysis; hence emphasis needs to be placed on continual augmentation of interaction and collaboration among learners in cycle three.

6.6.4 Engagement

The researcher plans on focusing students' attention on the instructions that are provided in relation to online quiz completion, based on feedback from one student who did not seem to be aware that detailed information on each quiz had been made available. As the majority of students in the first two cycles had no previous experience of online assessment, the researcher believes that it is important that students access these instructions in advance of attempting online assessments allowing them feel more relaxed and leading to a better learning experience.

Student participation and engagement in f2f class activities was enhanced in cycle two due to the addition of clicker technology as part of a group class activity. The researcher recorded that technical issues during the 'clicker class' resulted in the PowerPoint presentation working at a slower pace than planned. This was partly due to the slides loading slowly, but also as a result of the unavailability of the monitoring feature in the software which normally tracks the number of students who have answered each question. The researcher plans on testing the software in the room in advance of class to ensure that a similar issue does not occur in the upcoming cycle. It has been decided also to allow students to work in pairs while responding to questions with the clickers in order to evoke greater discussion and class participation and obtain maximum engagement during this class.

6.6.5 Interaction

In a bid to improve learner-interface interactions, the researcher conducted a think aloud protocol with the bank reconciliation multimedia resource. Based on the protocol findings, the researcher has re-published the resource with adapted quiz questions which are more compatible with the learning material presented therein for use in design cycle three. It is envisioned that this will increase learner satisfaction with online resources in semester 1 of cycle three. Also the researcher plans on investigating the possibility of publishing the online multimedia resources for mobile viewing.

The researcher has decided to speak separately with students within the class group for whom English is not their first language at the commencement of the module in

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cycle three. This will allow her to establish what supports they might need along with their group work preferences in order to help overcome obstacles which they may face due to communication difficulties and improve interactions for this particular cohort.

6.6.6 Technology

Use of MS Excel software while teaching accounting increases the authenticity of education but can pose challenges for some students who may prefer pen and paper. This preference for writing over typing may also be due to a lack of IT experience and consequent feelings of incompetence. The researcher became increasingly aware of the number of students who have no prior experience of using MS Excel from the various data sources during design cycle two. Therefore, it has been decided to hold a tutorial at the commencement of the programme where the focus is solely on use of MS Excel. This will familiarise students with using simple formulae, conceivably maximising learning effectiveness during financial accounting classes scheduled in the computer lab.

6.7 Chapter summary

This chapter discussed the second design cycle where implementation of an adapted BL design led to a greater sense of satisfaction among students. Levels of collaboration were augmented during this design cycle following the addition of f2f collaborative activities and refinements to the ratio analysis discussion forum activity.

Evidence presented portrayed a higher level of engagement by financial accounting students based on a more collaborative and interactive learning experience. The PACE-IT framework was used both to frame the discussion of the design and present the findings and confirming and disconfirming evidence was conveyed to illustrate the influence of the BL design on the student learning experience. The next chapter depicts the third design cycle, and its impact on students' learning experience in introductory accounting.

Chapter 7 Design Cycle Three

7.1 Chapter introduction

This chapter will discuss the third and final blended learning (BL) design cycle, illustrating how the design was enhanced and re-iterated with a similar student cohort to that in cycle two. The chapter commences with a depiction of the implementation of the design placing a particular focus on the minor design changes which were effected in this cycle. Cycle three findings are related, involving analysis of qualitative and quantitative data, with exemplars of data employed to demonstrate the impact of the BL design on the students' learning experiences. As in the previous two chapters, the PACE-IT framework has been used to frame the discussion of the design and the analysis of the data.

7.2 Implementation of design cycle three

7.2.1 Study participants

In line with previous cycles, design cycle three was implemented with students who were studying on the Financial Accounting 1A and 1B modules as part of the BAA1 and BALAW1 programmes in the 2019-20 academic year. A total of 19 students enrolled on first year of these programmes in that year, which was a reduction compared to previous years. Three students were ineligible to partake in the study due to being under 18 years of age, with the remaining 16 students consenting to participate having been informed fully of what the study entailed. One of these students was studying on the BALAW1 programme with the remainder being BAA1 students. Due to a change which affected the timing of the accounting modules on the BALAW programme, the BALAW1 student embarked on the Financial Accounting 1A module only during this academic year; therefore data collection during the Financial Accounting 1B module in semester 2 was based on 15 participants. However, the BALAW1 student did complete both pre and post-implementation surveys, answering all the questions on the post-implementation survey that were relevant to her. The majority of participants were recent school-leavers and, in contrast to the previous cycle, there were slightly more males within the group.

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Similar to previous cycles, the majority of students in the group were Irish, despite the presence of three other nationalities in the group; three students (19%) identified themselves as students from abroad who were studying in Ireland.

There was a further reduction in mature student uptake on the programmes in this cycle, with only one student (6%) within the cohort indicating that she was over 22 years of age, compared to 17% in cycle two (see Appendix 11).

7.3 Design changes

7.3.1 Pedagogy

7.3.1.1 Authentic learning activities

The researcher adapted questions in the students' question manual to scaffold students when transitioning from completing authentic bank reconciliation questions to traditional examination questions on that topic. This included providing students with opening bank reconciliation statements for some questions which is something that would be available in a workplace scenario, thereby preparing students for the task of preparing bank reconciliation statements in the workplace also.

7.3.1.2 Online assessment quizzes

The lecturer had set online quizzes on both blended topics to be taken following students' viewing of the online resources, but in advance of f2f classes where advanced material would be covered. The timing of the quizzes was changed in cycle two to take place in advance of the first f2f class on each topic to allow the lecturer to establish the learning achievement of students in advance of class, facilitating the adaption of in-class learning activities and scaffolding if necessary (Laurillard, 2002). The bank reconciliation online assessment quiz during cycle three was open for five days allowing students to take two attempts with no enforced time delay in between attempts. During the current cycle (in October 2019), the lecturer noted that students took their attempts in quick succession, allowing minimal study time in between attempts. Therefore, she changed the timing of the assessment attempts for the ratio analysis topic in semester 2 (January 2020), deciding instead to open the quiz for two separate periods, so that students could take

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one attempt after viewing the multimedia resource but before the in-depth f2f class and their second attempt after the f2f class. This design change was implemented to allow students to benefit from the knowledge gained during the in-depth f2f class before taking their second attempt and encourage them to study in between attempts. Assessment weightings for online quizzes remained the same as in cycle two.

7.3.2 *Autonomy*

7.3.2.1 F2f class timing

In line with previous cycles, students were provided with hard and soft copy instructions at the commencement of each blended topic (Appendix 12). Based on student feedback in cycle two, the researcher changed the timing of the ratio analysis topic f2f contact hours in semester 2 of cycle three, so that the f2f class in week 3 took place early in the week on Tuesday, rather than on Thursday of that week. This reduced the gap between the f2f classes on the topic, allowing an even spread between f2f classes on the topic and enabling earlier resolution of any questions that might arise for students (Appendix 20).

However, despite planning the above schedule, unexpected industrial action on Tuesday 4 February caused the class on that date to be re-scheduled to Thursday 6 February. However, students expressed no issue in relation to this and there was no evidence of discontent in relation to f2f class timings during subsequent data analysis.

7.3.3 *Collaboration*

7.3.3.1 Collaborative knowledge-building

Changes were implemented to the ratio analysis assignment task during cycle two to increase the level of challenge associated with the task and enable students to build on one another's knowledge. The lecturer felt that student-student interaction on the ratio analysis discussion forum could be further improved by incorporating 'knowledge-building' examples within her teaching and focusing students' attention on the grading rubric which assigns maximum marks for a comment which 'presents ratio information, raises thoughtful questions, analyses relevant issues, builds on others' ideas and appropriately challenges assumptions and perspectives'. Student

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attention was drawn to discussion forum netiquette at the commencement of the task to prevent individuals from monopolising the discussion to enable a more even participation level among all students. The lecturer also maintained an increased presence on the forum to scaffold students in knowledge-building attempts and used a class handout which offered tips to students on formulating possible forum comments (Appendix 14).

7.3.3.2 Collaborative f2f learning activities

There was an increased emphasis on collaborative f2f learning activities in cycle two based on the promulgation of collaboration to promote learning in the research literature (Vygotsky, 1978) with students reporting high levels of satisfaction with collaborative tasks and displaying evidence of learning from one another. Despite these improvements, the researcher recorded a lower than desired ‘sense of community’ among survey respondents at the end of the programme, particularly in relation to their levels of ‘connectedness’ (Rovai, 2002a). Cognisant of the role of community in promoting collaborative learning (Wegerif, 1998), the researcher decided to introduce informal pair work tasks in class immediately from the commencement of the academic year to assist learners in getting to know one another and build a sense of community within the class.

7.3.4 Engagement

7.3.4.1 Clicker technology

Students were highly positive in their responses in relation to use of clicker technology when teaching ratios during cycle two. Due to some technical issues which occurred during the class, the researcher contacted IT technicians in advance of cycle three to ensure that the TurningPoint software was installed in the relevant classroom and checked the room in advance of the class to ensure that all the software features were running properly. This ensured an improved ‘tempo’ within the class during the third iteration. Students worked in pairs while responding to questions with the clickers during this cycle, evoking a greater level of discussion and class participation than the previous cycle (Kelly, 2020).

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7.3.4.2 Online assessment instructions

To promote engagement with online assessments, the lecturer demonstrated online quizzes in the computer laboratory in advance of each assessment so that students were aware of the format of the quiz and types of questions to expect. This was to ensure that students felt adequately prepared when facing online assessments and therefore would not perceive them as a stressful experience.

7.3.5 Interaction

7.3.5.1 Interaction with content and learner-interface

Following a think aloud protocol undertaken during cycle two, areas for improvement identified in the bank reconciliation multimedia resource were addressed by returning to the source files and making all feasible changes before re-publishing the resource in SCORM format. In particular, the quiz questions at the end of the resource were adapted to better suit the learning material delivered within the resource itself. In addition, following investigations into the capabilities of the Articulate software being used, the researcher also succeeded in publishing both of the multimedia resources in a format suitable for mobile viewing. This was in response to requests from cycle two participants, and will ensure that students who may not have access to a laptop or PC at all times will still be able to access the multimedia resources on their phones.

7.3.5.2 International students

During the third cycle, there were three students within the group who were international students from abroad studying in Ireland. Cognisant of the language barrier which can exist for these students, the lecturer had regular conversations with them to establish any difficulties they may be having with learning materials and that they were aware of the importance of utilising the English language supports available to them within the college.

7.3.6 Technology

During cycle three the lecturer held a tutorial class in the use of MS Excel at the commencement of the programme to familiarise students with use of simple Excel

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formulae. This was designed to scaffold students so that they would not struggle later on when trying to use Excel while also encountering new financial accounting material. Students were provided with a handout (Appendix 19) illustrating the various formulae and worked on exercises which focused specifically on use of the formulae and formatting within Excel. Despite the fact that most of the students indicated that they had not used Excel formulae prior to this, students worked confidently on the tasks assigned during this class as the lecturer circled the room providing assistance if required.

7.4 Data analysis

Data collection and analysis were carried out using similar methods to previous cycles; however minor modifications were made to the pre-implementation survey. It was adapted to include two additional questions to establish if students were living in student accommodation in Athlone or commuting to college from home, along with what mode of transport they were using. This data may give an insight to the researcher on any possible difficulties which may arise in forming a sense of community when there are many 'commuter' students within a group (Appendix 6).

Sixteen students were eligible and consented to take part in the study having been provided with participant information sheets informing them of what was involved. All 16 students completed the pre-implementation questionnaire. The post-implementation survey was completed by 15 students (Appendix 7). However, as the BALAW student did not complete the Financial Accounting 1B module in semester 2 due to changes in the BALAW course schedule, she was not in a position to answer some of the questions in the post-implementation questionnaire. Data analysis was conducted on all 15 responses representing a 94% response rate (N=16). The online questionnaire data were downloaded and imported into MS Excel and SPSS for descriptive statistical analysis.

Similar to previous cycles, at the end of this iteration a group interview took place with seven randomly selected participants. Data were analysed using concept mapping, where 179 participant statements were coded and analysed using UCINET6 software, results of which are provided in Appendix 22, while data

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integration was achieved through use of the ‘following a thread’ method (Moran-Ellis *et al.*, 2006).

7.5 Design cycle three findings

7.5.1 Pedagogy

7.5.1.1 Prior knowledge

Analagous with previous cycles, a majority of study participants (88%) had completed leaving certificate or equivalent as their highest level of education before embarking on this programme (Appendix 11).

When surveyed on their prior accounting knowledge at the commencement of the programme, 25% of study participants had studied leaving certificate accounting at higher level, while 31% had no previous accounting experience as displayed in Figure 7.1. In line with previous cycles, there was evidence of mixed levels of accounting knowledge within the group, albeit a slightly higher percentage of incoming students without prior knowledge on the subject.

(N=16)

Previous accounting knowledge

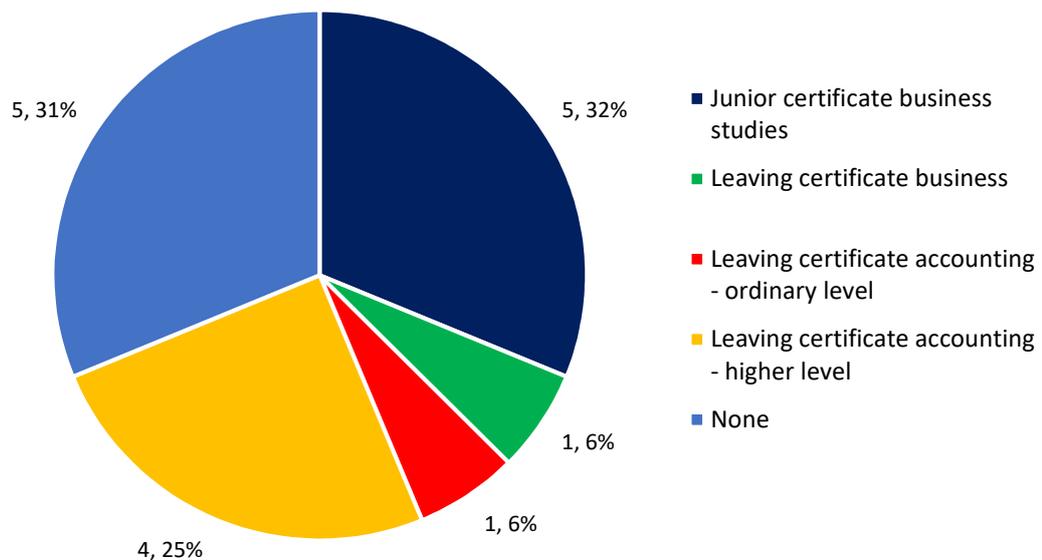


Figure 7.1 Students' previous accounting knowledge, 2019-20 questionnaire data

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7.5.1.2 Perceived effects on learning

Students' responses to post-implementation survey items seeking their views on the usefulness of the various elements of the BL design are illustrated in Figure 7.2.

Data pertaining to the BL course elements are based on responses for 15 study participants. However, as the BALAW1 student did not partake in Financial Accounting 1B module, data relating to the discussion forum are based on 14 participants.

Students' responses were predominantly positive, demonstrative of a broad level of satisfaction with all BL course elements. All respondents, except for one, rated the ratio analysis discussion forum as 'very' or 'extremely useful'. The sole respondent who rated the forum as 'not at all useful' elaborated that the format of the forum was difficult to follow and that she was unsure posting to it, as if she was wrong, "the whole class would see" (2019-20 Student 5, survey response). In addition, this student revealed in another survey item response that she had a "personal issue" resulting in difficulties exposing gaps in her understanding. The researcher believes that this may have affected her perception of forum use.

(N=15)

Usefulness of blended learning course elements

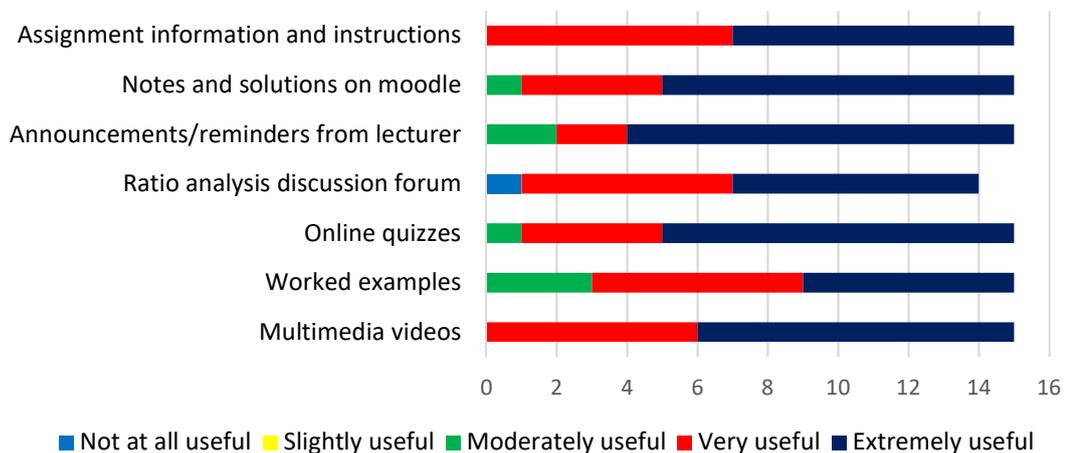


Figure 7.2 Students' perceived usefulness of BL course elements, 2019-20 questionnaire data

One student who agreed that the worked example videos were 'very useful' complimented the step-by-step nature of the videos, while another appreciated the opportunity provided to check her answer and pinpoint mistakes:

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I watched [the worked example video] while doing the question in a pause, attempt and check manner. I found this very helpful as I wasn't working with wrong figures the whole way through and could easily pinpoint my problem areas. (2019-20 Student 5, semester 1 student log)

A couple of advanced learners indicated within their student logs that they did not access worked example videos for the ratio analysis topic, due to having a level of confidence already in relation to their knowledge of the topic, indicating that students were inclined to use worked example videos on an 'as required' basis, as in the previous cycle. This allowed them to move directly on to independent problem-solving using question solutions provided on Moodle. In this way, the worked example videos provided a 'fadeable level of scaffolding' (Jackson, Krajeik and Soloway, 1998) allowing students to choose tasks which were appropriate to their individual skill levels.

Ten of the post-implementation survey questions pertained to students' perceptions of the effects of BL on their learning, using a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Respondents' levels of agreement/disagreement with each question item are presented graphically in Figure 7.3. While levels of agreement on some question items were slightly lower than declared in cycle two, nonetheless agreement was expressed by the majority of respondents on all question items, apart from the two reverse-scored items where there was predominant disagreement. A large number of students (60%) remained neutral when asked if BL led to better learning experiences compared to f2f classroom only; a couple of students commented indicating that they enjoyed both approaches, indicative of students valuing the f2f contact with their lecturer and peers, which is in line with previous BL research within accounting (Vamosi, Pierce and Slotkin, 2004; Concannon, Flynn and Campbell, 2005; Chen and Jones, 2007; Wong, 2012; Osgerby, 2013; O'Keefe, Rienks and Smith, 2014; Weil, De Silva and Ward, 2014; Lento, 2017; Fortin *et al.*, 2019). Nonetheless, on another question item, a large majority agreed that they preferred the BL to a wholly f2f approach, as will be discussed later.

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(N=15)

Effect of blended learning on learning in Financial Accounting

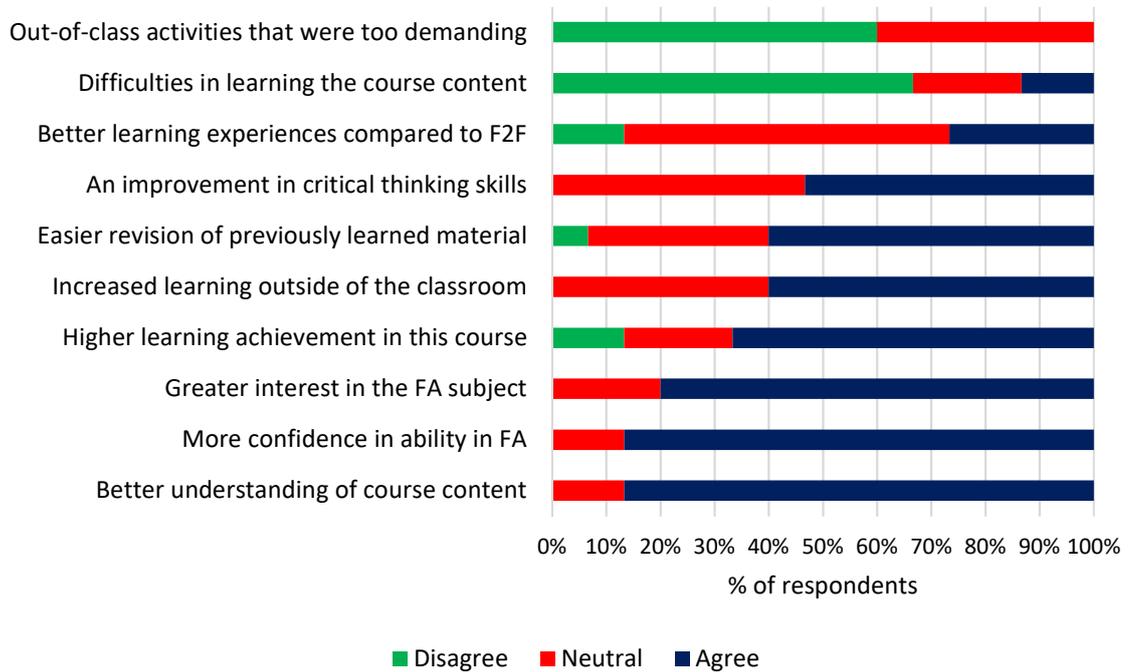


Figure 7.3 Effect of BL on students' learning in financial accounting, 2019-20 questionnaire data

7.5.1.3 Confidence

In the post-implementation survey, 87% of respondents agreed that BL led to more confidence in their ability in financial accounting, with one student commenting that “it feels great when we can help others” (2019-20 Student 16). Another student reflected on how use of a clicker quiz during f2f class boosted her confidence while encouraging her to consider each answer carefully before submitting a response:

I enjoyed the class where we used the clickers. I thought it was a good idea to put us in groups of two as it made me confident my answers were correct when my partner Student 13 agreed with me but also removed the chaos of group work, I also liked the immediate response that the answers were either correct or incorrect before moving to the next question as it boosted confidence as the questions went on. I liked the air of healthy competition it gave the class, which motivated me to think harder about my answers instead of rushing through, and also the bit of fun and discussion. (2019-20 Student 5, assessment task reflection).

The affordances of group work in allowing students to double-check their answers also boosted student confidence:

Being able to turn to the person beside you and say, ‘Did you get this? Grand’ which makes you more confident in your answer. (2019-20 Student 5, group interview)

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as well as being able to double-check answers on the discussion forum:

I found it good for the company I wasn't in to just have an extra buffer there. I was kinda confident in Sprite, but like Cola I wasn't sure if my figures were right so it was nice to be able to go through it and go 'OK they all said this, so that's OK then'. (2019-20 Student 5, group interview)

Another student indicated that the more relaxed atmosphere in computer lab classes offered re-assurance by affording her an opportunity to 'catch up':

Well I felt that when we went to the labs they were generally a little bit easier and you could catch up if you didn't understand something the previous day in the classroom. It's, I don't know, it made you feel sure of yourself. (2019-20 Student 14, group interview)

The lecturer also noted an air of confidence among students when required to learn remotely in response to the Covid-19 restrictions imposed at the end of semester 2 (Kelly, 2020), which is likely to have been due to familiarity with online resource usage through the BL approach.

7.5.1.4 Understanding and revision

There was also 87% agreement that BL led to better understanding of course content, with one student attributing enhanced understanding to the ability to replay the videos and get ideas from classmates via the discussion forum. Students made frequent references to enhanced understanding within qualitative responses:

It is easier to understand a topic with blending learning as you can go back over the multimedia resource whenever you want. (2019-20 Student 6, survey response)

It [blended learning] helped me to understand certain aspects of the course better. (2019-20 Student 7, survey response)

I enjoyed the clickers and they helped me to understand ratios. (2019-20 Student 6, semester 2 student log)

I came out with a good understanding of bank reconciliations from both classroom based learning and also the online resources. (2019-20 Student 7, survey response)

Students encountering new learning content affirmed the affordances of the online resources in promoting understanding, particularly as the resources may be re-visited at any time:

I have watched the online resource more than once so I could learn about ratios as it is my first time doing ratios. Altogether I spent about 30 mins viewing it. It did help me to understand ratios better as it was explained really well. (2019-20 Student 15, semester 2 student log)

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It is a good resource to use as sometimes you may forget about a topic after class but this gives you the opportunity to go back over it again. Also sometimes in class it can be hard to understand the information when it's the first time to go over it but now with the videos you have a back up. (2019-20 Student 2, semester 1 student log)

Likewise, students attributed increased understanding to the f2f collaborative activities:

I feel that I am more confident doing bank recs after the group classroom activity. I could work on it on my own at my pace, and could double check my work when finished. I got something wrong in the format and being able to see clearly where I went wrong and have a friend explain it to me developed my own understanding. (2019-20 Student 5, semester 1 student log)

The classroom activities really helped me to learn and understand ratios. I liked working in groups because you can discuss and explain parts to people if they don't understand and they can do the same for you. (2019-20 Student 6, semester 2 student log)

Another student mentioned that the f2f collaborative bank reconciliation assessment task promoted a higher learning achievement for her as it encouraged students to engage in active participation rather than rote learning:

I liked this type of assessment because it wasn't stressful and there was loads of opportunities to get help, I also felt that I learned more doing the assessment this way because I wasn't just going home to learn a load of information off by heart I was actively participating in the work. (2019-20 Student 14, semester 1 student log)

In general, students determined that there was a greater understanding and a reduced reliance on rote learning during the modules:

I have learned the meanings behind the calculations, whereas before I just worked them out and never understood them. (2019-20 Student 11, assessment task reflection)

The theory is also much easier to understand because, I don't know, I just didn't understand it in secondary school. ... I memorised 'you add that you take away that', 'Due is added, prepaid is minus'. (2019-20 Student 8, group interview)

I found that when I did accounting in secondary school I like, I memorised the steps. ... everything was just like 'learn this, learn this, learn this!' (2019-20 Student 7, group interview)

Group interview participants indicated that they were able to see the reason behind the accounting treatment of specific items, which allowed them to learn through understanding rather than relying on the need to memorise, indicative of a sense of satisfaction with the lecturer's teaching style:

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It's easier to learn it when you can see the connections, like why this is the way it is. (2019-20 Student 5, group interview)

the reason that you're seeing these go in there, it's easier to remember, than just 'this goes here and that goes there' rather than 'this is here because of this'. (2019-20 Student 2, group interview)

The 'step-by-step' design of online learning resources, based on cognitive load theory principles, was commended by students:

I liked the videos as they could show me the step by step way of answering a question which was very helpful. (2019-20 Student 10, semester 1 student log)

It did help me learn because it showed the steps clearly and showed a worked example. I liked that you can rewind the video and go over steps that I did not understand. (2019-20 Student 11, semester 1 student log)

While lower than responses in previous cycles, a majority of respondents (60%) still agreed that BL led to easier revision of learning material. Within student logs, there was evidence of multimedia resources being used for revision purposes with advanced learners revealing that the online resources proved useful for revision of topics which they had encountered at leaving certificate level:

I used it [ratios multimedia resource] to revise the topic and to refresh my knowledge on ratio analysis. I took notes on the ratios I was unsure about. It wasn't rushed which helped me learn and the video was at a slow and easy learning pace. (2019-20 Student 12, semester 2 student log)

I liked the fact that if you watched one of the videos on the multi-media resource and needed to revise it again you could just play the video again or go back over what you are unsure about. (2019-20 Student 6, semester 1 student log)

It was clear that students valued the accessibility of resources for revision purposes in advance of assessments also:

I watched the online resource twice, I used it once to learn and the second time to revise before the quiz. It helped me to learn ratios because if I didn't understand one part of it I was able to go back and watch it again. (2019-20 Student 6, semester 2 student log)

Furthermore, the affordances of BL in fostering understanding and facilitating revision were mentioned by a number of students when responding to another survey item on what they liked most about the blended approach.

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7.5.1.5 Learning from ratio analysis discussion forum

A number of items on the post-implementation survey pertained to student perceptions of the effect of the discussion forum on their learning, results of which are presented in Figure 7.4.

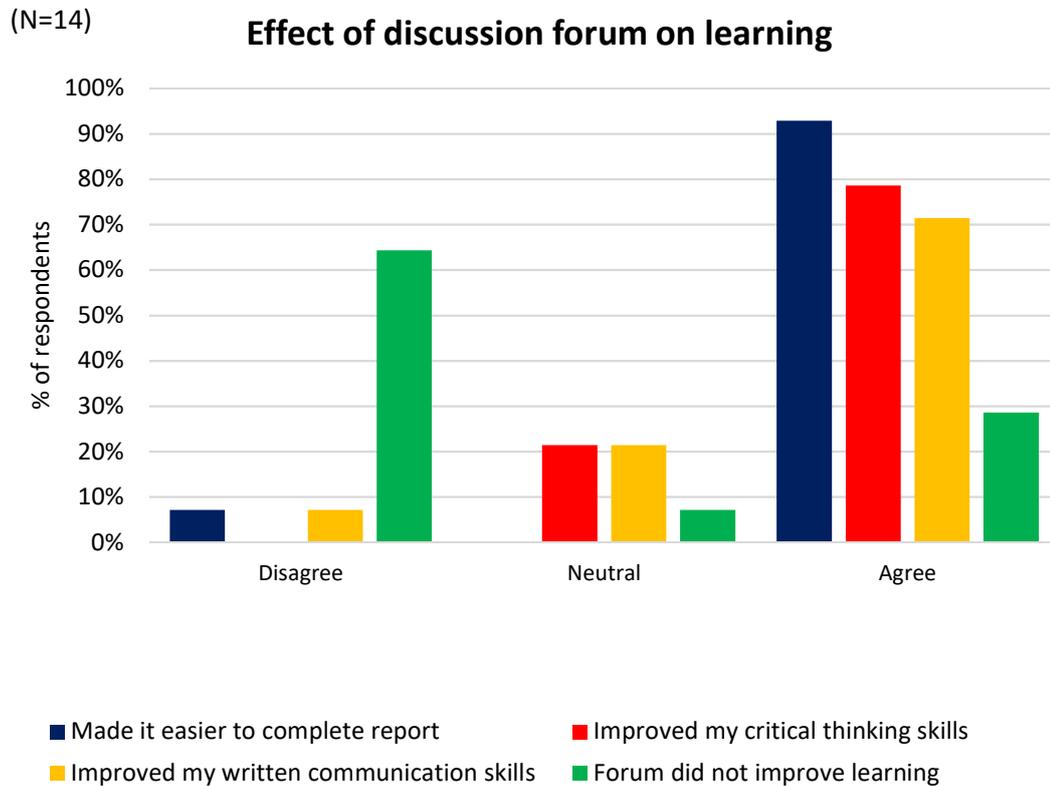


Figure 7.4 Effect of ratio analysis discussion forum on students' learning, 2019-20 questionnaire data

In line with cycle two findings, there was strong agreement among questionnaire respondents (93%) that the ratio analysis discussion forum assisted students when preparing the assignment task report. This was mentioned during the group interview and in student logs:

It was handy to use for the report because when you were doing it, it was like you had all the information in your head but you didn't really know how to say it. So you could look back on it and look at all the questions you asked and the replies and you could just re-word the way you were going to say it around the way you asked the questions. (2019-20 Student 7, group interview)

When I started to preparing the report, I thought it will be hard. But when I was doing it step by step, I found out that we actually had done most of the things through the forum provided. We had commented on the figures needed and had some comparison written in the forum too. (2019-20 Student 16, semester 2 student log)

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It was apparent that the support offered by the forum was particularly beneficial to students possessing strong mathematical abilities but struggling with writing skills:

I found the report was difficult to write as I often find it hard to write long answers and essays. I used the forum to complete the report by using it to help me compare the two companies. (2019-20 Student 13, semester 2 student log)

Furthermore, 79% of respondents agreed that the forum improved their critical thinking skills, with no student expressing disagreement. Two students, who perceived improvements in their critical thinking skills due to BL, acknowledged that posting on the discussion forum had helped them to “think more” about what they were writing. Another student who stated an overall preference for learning through BL elaborated that:

It makes you work for yourself and think about things more. (2019-20 Student 14, survey response)

During the group interview, one student referred to the lecturer’s presence on the ratio analysis discussion forum acting as a motivating factor to students to “think more about your answer before you actually post something up” while another student commented:

I think when you posted the questions. Like we all posted our opinions and whatever and then you would keep like asking questions obviously to try and get us to think more about it. I think that was helpful because you were trying to answer the questions and then if you could relate it to another person’s comment as well so you know you were in the head space and thinking about it. (2019-20 Student 14, group interview)

It was apparent that discussion forum use, coupled with the lecturer’s continual presence on the forum, encouraged students to contemplate more deeply before posting responses, which may have led to higher levels of reasoning being employed by students.

A majority of questionnaire respondents (64%) disagreed with the statement *I felt that the discussion forum did not improve my learning*. While this percentage was diminished relative to cycle two findings, the level of agreement regarding improvements in written communication skills (71%) was elevated. This was exemplified by one student during the group interview:

Sometimes people have better ways of saying things as well than you do, with their vocabulary or whatever. So if you couldn’t think of a way to put something, to read someone else’s helps. (2019-20 Student 14, group interview)

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7.5.1.6 Online assessments

Table 7.1 presents mean scores which were calculated for seven Likert type question items from the post-implementation survey which dealt with students' perceptions of online assessments scored from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Table 7.1 Students' perceptions of online continuous assessment, 2019-20 questionnaire data

	M (N=15)	SD	% Agree or Strongly Agree
The Moodle assessment quizzes were effective in assessing my level of knowledge.	4.53	0.64	93%
I prefer continuous assessment using an in-class assessment rather than a Moodle quiz (reverse-scored).	3.93	0.88	7%
I liked being able to sit the assessment in my own time.	4.07	1.16	73%
I liked being able to have more than one attempt at the assessment.	4.33	1.11	87%
I liked getting instant feedback on my result once I completed the quiz.	4.40	0.91	87%
The Moodle assessment quizzes prepared me well for the end-of-semester exam.	4.20	0.68	87%
Moodle assessment quizzes result in better feedback to students than in-class assessments.	3.93	0.88	60%

Results show a predominantly positive response to question items pertaining to the online assessment quizzes used as part of the BL process. This was also evident from student logs where students lauded the opportunity to take more than one attempt at the quiz in order to improve their grade:

I've attempted the quiz twice, first time was with no study done before hand, and the second try was after studying for it, the second try was more successful and my mark was higher than the first try. I really liked this type of assessment as you can do it twice and get marked on you highest mark, it's also quicker than doing it on paper. (2019-20 Student 1, semester 1 student log)

I attempted the quiz twice. I took the quiz the first time and the theory side of it let me down, so I then revised the theory and repeated the quiz the second time and improved on where needed. First time taking a quiz like this as part of an assessment. I liked the way you can do the quiz twice in order to learn and fix your mistakes, which in turn

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makes it a very practical way of learning. (2019-20 Student 12, semester 1 student log)

It was the first time I took a quiz like this as part of my assessment. I liked this type of assessment because it gave you two attempts so if you messed up on the first one you had a chance to bring your marks up in the second attempt. (2019-20 Student 6, semester 1 student log)

Group interview participants commended the merits of the instant feedback provided by the online assessments:

I thought they were very good, especially when you have your answers straight away. Like you see 'Oh I got this wrong' and you're like 'oh maybe, oh I understood that' but then you see that you got it wrong and you think 'oh this is why I got it wrong'. (2019-20 Student 2, group interview)

You got the result immediately ... before you do the next attempt you can go back and work out the answer that you got wrong, before you try again. (2019-20 Student 14, group interview)

They were also highly appreciative of the ability to do it at home:

I attempted the quiz twice I'm proud of myself because I got pretty good high marks in it. It was really cool how you were able to do this quiz at home. (2019-20 Student 8, semester 2 student log)

A large number of students referred to the reduced stress associated with doing online assessment quizzes in their own environment in comparison to formal in-class exams:

I like this type of assessment as there is not as much pressure. ... It didn't have a very stressful environment compared to other assessments I've done in every subject. (2019-20 Student 5, semester 1 student log)

This was my first time taking an online quiz as part of an assessment. I like this type of assessment. I liked that I got two attempts. I liked that you could do it at home and it took some pressure off you. (2019-20 Student 11, semester 1 student log)

It is a good way to do exams as it gives you the opportunity to retry the exam as the first attempt you can be nervous and make silly mistakes. (2019-20 Student 2, semester 1 student log)

7.5.1.7 Face-to-face learning and teaching experience

Results of seven post-implementation survey items pertaining to students' perceptions of the lecturer's integration of technological, pedagogical and content knowledge when teaching are displayed in Table 7.2.

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Table 7.2 Student perceptions of lecturer's integration of technological, pedagogical and content knowledge, 2019-20 questionnaire data

	M (N=15)	SD
The lecturer had a sufficient knowledge of the subject to answer students' questions.	4.40	0.63
The lecturer adjusted her teaching approaches based on the students' level of understanding.	4.40	0.63
The questions we worked on in class are similar to problems I might encounter in my future career as an accountant.	4.40	0.63
The teaching approaches used made me stay interested in the content of the accounting subject.	4.40	0.74
The assessment methods used evaluated my understanding of the accounting subject.	4.33	0.82
	M (N=14)	SD
The use of 'clicker' technology in this module made the teaching of ratio analysis more effective.	4.29	0.83
The use of 'clicker' technology increased my understanding and learning of ratio analysis.	4.29	0.73

As discussed earlier, the BALAW1 student was not present for the Financial Accounting 1B module, therefore findings relating to use of clicker technology in semester 2 are based on 14 respondents. The clicker class activity was described as an enjoyable experience, which promoted interaction and helped students to 'learn differently':

This was my first time using the clickers and I felt that using the clickers in a class activity was very helpful in learning and understanding the ratios and analysis of accounts. I enjoyed using the clickers. (2019-20 Student 9, semester 2 student log)

The class group work is good overall I think. It gives us an opportunity to learn differently as normally its take down questions and do them whereas when using the clickers you have to have a discussion with your partner about which answer is right and why it is so and not a different answer. (2019-20 Student 7, semester 2 student log)

As described earlier, data analysis revealed a high level of student satisfaction with the lecturer's teaching style. During the group interview, participants elaborated on the importance of f2f classes in motivating students, with one student elaborating that online learning requires "a lot more discipline, because it would be very

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tempting to just go ‘ah I’ll do that later tonight’ and then later tonight doesn’t happen” (2019-20 Student 5, group interview). A couple of students related the advantage of f2f classroom activities in allowing the lecturer to answer students’ questions. There was a sense of appreciation of the f2f and online elements working in tandem together to promote learning:

I was given the questions and tips in the class to complete them [bank reconciliation questions] and then could double check my answers online before the discussion the next day in class. (2019-20 Student 5, survey response)

Students reacted positively to the lecturer’s teaching style when illustrating questions during class in tutorial-like fashion:

In class like, whenever you are doing questions ... the tutorial kind of thing was really good ... if you don’t get a question then all you have to do is listen for a few minutes while you’re doing the question. (2019-20 Student 15, group interview)

There were no complaints regarding timing of f2f classes during this cycle, despite the timing being affected by industrial action. In general, students expressed satisfaction that any queries that they had were addressed; therefore, the earlier scheduling of the first in-depth f2f ratio analysis class in week 3 appeared to have been a success.

In line with cycle two, there was a high level of satisfaction among respondents that they had received the correct number of f2f hours for each blended topic, as presented in Figure 7.5.

Students' views on number of face-to-face hours received per topic

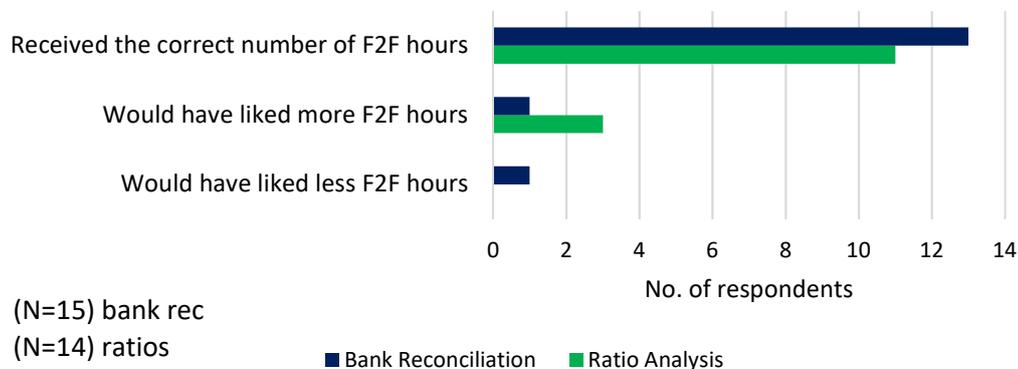


Figure 7.5 Students' level of satisfaction regarding number of f2f hours received, 2019-20 questionnaire data

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Results for the bank reconciliation topic are based on all 15 respondents; however as the BALAW1 student did not take the Financial Accounting 1B module, results for the ratio analysis topic are based on 14 respondents. One international student, who indicated she would have liked more f2f hours on both topics, commented that the f2f classes offered an opportunity to ask the lecturer questions on material that she did not understand. Another student who indicated that he would have liked more f2f hours on the ratio analysis topic elaborated:

I found it harder to pick up the ratio topic. Once I got my head around it, it was OK. (2019-20 Student 13, survey response)

However, the majority of students, including both novice and advanced learners, were happy with the amount of f2f hours received for each topic, with comments indicating that there were sufficient f2f hours to allow the lecturer answer any questions that students may have had.

I feel splitting it half and half between face to face class and online learning was the right amount as we were able to learn independently but also able to have class where we could ask the lecturer about anything we were stuck on. (2019-20 Student 9, survey response)

7.5.1.8 *Authenticity*

In response to a post-implementation survey item (previously detailed in Table 7.2), 93% of respondents agreed that the questions encountered in class were similar to problems they may encounter in their future accountancy careers. Group interview participants expressed a view that ‘textbook questions’ may not be representative of tasks which they might be required to perform in the workplace, as it is a ‘different situation’. They were aware of the importance of being able to apply knowledge learned in college when they arrive in the workplace:

You don’t want to land in on your first day at work and they hand you a bank rec sheet and you’re like, what’s this? (2019-20 Student 5, group interview)

They appreciated the opportunity to work on tasks that resembled ‘real life examples’, stating that it made the subject more ‘realistic’ for them:

You can apply it to your own life, like when your own bank statement comes in you’re like ‘oh, this is like what we did in class!’ (2019-20 Student 14, group interview)

One student described how he felt like he was doing ‘actual work’ while another student drew connections between the authentic bank reconciliation statement

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questions and the use of MS Excel throughout the module, indicating that they both acted as preparation for the world of work.

7.5.1.9 Exam results

Similar to previous cycles, the exam paper at the end of each semester assessed topics studied, with Q1 and Q2 as compulsory questions and students having to choose one question from Q3 and Q4. The bank reconciliation question was a compulsory question in semester 1 and was attempted by all except one student. Ratio analysis was similarly examined as a compulsory question in semester 2. However, restrictions imposed due to the coronavirus pandemic resulted in this paper being delivered as an 'alternative assignment' in online, open-book format, where students uploaded their answers following the paper being made available to them over a 48 hour period. The researcher is cognisant that this would have affected student performance. Due to the open-book nature of the assignment, the lecturer adjusted the marking scheme for the ratio analysis question to allocate less marks for ratio calculations and a greater proportion of marks for critical analysis. Similar to cycle two, students scored above average in both blended topics on the end-of-semester paper, with the mean mark on both questions above the overall mean mark for each paper. Further details of exam scores are provided in Appendix 15.

The assignment report task was administered in a similar fashion to cycle two requiring students to analyse the comparative performance of two companies named Sprite Ltd and Cola Ltd, and to include a reflection piece relating to a learning or assessment activity they encountered during the BL approach (Appendix 13). Marks awarded on the assignment report task included 20% for lower-level skills (formulae calculations and presentation), 20% for discussion forum participation, 50% for use of higher level cognitive skills (analysis, evaluation and report creation) and 10% for metacognitive awareness. Students achieved a mean mark of 66.50% on the assignment (SD 11.41%) with a mean score of 62.86% achieved on the 'higher level cognitive skills' element of the assignment (SD 9.24%). Although the mean assignment score remained the same as in cycle two, all students who submitted the assignment received an honours grade, as illustrated in Figure 7.6.

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(N=14)

Ratio analysis assignment grades 2019-20

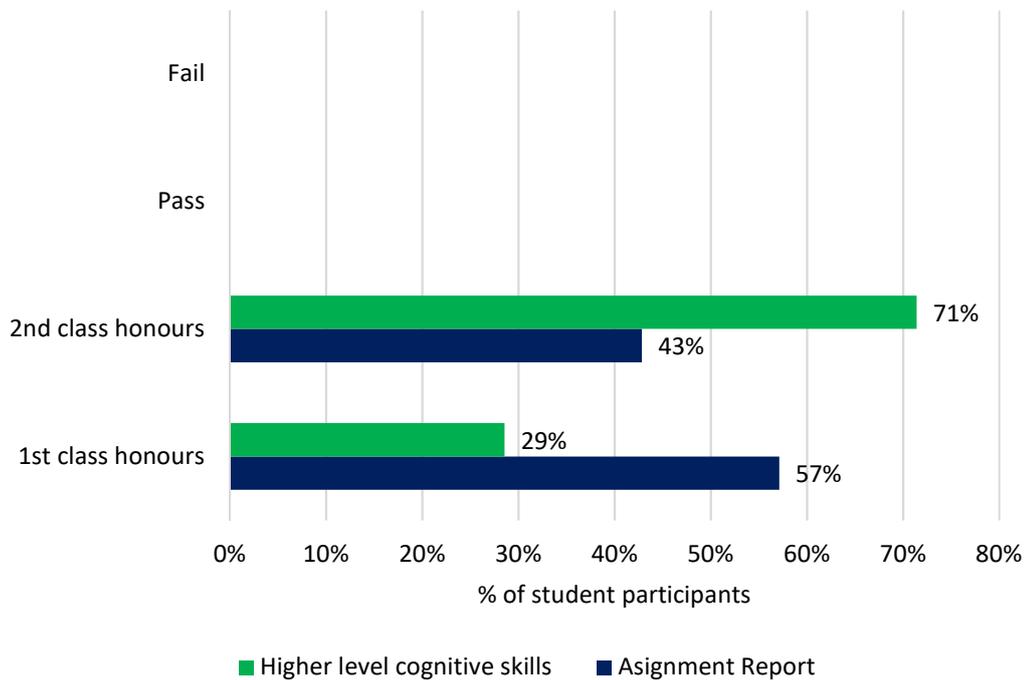


Figure 7.6 Students' grades on ratio analysis assignment task, 2019-20

The mean 'higher cognitive skills' score dropped marginally (mean 63.91% cycle two) in cycle three, due to the fact that there was a lower percentage of first class honours on this element in cycle three. However, all students achieved an honours grade on the 'higher level cognitive skills' element of the report, reflecting a more even spread of learning achievement across the class group.

The assignment was completed by 14 participants, with one participant failing to submit despite reminders and encouragement from the lecturer. The student did not post a comment during the computer laboratory class where the forum was introduced to students, despite all students being offered an opportunity to do so. However, he did subsequently post one comment and viewed the forum 10 times.

Discussion forum participation levels exhibited a further increase in the third iteration, with all students commenting on the forum and the mean percentage mark achieved for the discussion forum element of the assignment increasing to 71% (from 60% in cycle two). The 15 student participants posted a total of 105 comments to the ratio analysis discussion forum. The same grading rubric used in cycle two was applied when assigning marks to students, with maximum marks

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awarded for comments which built on others' ideas and challenged assumptions and perspectives (Appendix 9). There was an increase in the quality of forum posts in cycle three, with the majority of comments analysing issues or building on the ideas of others, as Figure 7.7 illustrates.

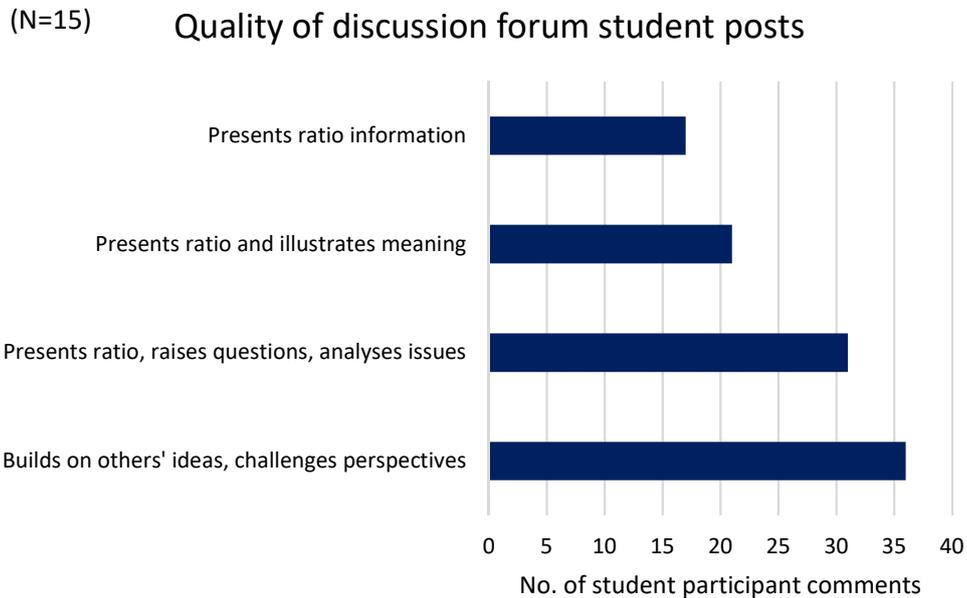


Figure 7.7 Quality of student posts to ratio analysis discussion forum, 2019-20

One group interview participant detailed how the lecturer's emphasis on the grading rubric influenced her interactions on the forum:

I think the fact that you know the way you told us that there would be marks going for responding to someone else's responses. You kind of had to read over what they say and then think about what you would reply to them. That's kind of group work of a type. (2019-20 Student 14, group interview)

It was apparent that students used the rubric to ensure higher quality of posts to aim for maximum marks in this element of the assignment. The lecturer's emphasis on knowledge-building during f2f classes is also likely to have influenced quality of student posts. The lecturer also maintained an increased presence on the forum in cycle three, posting a total of 73 comments to stimulate students' thoughts and spark further comments. The lecturer noted when marking assignments and forum posts that the quality of comments increased over time, with earlier comments more likely to present ratio information and later comments showing greater evidence of knowledge-building. This corresponded with the fact that students became more comfortable with posting as time progressed while there was also more scope for

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knowledge-building and analysis as the forum became increasingly populated with comments.

One student who achieved a first class honours grade on the ratio analysis assignment task indicated within his student log that he had used the grading rubric to give him ideas on how to improve his grade; however another student who achieved a second-class honour remarked:

I did not use the grading rubric as I felt I didn't need and now realize that this was an error on my part. (2019-20 Student 5, semester 2 student log)

Another student who scored highly on the assignment, achieving maximum marks on the discussion forum element, remarked on how she checked the rubric to ensure that she would maximise her mark:

you would [check the rubric], to make sure you cover all the points as well. When you could read through the marks and see 'Oh, did I say this to cover this mark? OK' (2019-20 Student 14, group interview)

It is apparent that the grading rubric provided a useful tool when used by students for direction when completing the assignment. Furthermore, drawing student attention to discussion forum netiquette at the commencement of the cycle is likely to have prevented individual monopolisation of the forum, contributing to more equal participation levels among students during this cycle.

7.5.2 *Autonomy*

7.5.2.1 Students' lifeload

A pre-implementation survey question which asked students about their time commitments outside of college revealed that seven students (44%) were heavily involved in sporting activities and four students (25%) worked in part-time employment. Seven students (44%) indicated that they had no time commitments outside of this programme; however, three students identified more than one other time commitment (see Figure 7.8).

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(N=16)

Students' time commitments 2019-20

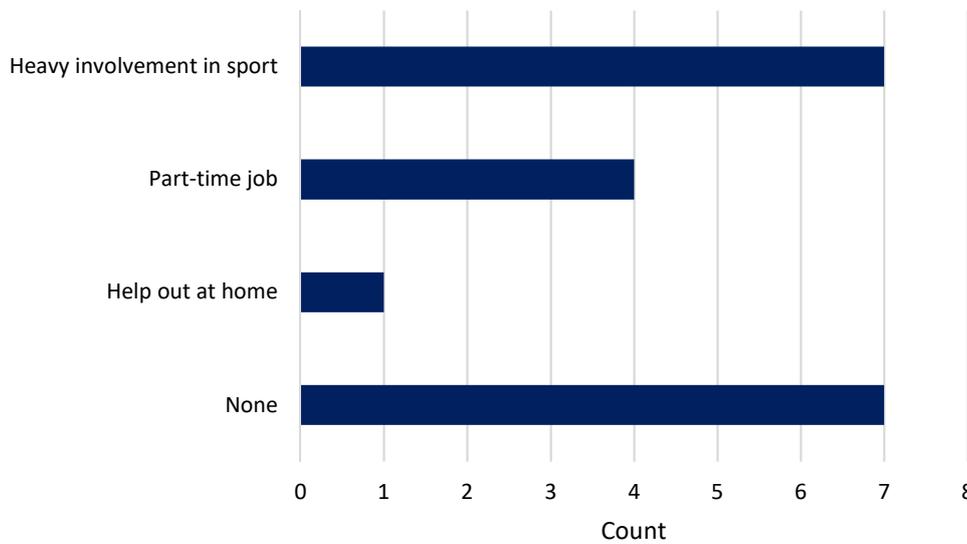


Figure 7.8 Students' other time commitments, 2019-20 questionnaire data

The majority of students travelled less than 10 kilometres to college; in addition, 50% of students had journey times of less than 15 minutes. However, five students (31%) lived over 20 kilometres away, with four of them having journey times of between 30 minutes and one hour, and one student having a journey time of greater than one hour. There was an equal split within the class between students living in student accommodation in Athlone and those living at home and commuting to college, with those commuting travelling by bus or car (Appendix 11).

7.5.2.2 Perceived flexibility of blended learning

Students were surveyed on their views on the flexibility of the BL process, results of which are displayed in Table 7.3. Students indicated their level of agreement with five statements on a Likert type scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Total 'flexibility scores' were calculated by summing individuals' scores on each question item, as in previous cycles. The overall mean 'flexibility score' for all five question items was 18.53 which was an increase on the cycle two mean. As in previous cycles, the lowest scores related to BL saving time and money on unnecessary travel to college. This was due to the fact that BL did not apply to all modules in their programme and had a limited effect on their overall timetable, thereby resulting in minimal travel-related savings. Students recognised that BL

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offered more flexible learning time, with all students expressing agreement with this statement. The majority agreed that BL allowed them flexibility to access lessons when they missed a class.

Table 7.3 Flexibility scores by question item, 2019-20 questionnaire data

Blended learning allowed me to:	M (N=15)	SD
Have more flexible learning time	4.40	0.51
Save time on unnecessary travel to college	3.40	1.24
Better manage my other commitments outside of college	3.53	0.64
Access lessons on Moodle on days when I am absent from class	4.00	0.66
Save money on unnecessary travel to college	3.20	1.32
Total flexibility score	18.53	3.11

Group interview participants spoke positively about their ability to fit in other activities, including work commitments, due to BL. This was due to the reduction in f2f hours as well as the ability to view learning materials and complete assessments in their own time.

We have the free time to review the knowledge that we learnt in class. (2019-20 Student 4, survey response)

I like about it [multimedia resource] that we can watch whenever we have time and wherever we are. (2019-20 Student 16, semester 2 student log)

Because you could fit them into your life as well because like if you did happen to get, for myself like called into work, you can go to work and you still have time to do the assessment. (2019-20 Student 2, group interview)

Even on the discussion forum, if you don't know something you can post on it at any time and anyone can reply at any time, so you're not, you're not restricted to classes either. (2019-20 Student 8, group interview)

Students who may miss class for various reasons valued having resources available to them to catch up on missed learning material:

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I have missed a few classes due to illness and having the course on Moodle means that I don't fall too far behind and can catch up in my own time. (2019-20 Student 5, survey response)

I think it's better that even when you miss class and even when you're sick even when I went to Poland like I could always look back on Moodle and see what happened. (2019-20 Student 8, group interview)

It helps as well that it's online because if you're stuck and have to go to work or something and you can't make it to college, that it's not 'oh well you have to be there to understand it'. Like you can go back on the videos and you can go back over it and stuff like that. It's not just kind of like, 'if you miss class you miss the interpretation of it' and then it's just 'here's the slides!' kind of thing. (2019-20 Student 2, group interview)

All students achieved high or medium flexibility scores, which was an improvement on previous cycles (see Figure 7.9).

(N = 15) **Flexibility offered by blended learning experience
2019-20**

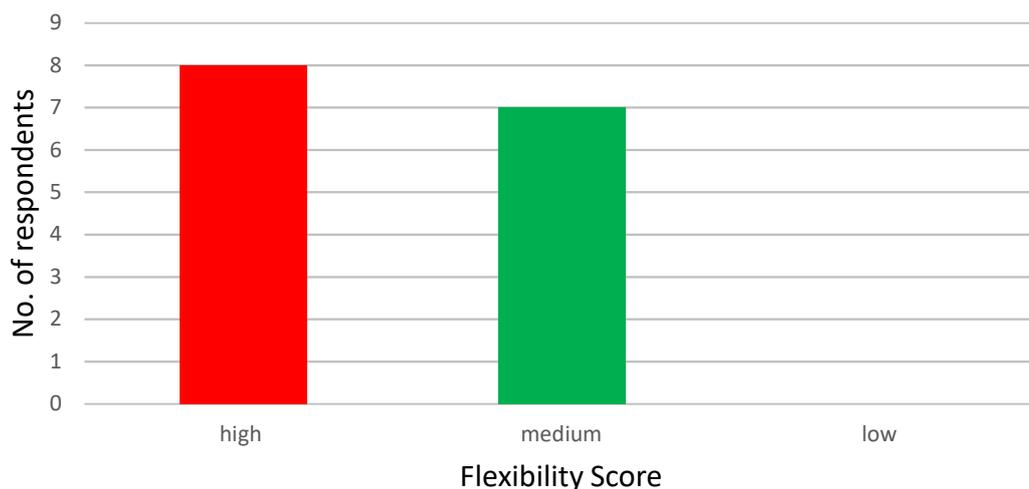


Figure 7.9 Flexibility scores from 2019-20 post-implementation questionnaire data

It was apparent that students welcomed the flexibility offered by the BL approach, in terms of the ability to fit the workload into their lifestyles. The researcher has noted a reduction in mature students embarking on these programmes over the three design cycles along with a marked reduction in enrolment for the third iteration. This may indicate a need to increase the flexibility offered by these programmes in terms of providing a blended offering across all modules to enhance its attractiveness to potential mature students while allowing them to balance their other time commitments.

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7.5.2.3 Independent learning

As evident from Figure 7.10, 86% of the respondents who had viewed the online resource agreed that it allowed them to work at their own pace.

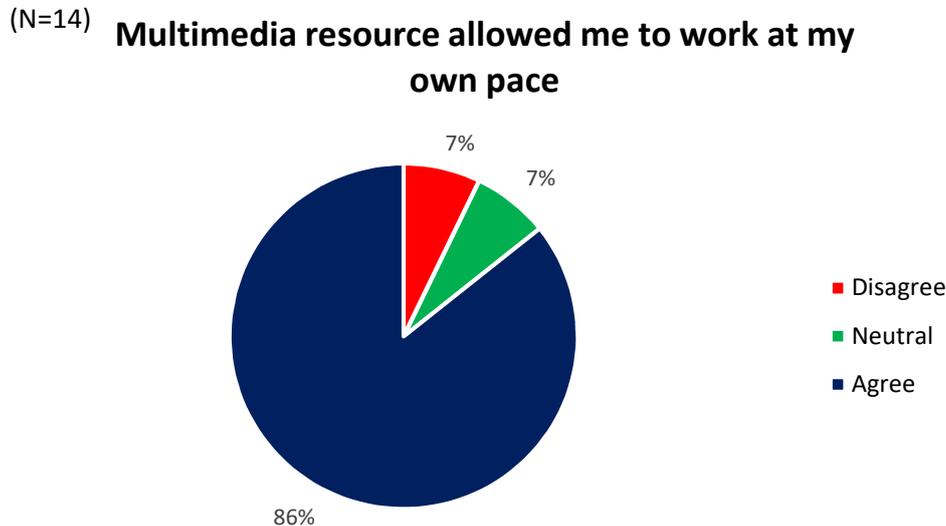


Figure 7.10 Students' views on multimedia resource allowing them to work at own pace, 2019-20 questionnaire data

Evidence from student logs and the group interview indicated that this feature was appreciated highly by students:

I attempted the question while I was watching the video, it helped me learn because if I was unsure on how to answer a part of a question I could rewind the video and watch it again. I liked that it was an example of the questions we will face in bank reconciliation because it shows me exactly how to do the question and I can watch the video again for revision. (2019-20 Student 6, semester 1 student log)

The videos I found were helpful for the bank recs because I had a lot of trouble deciding on what went where. So being able to go to the video a couple of times like 'right this goes here and this goes here' and then being able to work on it, and then go back to make sure it was right. (2019-20 Student 5, group interview)

I liked this way of learning as I could do it at my own pace ... and the fact that I had to learn the whole topic by myself it made me think a bit more than if I was sitting in class just listening, I was a lot more focused and it held my attention better. (2019-20 Student 14, semester 2 student log)

There was also evidence of students having control over their own learning:

I think the resources are very useful and it is very clear. In the resource, I can choose what I want to learn. (2019-20 Student 4, semester 1 student log)

It gives me control of my own learning and I can work at my own pace. (2019-20 Student 5, survey response)

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I have watched the video several times to revise my lesson as I may missed some important note in the class. I usually watch it for 10-20 minutes by skipping the content I already know and just look at the content I am not familiar with. (2019-20 Student 16, semester 1 student log)

This particularly suited advanced learners enabling them to choose the learning material which they needed to concentrate on:

I didn't spend long on the videos as I already knew most of what was in them from my previous accounting done in secondary school. (2019-20 Student 10, semester 1 student log)

Especially if you are a bit more confident about the topic, the good thing is you can work at your own pace if you don't get it, but you can also work at your own pace if you do get it, so you don't have to devote the 2 full hours to something you only need to do an hour in because you understand that, so you can give that extra hour to something else. (2019-20 Student 5, group interview)

There was strong agreement also that BL allowed students to take more responsibility for their own learning, with no student expressing disagreement, as evident from Figure 7.11.

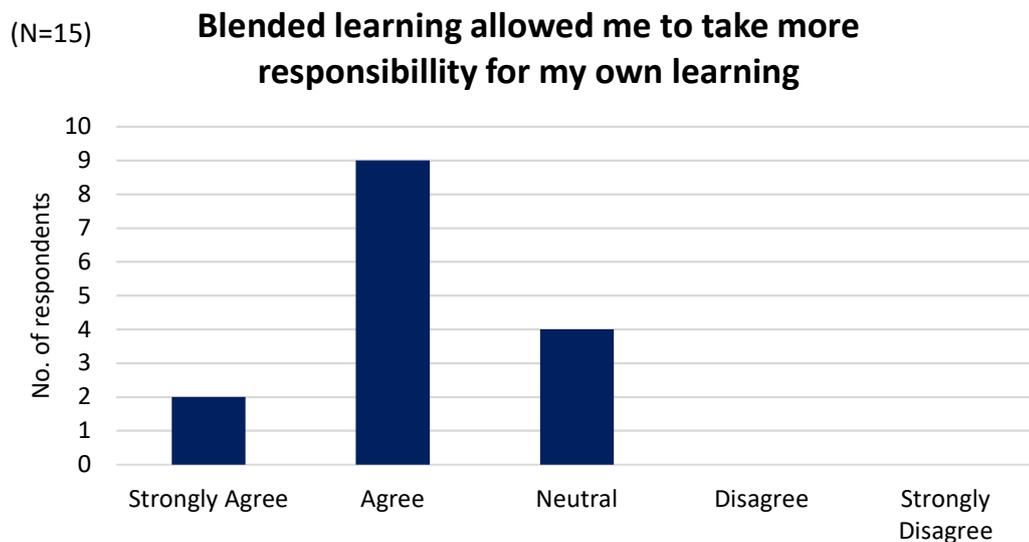


Figure 7.11 Effect of BL on students' independent learning, 2019-20 questionnaire data

Nonetheless, there was evidence of the challenges faced by students when taking responsibility for their own learning:

I disliked the fact that it was easy to forget about the forum online. (2019-20 Student 12, semester 2 student log)

I didn't like that I was losing a little motivation to learn which is sometimes caused by distractions on my phone or in the house. (2019-20 Student 13, survey response)

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It was just sort of remembering to comment, that was the hardest part, remembering to comment on the discussion forum. (2019-20 Student 7, group interview)

In semester 1 logs, a couple of students mentioned the drawback of not being able to ask questions when learning independently online:

The thing I disliked about the multi-media resource was that if I had any questions about the topic I could not ask my lecturer because I was at home. (2019-20 Student 6, semester 1 student log)

However, in line with cycle two, the inability to ask questions was not mentioned in semester 2 logs as students gained confidence in learning through the blended approach. Additionally, the lecturer recorded a level of contentment among students as they became habituated to the BL approach.

Students were more proactive in making contact with the lecturer during the second semester, often via the class rep, with evidence of an increased level of messaging relative to semester 1 (Kelly, 2020). The sample quiz, which was due to open on 8 October, did not open as planned due to a quiz setting error. One of the students drew the lecturer's attention to this on 17 October 2019 in class. Moodle usage logs indicated that 12 students attempted to access the quiz between 8 October and 17 October in advance of taking the first online quiz. Despite having a number of communication channels available to them, students failed to use them to alert the lecturer regarding this issue, waiting instead to inform her during f2f class. This may show evidence of students' lack of confidence in taking responsibility for their own learning and approaching the lecturer in the new college environment, while transitioning from the familiarity of the second-level setting. The lecturer noted, however, that as time passed students contacted her freely with messages using email or whats app messages forwarded via the class rep.

In the post-implementation survey, there were high levels of agreement that respondents would like to see BL offered across more financial accounting topics (87%), increasing from 57% agreement in cycle two. Furthermore, no student expressed disagreement; however, two students selected 'Don't know', with one commenting that he liked using the online resources when learning bank reconciliations but not so much for ratios. Students who agreed commented that it

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made topics more “interesting”, “engaging” and was a “really effective way of learning”.

In addition, 80% of respondents agreed that they would like to see BL offered across more modules in their programme, elaborating that it would be a more effective delivery method for certain subjects and topics, fostering learning and engagement, as this student summarises:

Absolutely, it’s better than literally just listening to what the lecturer is saying and then going home and studying yourself ... it makes the module more exciting. (2019-20 Student 15, survey response)

Only one student indicated that he would not like to see BL offered across more modules, explaining that he would not be as motivated when learning through BL. This student is a recent school-leaver, accustomed to the pedagogical practices of secondary education. This reflects the importance of supporting learners to gain autonomy so that they are capable of learning on their own, as they become adults faced with adjusting to an andragogical, or even heutagogical, learning approach (Canning, 2010; Blaschke, 2012; Blaschke and Hase, 2016).

7.5.2.4 *Metacognition*

Fourteen students completed the ratio analysis assignment tasks in cycle three, which contained a reflective piece to foster metacognition and self-awareness among students. Analogous to cycle two, students were awarded a maximum of 10 marks for the reflective section of the ratio analysis assignment task with a mean of 5.43 marks (SD=1.87) achieved by the group during this iteration. Table 7.4 displays the breakdown of marks achieved by participants as per the grading rubric. All students attempted the reflective element of the assignment; however, three received an unacceptable grade, in contrast to 50% of students (n=7) who expressed good awareness of their individual processes of thinking and learning and were awarded six marks or above.

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Table 7.4 Marks achieved on metacognition element of ratio analysis assignment task, 2019-20

	Marks	No. of participants (N=14)
Excellent to supreme	8 – 10	3
Good to very good	6 – 7	4
Satisfactory	4 – 5	4
Unacceptable	0 - 3	3

Students' views in relation to reflecting on their learning were also mixed. Some students reflected with ease and had a clear understanding of what it involved:

The reflection was easy because I already knew what I was doing wrong but it was helpful so I can address my issues. (2019-20 Student 11, semester 2 student log)

while others clearly struggled a little with the reflection task:

The reflection part wasn't too hard but I feel like I could have written more but I didn't really know what else to write which made it a little more difficult to write. (2019-20 Student 13, semester 2 student log)

During the group interview, students recounted that the act of reflecting on their learning was completely alien to them:

It was different because I personally like I never would have really reflected back on how I was taught a course like. It was just 'do it, learn it, do the exam, then you're done!' (2019-20 Student 7, group interview)

Yeah it was weird at first, like Student 7 said, it was like any work you had done you had never reflected back on it. It makes you think more about it like. (2019-20 Student 15, group interview)

Nonetheless, there was agreement that it was a valuable exercise in which to engage, and students could see the benefits, as evident from one student's comment:

It's better than just forgetting everything you did like, what kind of strategies you used for learning for instance. Think about what you liked and you can use that in the future then like. (2019-20 Student 15, group interview)

It was apparent to the researcher that the mixed results on the reflective element of the ratio analysis assignment task may have been due to students' lack of experience in engaging in reflective tasks. Despite this however, there was evidence of some

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students reflecting deeply on their thinking and learning processes which should aid their future learning, as demonstrated by these reflection excerpts:

As part of this assignment I was required to post calculations and comments in a discussion forum, for me this was very intimidating. I felt like a sailor watching a storm looming on the horizon. I was very unsure of myself and didn't have any self confidence in my answers, I thought that I would look stupid in front of my classmates if I posted something that was wrong, I also feared that I would disappoint my lecturer if I couldn't do the calculations correctly. ... I think the most valuable thing I learned was to have confidence in myself. That being a future accountant requires you to have undisputable faith in yourself and trust that you are making the right decisions. The overall process of this assignment taught me a lot, particularly that it is important to open yourself up for discussions and not be afraid of other people's opinions because sometimes hearing what everyone else has to say is the best way to learn. (2019-20 Student 14, assessment task reflection)

The best thing I have learnt from the experience of the face-to-face group activities and the lecturer's tutorials, is taking each question step-by-step. If you know the simple methods and steps to do each question, it becomes far easier compared to looking at the question and instantly thinking, 'I can't do this'. I will definitely be approaching questions differently in the future, and I think it has enhanced my knowledge and skillset. (2019-20 Student 15, assessment task reflection)

There is evidence that the act of reflection benefitted many of the students in the group by encouraging them to reflect deeply in order to improve their future learning experiences. It is clear to the researcher that reflective learning is something which must be emphasised on a greater level across the financial accounting modules, even as a brief reflection at the end of weekly lectures, as well as across the programme as a whole.

7.5.3 Collaboration

7.5.3.1 Team-work preferences

When surveyed on their team-work preferences at the commencement of the cycle, 50% of students indicated that they enjoy teamwork and working alone. However, 44% of students indicated that they usually or almost always prefer working alone and only one student identified a preference for teamwork (see Figure 7.12). Based on these responses, there was evidence of a greater preference for working alone in this group relative to cycle two participants.

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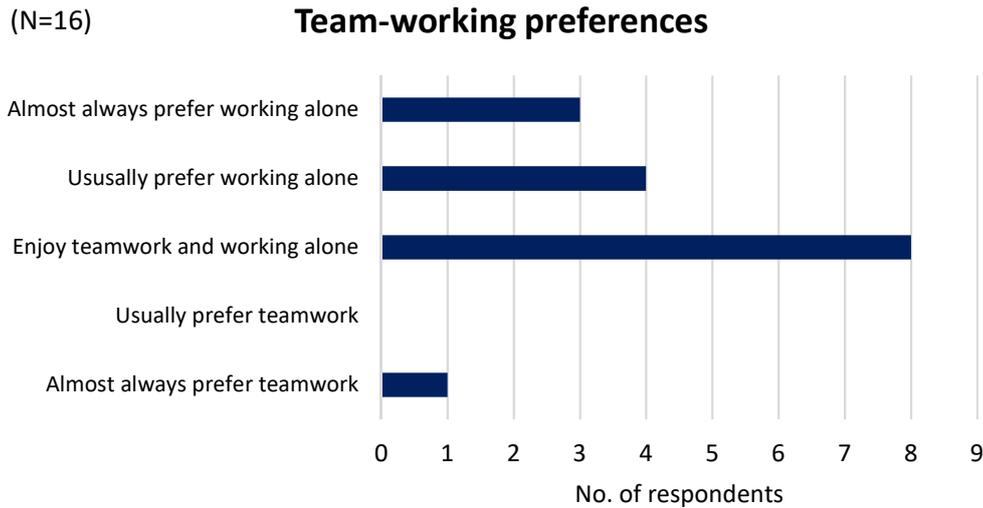


Figure 7.12 Students' team-working preferences, 2019-20 questionnaire data

In response to a post-implementation survey item, 73% of students agreed that BL resulted in an improvement in their team-working skills, which was in line with cycle two findings. Only two students expressed disagreement; one of the students who strongly disagreed had expressed a preference for 'almost always working alone' at the commencement of the programme. In contrast, another student who had expressed a strong preference for working alone did recognise an improvement in her team-working skills; in doing so, she acknowledged the discussion forum as a valuable mechanism for teamwork, as it afforded her opportunities to answer others' questions and share ideas.

7.5.3.2 Oral communication apprehension (OCA)

Students' OCA levels were measured at the commencement of the cycle to discern the presence of communication apprehension within the class group using McCroskey's (1978) Personal Report of Communication Apprehension (PRCA-24) which measures students' scores in four communication contexts – group discussions, meetings, interpersonal conversations and public speaking. Scores on each sub-construct can range from 6 to 30, with scores above 18 indicating some degree of apprehension according to McCroskey (1978, 1982). An overall communication apprehension score was computed by totalling the scores on the four sub-constructs. Results are displayed in Table 7.5 alongside cycle two results and

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comparative results from a study undertaken in Dublin Institute of Technology (DIT) with business and accounting students (Shanahan, 2013).

Table 7.5 Mean OCA levels for study participants in cycles two and three (questionnaire data) and comparative information from DIT study (Shanahan, 2013)

	AIT (cycle 3) BAA & BALAW Mean (N=16)	AIT (cycle 2) BAA & BALAW Mean (N=24)	DIT Bus & Acc Mean (N=368)
Group discussion	15.06	15.54	15.77
Meetings	16.50	16.96	17.01
Interpersonal conversations	17.00	16.12	14.78
Public speaking	19.44	20.67	20.10
Total	68.00	69.29	67.67

A maximum total score of 120 may be achieved with Shanahan (2013) classifying students scoring 85 or above as highly apprehensive. Using this benchmark, 19% (n=3) of the current study participants demonstrated high OCA, compared with 13% of cycle two participants and 18% classified as highly apprehensive in the DIT study. One student demonstrated a total OCA score at the maximum level of 120. However, the overall mean score of 68.00 was close to the DIT mean, although above the US national norm of 65.60 as identified by McCroskey (Byrne, Flood and Shanahan, 2012). While students expressed greatest levels of apprehension around public speaking (mean 19.44), results on this item were lower than both cycle two and DIT findings. Results on apprehensions regarding group discussions and meetings were also lower than the DIT study and cycle two findings. However, there were notable levels of apprehension in relation to interpersonal conversations, with mean scores in relation to interpersonal conversations (mean 17.00) higher than DIT or cycle two findings. These results gave the researcher/lecturer some insights into apprehensions around communication existing among some students with the group.

Challenges faced by first-year students when entering third-level education were discussed during the group interview, with one student elaborating on feelings of apprehension experienced early in the year:

It's just trying to get used to everyone in the class, you're sort of like, a bit kept back and not wanting to answer questions, you're just a bit nervous like because you don't

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want to look like a fool in front of everyone that you don't know. (2019-20 Student 7, group interview)

Another student who exhibited a high OCA level emphasised the important role of the lecturer in ensuring a non-threatening learning environment by making students feel comfortable when asking questions during class:

I think if a lecturer listens to you and even if your answer is wrong rather than shooting you down if they explain it back to you and kind of accept your answer. You know some lecturers just say 'no that's not right' and then you'd be afraid next time to say something in case you'd get it wrong because it's embarrassing. (2019-20 Student 14, group interview)

Mindful of some students' apprehensions, the lecturer ensured to maintain a positive and supportive classroom climate particularly when facilitating collaborative activities.

7.5.3.3 *Sense of community*

In a similar fashion to cycle two, the researcher measured students' sense of community at the end of the programme using Rovai's (2002a) Classroom Community Scale which consists of 20 Likert-type statements, with participants expressing agreement on a 5 point scale from *Strongly Disagree* (scored at 0) to *Strongly Agree* (scored at 4) and items reverse-scored where appropriate. Possible scores range from 0 to 80, with higher scores manifesting a deeper sense of community. The scale can be broken down into two subscales – connectedness and learning – with a maximum score of 40 achievable on each subscale. The connectedness subscale measures students' feelings in relation to trust, spirit, cohesion and interdependence within the class group, while the learning subscale reflects their feelings regarding learning quality and the degree to which their learning needs are being met. Table 7.6 illustrates mean scores for questionnaire respondents for the classroom community scale and subscales, along with comparative results from the second BL iteration.

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Table 7.6 Classroom Community Scale – descriptive statistics, questionnaire data

	2019-20 (cycle three) N=15		2018-19 (cycle two) N=21	
	Mean	SD	Mean	SD
Connectedness subscale	26.73	3.73	22.52	4.77
Learning subscale	28.07	5.16	27.00	5.10
Classroom community	54.80	8.46	49.52	8.09

The researcher felt that there was a lower than desired level of connectedness among the class group in cycle two and therefore aimed to introduced collaborative tasks early in the programme to achieve connectedness and build a ‘sense of community’ within the group. Rovai (2001) asserts that sense of classroom community in online courses can be enhanced through use of interactive teaching approaches involving innovative course design and continual facilitation of online discussions. During cycle three the lecturer maintained an increased presence on online forums and placed an added emphasis on collaborative tasks from early commencement and throughout the financial accounting modules in order to foster a sense of community. As Table 7.6 illustrates, classroom community mean scores were higher in cycle three, with a notable increase on the connectedness subscale mean score, presumably contributed to by the cycle three changes.

As alluded to earlier, students discussed the struggles faced by first-year students in their early days in college when getting to know their classmates:

when I first came in here I was just, I was so scared because I was so scared to make new friends because I was like ‘oh this is going to go bad’. (2019-20 Student 8, group interview)

I feel that lecturers kind of assume that because you’re young and all doing the same thing that you’re all going to be friends immediately, whereas that mightn’t be the case ... you know it takes time! (2019-20 Student 14, group interview)

Akin to previous iterations, the BALAW1 student indicated during the group interview that she found it easier to “fit in” with students enrolled on the law programme because she shares a larger number of modules with them. Nonetheless,

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students expressed overall satisfaction with the level of connectedness and cohesion with the class group and felt that the small size of the group “made it easier to interact with people” (2019-20 Student 8). There was also the perception of a “community feeling in the class” (2019-20 Student 5) which is likely to have been bolstered by the collaborative opportunities provided to students in the online and f2f settings during financial accounting modules.

7.5.3.4 Collaboration through in-class group activities

Responses to question items relating to use of group-work activities during BL are displayed in Figure 7.13.

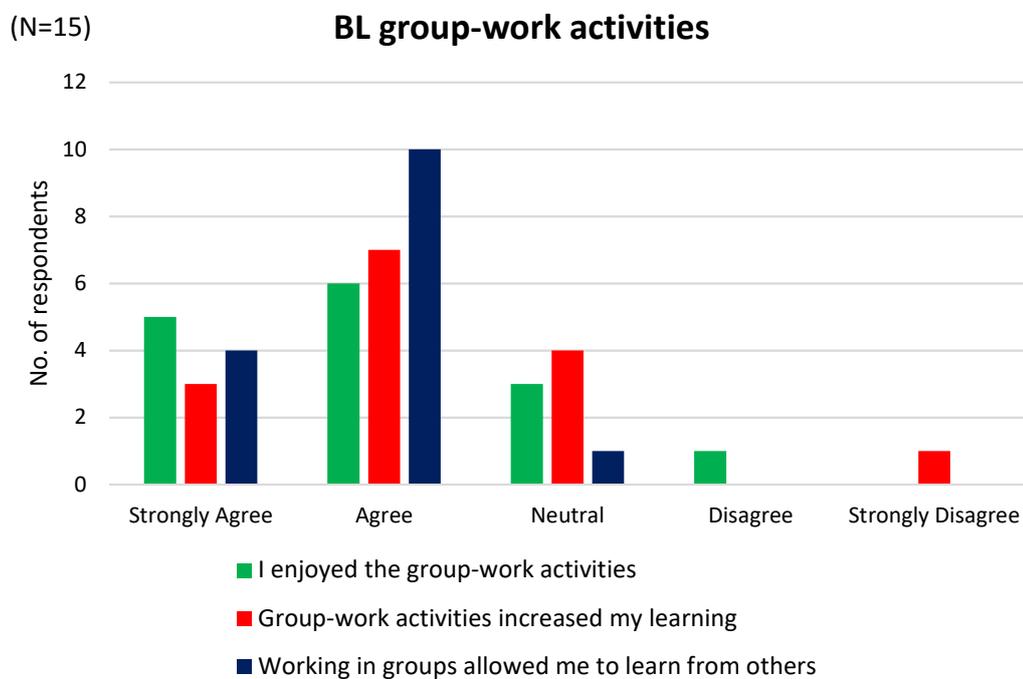


Figure 7.13 Students' perceptions of in-class group-work activities, 2019-20 questionnaire data

Only one student disagreed that she enjoyed group-work activities stating that she preferred to complete tasks by herself. However, she did agree that group-work activities helped her to learn from others. Another student disagreed that group-work activities increased her learning, despite agreeing that she enjoyed group-work. Two students indicated that they felt uncomfortable during group work despite neither having expressed a preference for working alone in the pre-implementation survey or exhibiting high OCA scores; however, they did not elaborate on their responses.

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Surprisingly, despite the fact that a larger proportion of the class group indicated that they preferred working alone relative to cycle two, responses to questions on group work in terms of enjoyment and increased learning were very much in line with the previous cycle, with actually less evidence of disagreement. Furthermore, 93% of respondents agreed that working in groups allowed them to learn from others while group interview participants discussed at length how group work facilitated them in getting to know, and learn from, one another. Evidence from student logs and the group interview included:

I felt the classroom activity was very helpful for learning the bank reconciliation statement. Working in a group with other students was very helpful and we learned a lot off each other and were able to get to know the students better. (2019-20 Student 9, semester 1 student log)

There was more of a discussion about the comparisons. Do you remember that class we were all in fours working together? There was more comparison, like, 'oh I didn't think of that'. (2019-20 Student 5, group interview)

Students spoke positively about the 'friendly environment' during f2f class group activities, whereby students could help each other out:

The classroom activity was very helpful towards my learning about bank reconciliation, as we were put into groups and if anyone was stuck or didn't know how to do the question we could just ask the whole group and figure it out together. (2019-20 Student 1, semester 1 student log)

This was a good assessment, working in the group was not dependent on one person doing a section ... we all did the work but then could talk about our answers. (2019-20 Student 2, semester 1 student log)

It provided an appropriate level of scaffolding that students could avail of if needed, but work on their own if they had the skills to do so.

Class activity [bank rec] let you work on own initiative but also ask for help when needed. I liked it and would prefer working with people in group assessments. (2019-20 Student 11, semester 1 student log)

It was good system [bank rec class activity] as we could work on our own within the group first and then discuss where we were or if we didn't balance up. (2019-20 Student 2, semester 1 student log)

Students acknowledged the insights achieved from being exposed to the ideas of others during group work:

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The group activities were good as they got me talking to people I didn't know very well, and it was good to hear what other people had to say about certain aspects ... it was also good when during the clicker activity, discussing answers with people and hearing their point of view as to why they would pick a certain answer. (2019-20 Student 14, semester 2 student log)

I like working in groups as you can get different opinions on an answer and there is always someone to explain anything you're stuck with to you. (2019-20 Student 15, semester 2 student log)

There was also evidence of some students 'teaching' others how to approach the topic with another student expressing an awareness of the benefits of peer learning:

I preferred the class activity to the online resource for learning this topic. We were in a group and we could help each other. I think it is better to work together for this sort of activity because some people learn the topic quicker and can teach the other students. (2019-20 Student 13, semester 1 student log)

I also think sometimes when a peer explains something to you it can stick in your head a bit better. (2019-20 Student 14, semester 2 student log)

while one advanced learner admitted during the group interview that helping other learners acts as revision for the competent students allowing him to "have an even better understanding" himself (2019-20 Student 7, group interview).

Group activities proved particularly helpful for shy students, as one student who exhibited a high level of OCA articulated:

I felt the class activity helped me a lot to learn, it was nice working in small groups because you can compare your answers with others and if the lecturer doesn't have time to explain something to you, or if you're too afraid to ask for help or can just get the person beside you to help. (2019-20 Student 14, semester 1 student log)

displaying evidence of how OCA can be alleviated through providing group work opportunities to students.

7.5.3.5 Discussion forum 'warm up activities'

Discussion forum 'warm up activities' were used again in cycle three following successful implementation in cycle two in familiarising students with forum use. An introductory forum was opened on 12 September 2019 with 14 study participants contributing to the forum by introducing themselves to the class group. Two students who joined the class late did not post; however, one of them did view the forum posts on two occasions. Posting continued until 26 September 2019 and the majority

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of students posted twice to the forum. Two students returned to the forum at later dates to review postings.

In a similar vein to cycle two, the lecturer opened discussion forum threads on 13 November 2019 to discuss accounting theory topics and further familiarise students with discussion forum use. Ten of the study participants (63%) posted to the forum while the forum was viewed by 11 participants (69%). Two students re-visited the forum in the period in advance of the end-of-semester exam.

The primary aim of these forums was to make it easier for students to use the ratio analysis forum in semester 2, as 86% of study participants had no prior experience of discussion forum use. Agreement was expressed by 71% of respondents that the semester 1 forums made it easier to use the ratio analysis forum, with no student expressing disagreement. Evidence that students perceived benefits from encountering discussion forums in semester 1 is displayed in Figure 7.14.

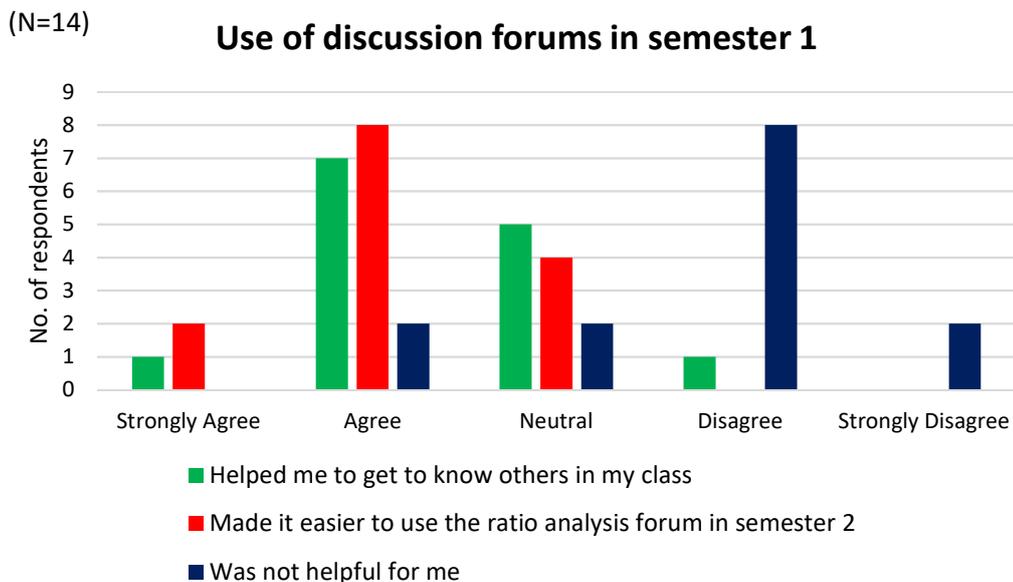


Figure 7.14 Perceived effects of semester 1 discussion forum use, 2019-20 questionnaire data

A secondary aim of using an ‘introductory forum’ at the start of the academic year was to help students to get to know one another. 57% of students agreed that the forum was helpful, with only one student expressing disagreement. The BALAW student is excluded from the participant data above, as she only completed the Financial Accounting 1A module and therefore did not use the ratio analysis forum in semester 2; however, she did agree that the semester 1 forums helped her to get to

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know others in the class. This would be of particular importance to her, as the majority of her modules are law-related so she would have had a limited number of lecturing hours with the accounting group making it harder for her to become allied to the group, as discussed earlier.

Group interview participants remarked positively on the usefulness of the introductory forum in getting to know their classmates and finding out about their interests:

It was helpful to find out what other people were interested in, because you're just looking at it and if you see like, in my case if you see someone played rugby or gaelic, you'd be like 'oh I can talk to them about that'. (2019-20 Student 7, group interview)

One student explained how she preferred this method of class introductions to the typical approach taken where students are put on the spot when asked to introduce themselves to the class verbally:

It gives you time to suss out what you are going to say about yourself. You weren't just 'Em I like this', like panicking. ... You'd be like 'Oh, so and so likes that! Oh that's cool!' rather than, 'Oh God what am I going to say, what am I going to say?' and you're not listening to anybody else. (2019-20 Student 5, group interview)

Group interview participants also recommended group work activities and 'classroom-based interactions' early in the academic year to allow them to get to know one another.

If you could split up into groups of four, to work on a question but not a serious question, that you can have a chat and then do a bit on it, like you're talking to people 'oh yeah, what do you think?' kind of thing and then in different classes you would be in a different group for 5, 10 minutes, so like you can work together, get to know each other and be still kinda doing some work especially in the early stages because it's not that serious at the start because you're just getting used to the subject (2019-20 Student 2, group interview)

It was apparent that students valued opportunities provided by the lecturer to interact, work together and socialise during class in order to allow them to build relationships with one another, and ultimately form a community.

7.5.3.6 Collaboration through ratio analysis discussion forum

Following the successful changes implemented in cycle two in relation to the ratio analysis assignment task and discussion forum, the researcher followed a similar format in cycle three. Students were assigned to two separate groups commenting on

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two different companies on private forums (Sprite Ltd and Cola Ltd) for the initial period of the task, commencing from 11 February 2020. Subsequently, a ‘Comparison forum’ was opened allowing students to post comparative comments on the performance of both companies before submission of a written report via Moodle by Monday 9 March, 2020. Once the Comparison forum opened, the Sprite and Cola forums were made available for review by all students within the class group. As before, the three elements of the forum in this cycle will be referred to collectively as ‘the ratio analysis discussion forum’. Levels of participation and engagement with the forum during cycle three are displayed in Table 7.7.

Table 7.7 Ratio analysis discussion forum usage, 2019-20

	Sprite Forum	Cola Forum	Comparison Forum	Total
Students subscribed for posting	6	9	15	15
Students who posted to forum	6	8	13	15
Posts to forum by students	22	51	32	105
Posts to forum by lecturer	27	32	14	73
Posting period dates (2020)	10 – 26 Feb	10 – 27 Feb	26 Feb – 14 Mar	
Students who viewed the forum	15	14	14	15
Forum views	64	101	124	289
Viewing period dates (2020)	11 Feb – 10 Mar	11 Feb – 10 Mar	20 Feb – 23 Mar	
Students accessing the forum before end-of-semester exam	0	0	1	

Data relating to three students aged under 18 years within the class group who were ineligible to partake in the study were excluded from the above table. As all three were assigned to the Sprite forum, data collection on this forum was based on only six users, in comparison to nine users on the Cola forum.

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Similar to cycle two, students were introduced to the forums within a f2f class and given an opportunity to post their first comment during that class. This class was a few days later than planned due to industrial action effecting cancellation of lectures resulting in the ratio analysis discussion forum being opened at the beginning of week 5 (rather than at the end of week 4). Engagement with the forum was slow during the following week (week 6) due to RAG week taking place in the college. This showed evidence of how student engagement can be affected by a myriad of factors outside of the classroom, including institutional culture (Kahu, 2013; Kahu and Nelson, 2018) or in this case, student culture.

The lecturer noted spending considerable amounts of time reading student messages and posting replies to ‘spark’ further student comment. Furthermore, student messages were read carefully to pinpoint incorrect calculations and misconceptions which were subsequently clarified in a tactful manner via a reply message posted on the forum (Kelly, 2020). One student referred to this in the group interview:

and just the fact that you were responsive as well that, you know, we got answers from you whether it was correct or not correct. You know if you weren’t posting in it and everyone was just posting, some of the stuff could have been wrong and you could have been taking it as it was right. (2019-20 Student 14, group interview)

Once RAG week ended and college life returned to normality, student commenting increased and a good level of engagement and interest was expressed in the forum by students (Kelly, 2020). Despite the disruption of RAG week, student engagement and collaboration within the forum was good overall, with an average of 7 posts per student (in comparison to 5.7 average in cycle two). Albeit, lecturer posting was considerably higher than during the previous cycle.

All students accessed at least two of the forums with the majority accessing all three forums. This indicated that, despite being assigned to one forum, the majority of students viewed both the Sprite and Cola forums once they became visible.

Furthermore, all study participants posted at least one comment to the semester 2 ratio analysis forum. While posting eased off as the ratio analysis report completion date drew near, some participants did continue posting right up until the submission date.

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Students were surveyed in relation to any feelings of anxiety they may have had while commenting on the discussion forum, results of which are displayed in Figure 7.15.

(N=14)

Felt anxious while commenting on forum

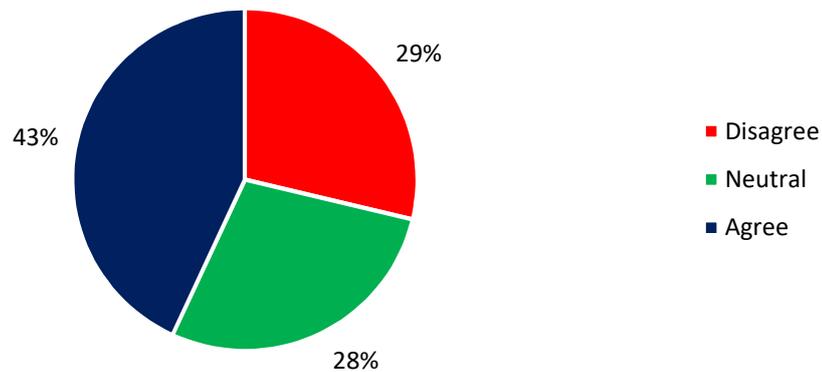


Figure 7.15 Anxiety about commenting on discussion forum, 2019-20 questionnaire data

While 43% agreed that they felt anxious while commenting on the forum, one student elaborated revealing that his anxiety occurred when commencing commenting and abated once he became confident at posting. He expanded within the group interview and his student log on his experience:

When it came to the discussion forum for the report it was just sort of like a bit daunting at the start. So you were like 'I don't want to be the first person to comment on this but I don't want someone to take up all the information as well, that I was going to say' so I was just sort of torn whether to comment or not. (2019-20 Student 7, group interview)

I was a bit nervous at first but as everyone began commenting I felt more comfortable to comment. (2019-20 Student 7, semester 2 student log)

This was further reflected by a number of other students in their logs:

At the beginning I felt confused about how to make comments and what to say. As time progressed I got used to commenting and contributing to the discussion forum and found it a lot easier to add in my comments. (2019-20 Student 6, semester 2 student log)

And there was also a bit of 'Can I write this? Is this correct or is this wrong? Everyone will see it, that I'm wrong' whereas as it got on you were like 'ah I don't care! (2019-20 Student 5, group interview)

This shows evidence of the importance of scaffolding students from the outset to encourage initial commenting, emphasising the importance of allowing them to post

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their first comment within a f2f class. Additional support to help continue the conversation with ‘weaving’ and ‘summarising’ comments is also important, which was confirmed by the following student when she reflected:

When I went to post my comments, I seen that my lecturer had already posted some comments to start the discussion. For some reason that made it easier to post my comments, I suppose no one wants to be the first person to post. After I posted my comments my lecturer answered each one and gave some feedback - this really boosted my confidence, seeing that someone was agreeing with what I had said and continued on the discussion (other students also did this) really made me feel like I was part of a team and that my input was valued. (2019-20 Student 14, assessment task reflection)

Students remarked on the presence of the lecturer on the forum and the importance of the lecturer monitoring the forum to ensure that student comments were accurate:

At the beginning of posting to the forum I felt nervous if I got a calculation wrong, but Orla kept a close eye on the forum and if we got something wrong she'd correct us straight away. (2019-20 Student 15, semester 2 student log)

At the beginning I didn't mind posting to the forum, however as it went on, I became anxious about posting interpretations of what the figures meant because I wasn't as confident in them. Being able to see what others posting regarding the interpretation of figures did help my understanding, especially when Orlaith would add to them and elaborate. An improvement I feel could be made would be some kind of vetting before the posts were visible to everyone to give people time to correct mistakes before the whole class seeing them. (2019-20 Student 5, semester 2 student log)

Despite the lecturer posting ‘weaving’ comments and questions to stimulate students to comment further, one student who only posted four comments stated within his student logs that he was “struggling to find things to comment on” as most of the comments he thought of were already mentioned (2019-20 Student 13, semester 2 student log). However, this was not raised as a concern by any other student. The lecturer observed a more equal participation level than in previous iterations along with the absence of any student monopolising the discussion (Kelly, 2020).

It was clear that once students commenced use of the forum, they quickly became accustomed to it and the learning gains in terms of enhanced understanding became evident to them:

At the beginning I was not looking forward to commenting on the forum but after a few days I thought it was a really good idea because as I was writing my own comments I saw others and read them and it helped me understand not just the ratios but how businesses work. (2019-20 Student 11, semester 2 student log)

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The fact that the forum was a written record which would be available to them at any time, unlike the verbal conversations which take place during class time, was also acknowledged:

The forum helps in learning from others comments and the comments made will be there for a long time. So that we can refer to it again and again whenever we need. I like about the forum as I can leave a comment whenever I had a time and I can learn a lot from it. (2019-20 Student 16, semester 2 student log)

When asked about the learning benefits of using the ratio analysis discussion forum, the majority of respondents agreed that it increased study time outside of the classroom (71%) and that it offered opportunities for student collaboration and sharing of ideas (79%) as displayed in Figure 7.16.

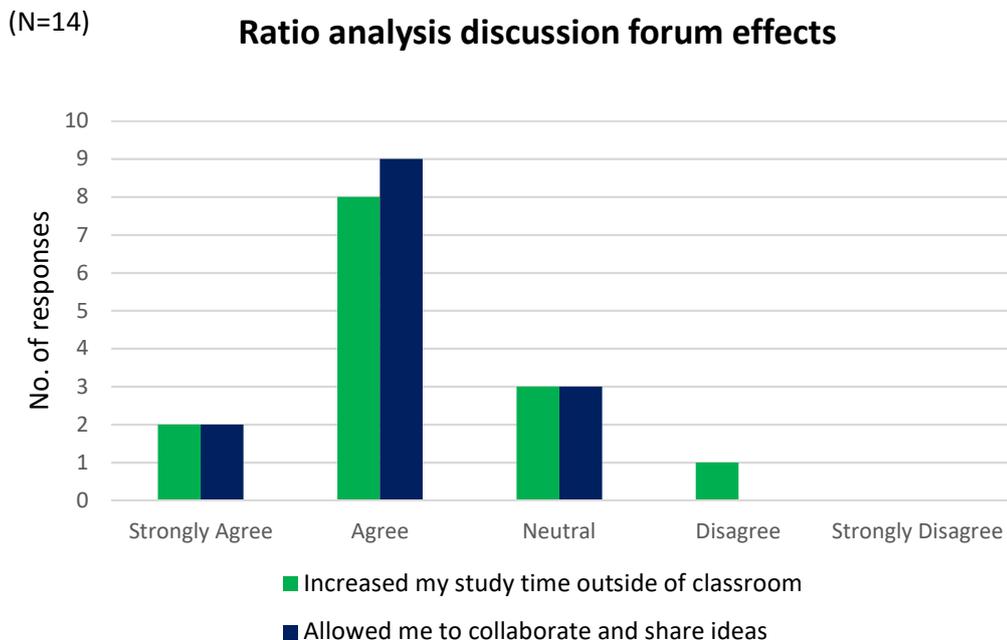


Figure 7.16 Student perceptions of learning benefits of ratio analysis discussion forum, 2019-20 questionnaire data

However, one student did disagree that the forum increased his study time outside of the classroom. He had expressed a preference for f2f teaching and showed evidence of difficulties taking responsibility for his own learning and overcoming outside distractions within some survey responses. Nonetheless, he did indicate within his student log that reading others' comments on the forum had increased his learning:

Also I found the forum useful when other people mentioned things about the company that I hadn't thought of. ... I certainly learned from other people's comments as they

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quite often came up with ideas I hadn't thought of. (2019-20 Student 13, semester 2 student log)

On the whole, student feedback revealed that students gained understanding from reading the ideas of others on the forum:

As the first comments came through and I read them, I started gaining more understanding about the discussion forum and grew some confidence to start commenting in it myself. I then began to gain a better knowledge of the discussion forum and also on the ratios. I was able to read everyone's ideas and opinions and compare them with my own which I found very helpful when I started doing my report. If I were to use the discussion forum again, I would comment more at the start instead of waiting until most of the things I would have said were already said by other members of the group and class. (2019-20 Student 6, assessment task reflection)

I also found the discussion forum helpful as other people's opinions gave me more insight into real life scenarios when it comes to a business. (2019-20 Student 12, assessment task reflection)

I suppose if people mention things that you, that never came into your head like. If Student 5 said something, you might have not been thinking it at all, then when they said it you realise 'Oh, that is valid!'. (2019-20 Student 14, group interview)

One student remarked on the dual impact of the forum in building teams as well as knowledge:

I really enjoyed the Ratios CA [continuous assessment] as well as it got the whole class working as a group and you would be talking to people who on a daily basis you might not talk to but it got you interacting with other people. To see everyone picking up on each other's comments as well and not being afraid to argue a point they felt was different was cool to me as I didn't think anyone in the class would pick up on each other's comments. (2019-20 Student 7, assessment task reflection)

while there was also evidence that the forum provided 'shy' learners, or perhaps those with OCA, an opportunity to participate actively in a safe space:

People were also more likely to put into the forum than they were to like raise the hand and say in class. (2019-20 Student 5, group interview)

In general, evidence pertaining to the forum's potential to cultivate understanding and encourage collaboration was highly positive, indicative of the success of the design changes implemented, particularly in relation to increased lecturer participation and scaffolding.

7.5.3.7 Overall effects of blended learning on collaboration

Similar to the previous cycle, 67% of respondents expressed agreement that BL offered more opportunities to learn from others as illustrated in Figure 7.17. One

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student expressed disagreement; he had indicated difficulties motivating himself towards the use of blended resources outside of class and, while not wholly resistant, he expressed some negative perceptions towards the BL approach.

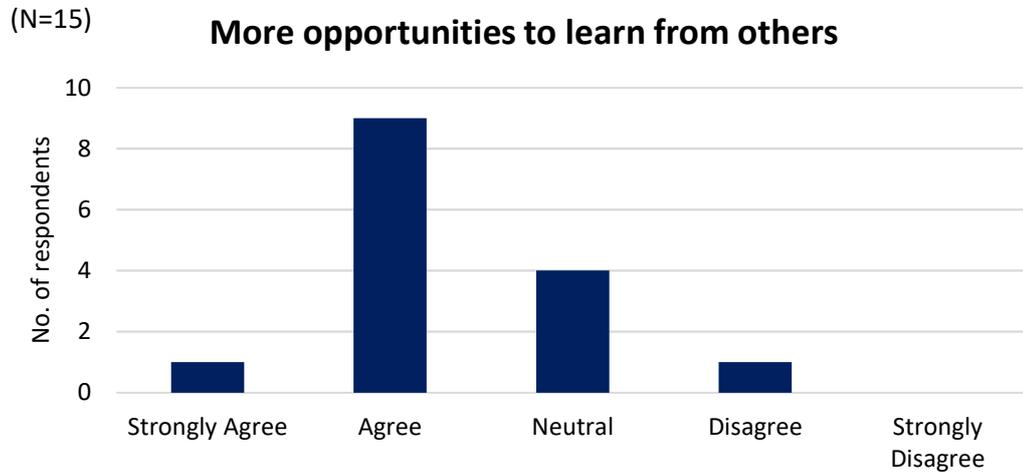


Figure 7.17 Students' perceptions of opportunities provided by blended learning to learn from others, 2019-20 questionnaire data

When students were surveyed on the effects of BL on their collaboration, respondents displayed strong agreement that BL encouraged them to contribute to course materials (93%) and collaborate and share ideas (87%), as evident from Figure 7.18.

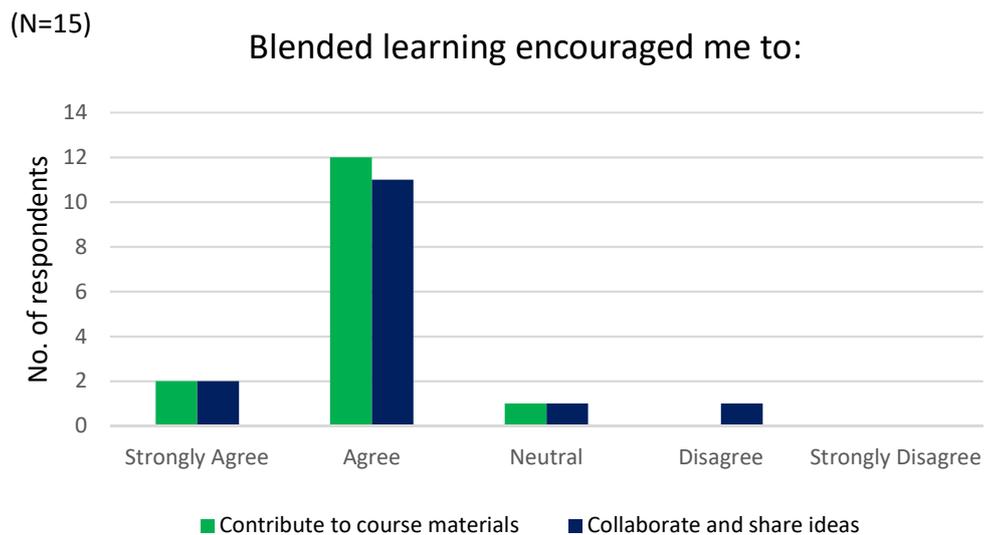


Figure 7.18 Effect of blended learning on student collaboration, 2019-20 questionnaire data

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The high level of satisfaction in this cycle is likely due to the use of pair work tasks during f2f classes from early in semester 1, along with a strong lecturer presence on the ratio analysis forum. Furthermore, these agreement levels have demonstrated a consistent increase over the three cycles, in tandem with the heightened emphasis placed on collaboration by the researcher in each succeeding cycle.

7.5.4 Engagement

7.5.4.1 Engagement with online multimedia resource

As in previous cycles, level of engagement with the online multimedia resource was measured using ten Likert scale type items adapted from the User Engagement Scale (O'Brien and Toms, 2008). Total mean scores based on the fourteen questionnaire respondents who viewed the multimedia resource are displayed in Table 7.8 under four subscales – aesthetics, focused attention, perceived usability and reward factor.

Table 7.8 Mean engagement scores by sub-scale item from 2019-20 post-implementation data

	M (N=14)	SD
Aesthetics The screen layout of the resource was visually pleasing. I liked the graphics and images used in the resource.	4.11	0.68
Focused attention I blocked out things around me when I was using this resource. I was so involved in using this resource that I lost track of time.	3.14	0.75
Perceived usability I felt frustrated while using this resource (reverse-scored). Using this resource was stimulating. Using this resource was difficult (reverse-scored).	3.71	0.58
Reward factor Using this resource was worthwhile. I would recommend that others use this resource. I continued to use this resource out of curiosity.	3.71	0.63
Total Mean Engagement Score	14.68	1.20

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In addition, total engagement scores were calculated for individual students by summing each student's mean score on the four sub-scale items, and subsequently classified as low (4 – 9.33), medium (9.34 – 14.66) or high (14.67 – 20). All students displayed medium or high levels of engagement, as illustrated in Figure 7.19, remaining in line with cycle two.

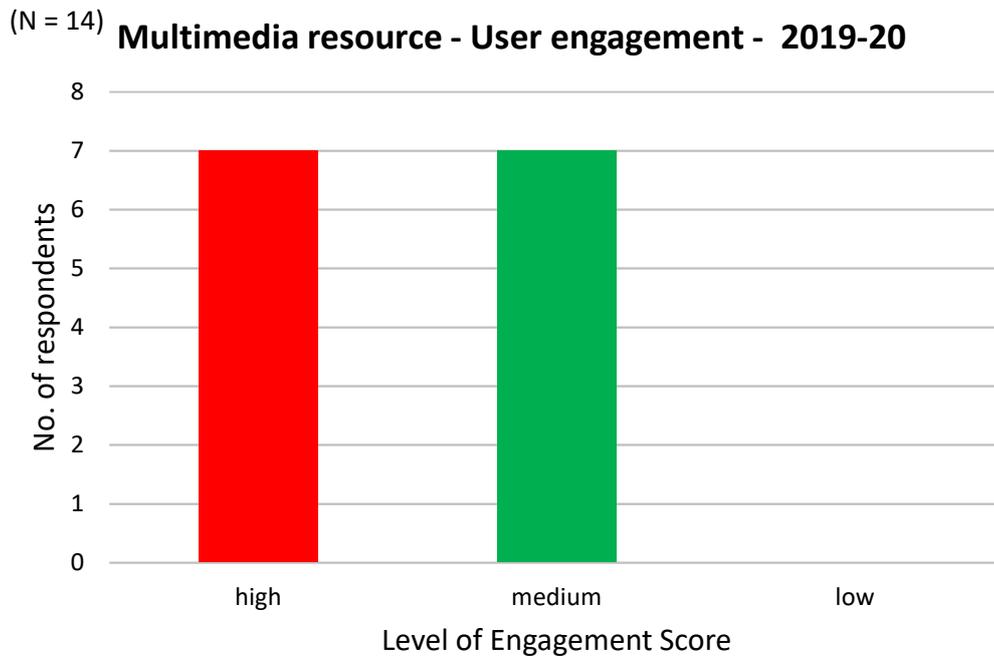


Figure 7.19 Level of engagement scores from 2019-20 post-implementation questionnaire data

Two respondents agreed that they felt frustrated when using the online resource with one elaborating to say that this was due to technical difficulties he encountered when first accessing the resource that were subsequently addressed by the lecturer. The other student elaborated that she found it difficult to follow the discussion forum, indicating that her frustration was linked with using the discussion forum, rather than the multimedia resource. One of the international students commented that she liked the graphics and images used in the resource as they helped her to gain knowledge quickly despite the challenges posed when learning through English.

Mean scores for questionnaire respondents' level of agreement with six statements taken from the *Intrinsic Motivation Instrument* (IMI) are displayed in Table 7.9. The questions were posed using a Likert scale from *Strongly Disagree* (1) to *Strongly Agree* (5).

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Table 7.9 Mean motivation scores by question item, 2019-20 post-implementation survey data

	M (N=14)	SD
Interest/Enjoyment		
Using this resource was quite enjoyable.	3.93	0.73
Using this resource was a boring activity (reverse-scored).	3.64	0.63
This resource was fun to use.	3.57	0.51
Pressure/Tension		
I was anxious while using the resource (reverse-scored).	3.86	0.77
Value/Usefulness		
This resource helped to improve my knowledge of bank reconciliation / ratios.	4.14	0.86
This resource is useful for revision of a topic before the final exam.	4.21	0.80

A mean score for all six question items was calculated for each individual student and classified as low (1 – 2.33), medium (2.34 – 3.66) or high (3.67 – 5), results of which are displayed in Figure 7.20. Similar to cycle two, the majority of respondents (71%) viewing the resource displayed high motivation scores and no respondent exhibited a low score. Only one student agreed that using the resource was a boring activity. He was an advanced learner who had studied leaving certificate accounting at higher level; therefore his response may be due to the fact that he was encountering basic knowledge on a topic in which he already felt competent.

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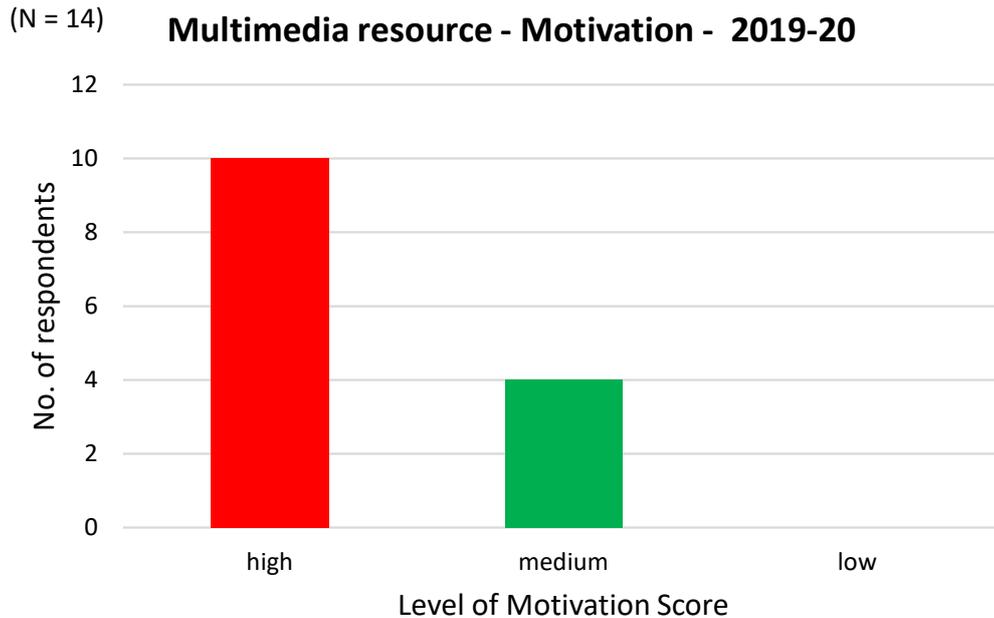


Figure 7.20 *Level of motivation scores from 2019-20 post-implementation questionnaire data*

Students expressed their enjoyment of the multimedia resource, f2f class activities and the BL process overall with many references to how these enjoyable learning experiences helped to advance their understanding, making topics “more engaging and easier to learn” (2019-20 Student 14, survey response):

I actually really enjoyed it [multimedia resource] as it helped to better understand the course. (2019-20 Student 8, semester 1 student log)

I enjoy the class activities in order to learn. It's more hands on, and I love the double classes in computer rooms when the lecturer takes over our screens to explain topics. (2019-20 Student 15, semester 2 student log)

I liked the blended learning process it was different to how I would have learned in the past but it was enjoyable and easy to follow. (2019-20 Student 7, semester 1 student log)

Even the group work we had in class when we first started ratios and you put us into groups ... yeah that was fun. (2019-20 Student 8, group interview)

There was evidence also that the variety of learning activities available to students within the BL design aided students’ understanding of financial accounting:

I really enjoyed completing this assignment as the different use of learning methods helped me to get a real understanding of this topic. In class I really enjoyed using the clickers as it was a fun way to learn and it was good for revision. (2019-20 Student 12, assessment task reflection)

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7.5.4.2 Engagement with online quizzes

Data obtained from Moodle activity logs demonstrating student engagement with online assessment quizzes throughout the financial accounting modules are presented in Table 7.10.

Table 7.10 Online assessment quiz participation, 2019-20, Moodle activity logs

	Quiz 1 Oct 2019 (semester 1) N = 16	Quiz 2 Nov 2019 (semester 1) N = 16	Quiz 3 Jan 2020 (semester 2) N = 15
No. of students who submitted the quiz	16	16	13
Total number of attempts	30	35	23
No. of reviews following completion	6	15	4
No. of students who reviewed the quiz prior to end-of-semester exam	1	1	0
Mean mark achieved	83%	54%	90%
Quiz open	12 – 17 Oct 2019	20 – 29 Nov 2019	24 – 27 Jan 29 Jan – 1 Feb 2020

Students demonstrated high levels of engagement with the online assessment quizzes overall, with just two students failing to attempt the second semester ratio analysis quiz.

The number of students reviewing their quiz attempts were lower than cycle two; however Moodle activity logs indicated that two students did review the quizzes in advance of the end-of-semester exams. While Moodle activity logs indicated a low number of reviews in between attempts on Quiz 1 and Quiz 3, both of which have a 5% marks weighting, the researcher is aware that students are likely to have reviewed their written workings on their first attempt before making another attempt. Therefore, the level of student effort in between attempts may not be captured as the activity logs only reflect online usage. In addition, 73% of students revealed that they used the online quizzes as a revision aid before the final exam, suggesting that

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some students used printed or saved versions of the quiz for offline revision purposes.

Figure 7.21 illustrates that the majority of questionnaire respondents (86%) agreed that they studied more to increase their score on their second quiz attempt; however, one student disagreed. Perhaps this was due to the fact that he was an advanced learner in the subject.

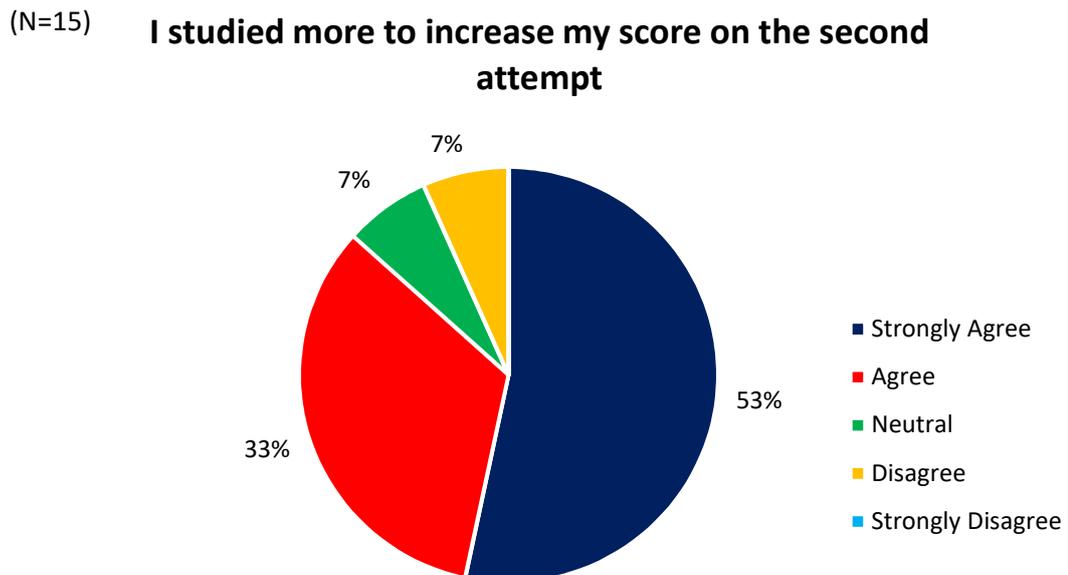


Figure 7.21 Study effort for online quizzes, 2019-20 questionnaire data

Students referred to the effort made in between attempts to improve their grade:

I attempted the quiz twice, and I found I did good on it. I studied the questions I got wrong from my first attempt so that I would be able to find my errors and not get them wrong again. I really like the online quizzes as you can do them in your spare time. (2019-20 Student 7, semester 2 student log)

I attempted the quiz twice. My second attempt was worse than the first for some reason even though I studied in the intervening time. I like this kind of assessment as I get my results right away. (2019-20 Student 5, semester 2 student log)

I really enjoyed the online quizzes as you could always look back on the previous attempts and learn from your mistakes to help you get them correct in the next one, I found this really beneficial as personally I learn best from doing questions and getting them wrong and seeing where I went wrong so as not to make the same mistake again. (2019-20 Student 7, assessment task reflection)

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One student acknowledged that she did not study in between quiz attempts during the first online assessment quiz but did review her first attempt before taking her second one.

I did watch the multi-media resource before I attempted the quiz and didn't do any study in between my attempts, I reviewed the questions I got wrong to see where I went wrong. (2019-20 Student 6, semester 1 student log)

No enforced time delay was implemented during the first quiz, so the majority of students made both attempts on the same day. As a result, the lecturer ensured that a time delay was implemented in second semester on the ratio quiz to encourage students to study in between attempts and scheduled students' second attempt after their f2f class on the ratio topic. While Moodle activity logs did not indicate an increased level of access to review quiz attempts in semester 2, the lecturer is aware that students are likely to have accessed handwritten notes or saved versions offline. The desire for an enforced time delay in between first and second quiz attempts was affirmed in the group interview, with one student remarking:

I thought the second time, the day in between was good as well. Like for myself as opposed to going 'oh I got that wrong' and then just looking up the one question that you got wrong and then just going back in straight away. It gave you time to think about it as opposed to just going in and doing it again. (2019-20 Student 2, group interview)

A number of students referred to the learning benefits of being able to see where you went wrong and take a second attempt at the quiz. One student expressed a desire for more detailed solutions to quiz questions:

I thought it was a good method of assessment [online quiz] as you get a second chance if you mess up the first time. I also liked how after the first attempt it shows you the answers so you can see what you got wrong and can go away and work on that before you take the second attempt. I think the only way it could be improved was if, after you complete an attempt, that it would show the question worked out as well as the answer to the question, that way it would be easier to see where you went wrong. (2019-20 Student 14, semester 1 student log)

This was deliberated during the group interview also; however, a number of students felt that it was beneficial to have to work out each question after the quiz and figure out where they went wrong by "learning from mistakes" (2019-20, Student 5):

You'll remember the method more if you have to work it out yourself. (2019-20 Student 7, group interview)

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A couple of students expressed a desire for more online quizzes as part of the BL design, with one student elaborating during the group interview on the usefulness of providing quizzes on all topics for formative assessment purposes allowing a student “to see where you are” on a particular topic [2019-20 Student 7, group interview]. This confirmed for the researcher the value of online assessment quizzes in fostering learner autonomy by providing students with opportunities to engage in self-directed learning.

7.5.4.3 Time invested in online activities

Frequency of access patterns to the internet and Moodle were similar to previous cycles, with students accessing the internet more frequently than Moodle.

Two questions on the post-implementation survey asked students in relation to the time they spent viewing the online ratio analysis multimedia resource and attempting and studying for one online quiz. Responses are shown in Figure 7.22. Three students had not used the multimedia resource (confirmed against Moodle usage logs); however one of these was the BALAW1 student who had not studied on the Financial Accounting 1B module. Another student was an advanced learner who had studied LC Accounting at higher level and had a good knowledge on the ratio formulae covered by the resource. The third student was an international student who was repeating the module and displayed a reduced level of engagement overall with the module relative to other students on the programme. View time was between one and three hours for the multimedia resource and time invested in the online assessment quiz ranged from one to four hours, with a total mean time invested in both activities of four hours per respondent.

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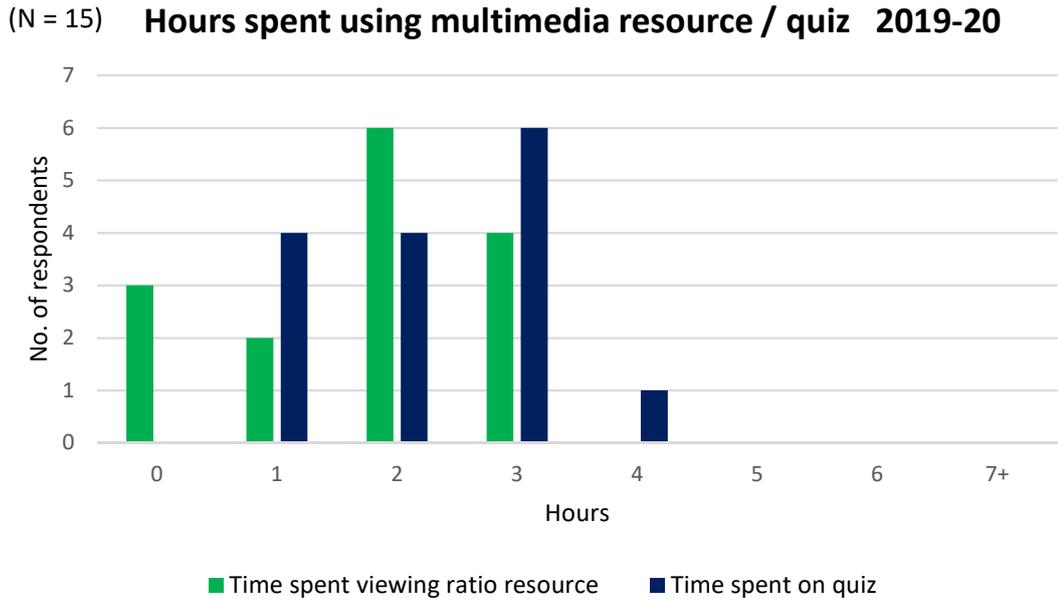


Figure 7.22 Hours spent using multimedia resource and quiz, 2019-20 questionnaire data

7.5.4.4 Engagement in face-to-face class activities

As Figure 7.23 depicts, 73% of students agreed that BL encouraged them to engage in learning activities and participate in class activities, with only one student expressing disagreement with each statement. One of the students who expressed disagreement that BL encouraged engagement in learning activities had mixed feelings overall towards learning in a blended format.

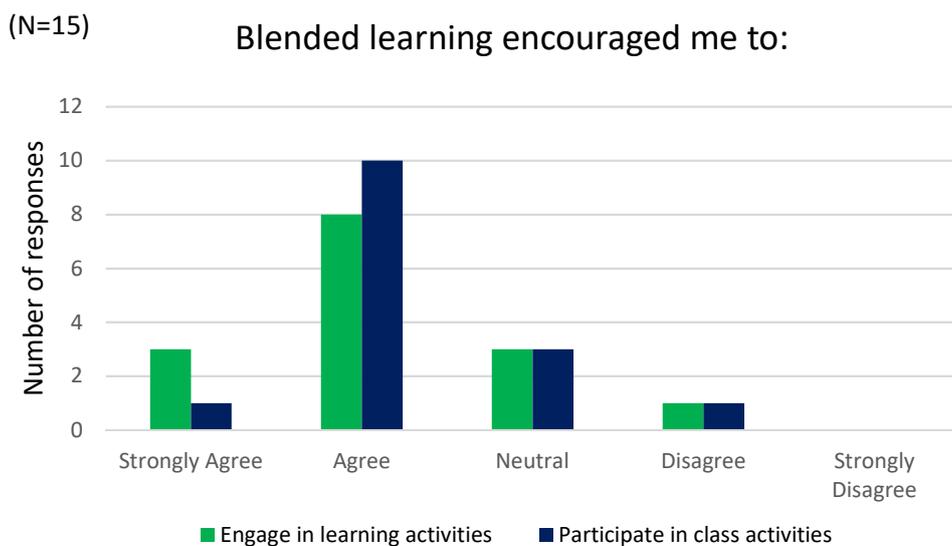


Figure 7.23 Survey response regarding participation in f2f class activities, 2019-20

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Students were highly positive in relation to participation and productivity in class with 80% of respondents disagreeing with the statement that BL decreased their productivity in class; furthermore, no student agreed with the statement. In addition, a strong sentiment that the BL model was a more ‘active’ type of learning was expressed during the group interview. During the interview students articulated how the variety of learning activities kept them engaged and interested in the financial accounting modules, with one student appreciating the modern approach taken:

I think you modernised it like. It made you more interested in financial [accounting] than any other modules because it’s just, you can do this online too. (2019-20 Student 8, group interview)

Another student emphasised the discussion forum as a contemporary form of out-of-class communication familiar to herself and her peers:

I really think posting in the forum is a good idea, particularly for people our age, we are more likely to text someone than walk up to them and ask a question, so posting in the forum is something similar, you can put your thoughts out there and get feedback. (2019-20 Student 14, semester 2 student log)

While 60% of respondents disagreed that BL may encourage them to skip classes, however three students did agree with the statement, all of whom had studied LC accounting at higher level. During the group interview, one of the students who expressed agreement acknowledged the flexibility of the online learning resources in allowing him to miss a class and instead view resources at home in his own time. Nonetheless, the lecturer observed that attendance levels at f2f classes remained high throughout the course, which may be partially attributable to Whats App reminder messages sent via the class rep (Kelly, 2020), as alluded to during the group interview:

I really like the way that Student X is the class rep and you might text him something and he just forwards it to the group chat, it’s just you know, you might say it’s an important class and people are just like ‘oh I was thinking about skipping it’ and then you’re just like ‘ah I have to go in now!’ (2019-20 Student 8, group interview)

Following successful use of clicker technology in cycle two, this tool was used again in cycle three with the use of one clicker per student pair, as opposed to individual clicker use. A high level of student satisfaction is evident from responses to three question items which related to student enjoyment and participation during clicker technology use, as Figure 7.24 illustrates.

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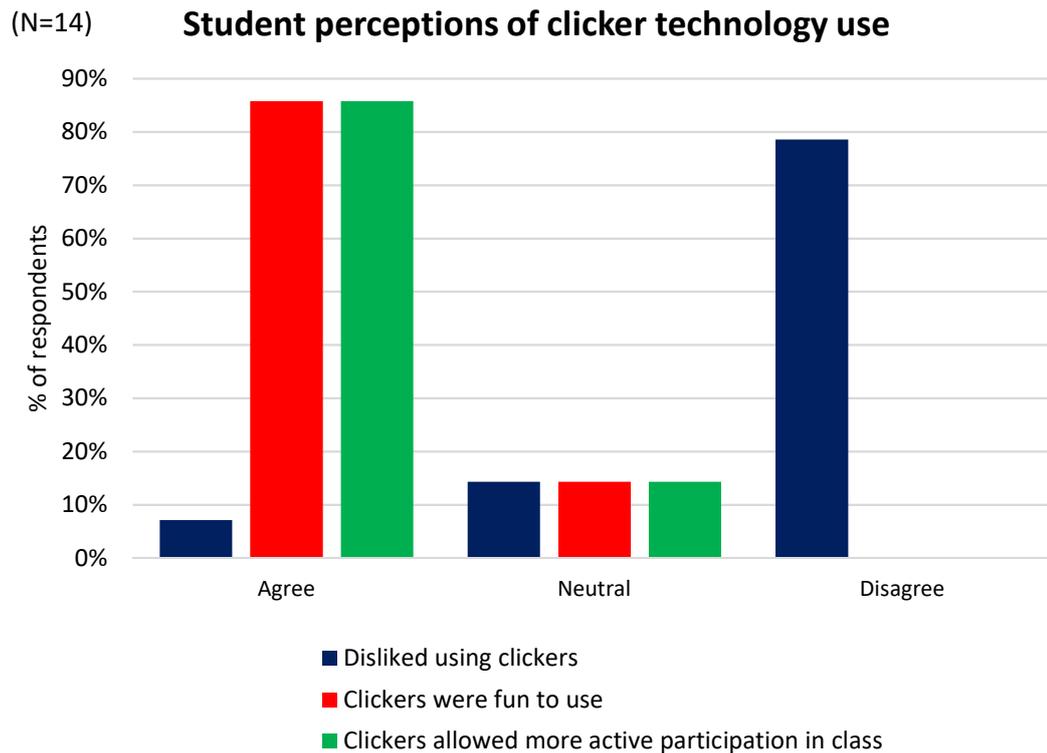


Figure 7.24 Perceptions among students of clicker technology use, 2019-20 questionnaire data

In line with cycle two findings, 86% of respondents agreed that the clickers allowed them to take part more actively in the class. The lecturer had noted an increased level of participation and discussion among students during the class, due to the allocation of one clicker per student pair forcing students to discuss answers before they submitted them (Kelly, 2020). Only one student admitted that he disliked using clickers, despite agreeing that they were fun to use, that they increased his understanding of ratio analysis and made the teaching of ratio analysis more effective.

Feedback in student logs and during the group interview in relation to using clicker technology was wholly positive with students revealing their sense of enjoyment during the activity:

I enjoyed using the clickers because it was something different that I have never used before. (2019-20 Student 6, semester 2 student log)

They [clickers] weren't much effort, so it's easy ... it wasn't boring at all, so it's not hard to engage with. (2019-20 Student 15, group interview)

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Allocation of one clicker between a pair of students in cycle three increased discussion among students, allowing them to actively participate throughout the entire class. This was confirmed by student feedback:

I preferred the interactive class activity where there was a clicker between two people. It helped us think about the answers together which helps us learn the topic. The time we got together as a group of four I felt there was less interaction between us. (2019-20 Student 13, semester 2 student log)

There was also an ease of use associated with pair work tasks to promote peer interaction, where students could automatically work with peers seated close by without a need for elaborate seating re-arrangements (Kelly, 2020). However, one student who had expressed a strong preference for working alone in the pre-implementation survey failed to recognise any benefits from engaging in the clicker quiz as part of a group:

As always, I would prefer working alone. And the clickers during class is like having an online quiz together with a group, I think there is nothing different with doing the online quiz alone. (2019-20 Student 16, semester 2 student log)

Nonetheless, group interview participants recommended a wider application of clickers, proposing their utilisation within group exercises early in the term to allow students to become acquainted. The lecturer observed a sense of enjoyment among students during the clicker class with more ‘active’ discussion and participation taking place and evidence of greater ‘knowledge-building’ among students rather than ‘knowledge-transmission’ from the lecturer. This student elaborates on the active discussion that took place during pair work using clickers due to the fact that some questions on the clicker quiz had more than one correct answer:

I did not like how there could be more than one answer as I found it confusing then to have to pick which answer we should submit and thought it added a touch of discontent to my partnership that both answers were equally right but still different and prompted the disagreement over which answer was more correct. I thought it was a good revision method and made me feel much more confident about the subject and I would like to do it again because it was fun but also effective. (2019-20 Student 5, assessment task reflection)

The researcher believes that the ‘disagreement’ over answers shows evidence of students having to think critically about the learning content and justify their choice of answer, which she considers a desirable outcome, despite the ‘touch of discontent’ that the student pair encountered. Another student who exhibited high OCA alluded

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to the fact that the clicker pair-work activity allowed her to participate in class within a safe environment due to being able to contribute anonymously:

I thought the classroom activity was good, for the usual team bonding reasons, what I did like was using the clickers as it is pretty much anonymous so if you pick an answer and it isn't right you don't have to be embarrassed about it as no one knows it was you, and also the fact that you do it in groups means you're not the only one to blame. (2019-20 Student 14, semester 2 student log)

It was apparent that the design change towards use of a clicker per student pair rather than per individual contributed to a more participatory learning experience for students. In addition, software testing within the room in advance of the class session ensured that the class ran smoothly without unnecessary delays, thereby positively impacting on student perceptions (Kelly, 2020).

7.5.4.5 Student satisfaction with BL design

Figure 7.25 illustrates students' responses when surveyed on what they liked most about BL. Respondents referred to online quizzes and videos along with the potential of BL to advance their learning and understanding. Similar to cycle two, respondents valued the flexibility of BL in allowing them to work in their own time and at in their own pace along with its usability features. One international student indicated that she liked all elements of the BL design and a number of students expressed more than one 'like'.

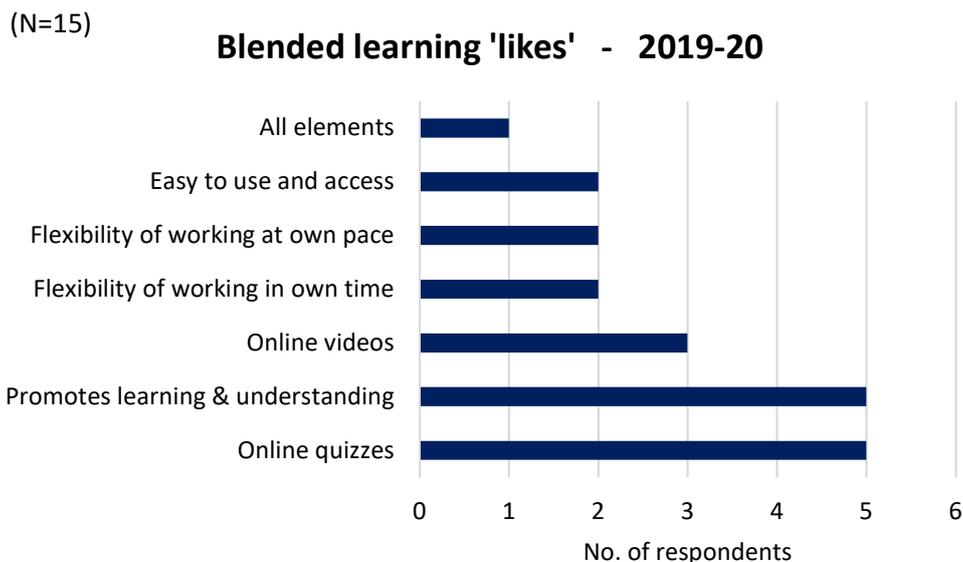


Figure 7.25 What students liked about blended learning, 2019-20 questionnaire data

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Another question item asked students what they liked least about the BL process, results of which are displayed in Figure 7.26. As in cycle two, the majority of respondents (73%) revealed that they did not dislike anything about the BL design. One student who disliked the multimedia resource, elaborated that “it was still effective though” (2019-20 Student 15) while two students struggled a little when taking responsibility for their own learning with one revealing that he sometimes forgot to complete learning tasks. As already contended, this can be a challenge for students when transitioning from a teacher-dependent pedagogical approach to a learner-centred environment, with some feeling a level of discomfort due to “the increased degree of freedom they experience” (Hoffman and Ritchie, 1997, p. 100).

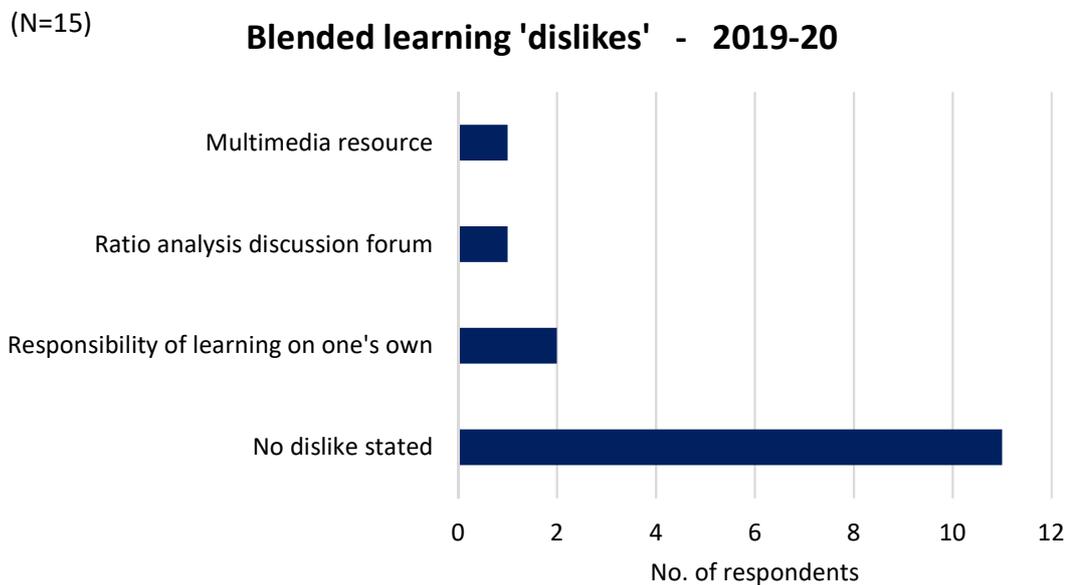


Figure 7.26 What students liked least about blended learning, 2019-20 questionnaire data

When asked what changes they would recommend to the design, students made very few suggestions. Leaving the design as it is, was recommended by 67% of survey respondents, while 20% of respondents advocated use of more quizzes and videos. A general sense of satisfaction with the current BL design was manifest within students' responses, evidence that changes effected throughout the three cycles had acted to optimise the design.

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7.5.5 Interaction

7.5.5.1 Interaction with content

Cycle three usage statistics pertaining to the two multimedia resources used throughout the BL design are displayed in Table 7.11.

Table 7.11 Online multimedia resource usage, 2019-20 Moodle activity logs

	Bank Reconciliation multimedia resource (semester 1, N=16)	Ratio Analysis multimedia resource (semester 2, N=15)
Number of students who accessed resource	13	12
Number of hits/views	31	17
Average views per student	2.4	1.4
No. of students who accessed resource prior to end-of-semester exam	2	1
Viewing period	10 Oct – 14 Dec 2019	12 Jan – 14 Apr 2020
End-of-semester exam date	14 December 2019	20 April 2020

Overall, of the 16 students who enrolled on the financial accounting modules, 14 of them viewed at least one of the multimedia resources (88%) and three students used one of the resources for revision purposes before the end-of-semester exam. Two students chose not to view any of the multimedia resources. Both of these students displayed a reduced level of engagement in the course, with one of them failing to submit continuous assessment assignments in both semesters, despite receiving encouragement from the lecturer. Similar to the previous cycle, 71% of questionnaire respondents who viewed the multimedia resources acknowledged that they took notes while doing so.

Worked example videos were provided for each blended topic in a similar fashion to cycle two, with one worked example video supplied for the bank reconciliation topic and the ratio analysis worked example being illustrated over three separate videos. A summary of student usage is presented in Table 7.12.

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Table 7.12 Worked example video usage, 2019-20 Moodle activity logs

	Bank Rec Worked example video (semester 1, N=16)	Ratios Worked example videos (semester 2, N=15)
Number of students who accessed worked example videos	10	4
Number of hits/views	17	12
Average views per student	1.7	3
No. of students who accessed videos prior to end-of-semester exam	2	2
Viewing period	10 Oct 2019 – 13 Apr 2020	14 Jan – 5 Apr 2020
End-of-semester exam date	14 December 2019	20 April 2020

While only a small number of students used the ratio analysis worked example videos, three of those users had no prior accounting experience, two of whom accessed the videos at the end of the semester in advance of their exam. Similar to cycle two, this shows evidence of the videos being used on an ‘as required’ basis by novice students or those who need extra assistance with the topic. Nonetheless, 12 of the study participants (75%) had viewed at least one of the worked example videos. It was evident from survey responses that some students with previous accounting knowledge did not feel the need to access these additional resources. Albeit, worked example videos proved valuable for students with no prior accounting knowledge, with novice learners asserting:

I did not learn the ratio topic before so the resource is quite useful for a new learner. (2019-20 Student 16, survey response)

I also viewed the extra online worked example videos. ... It's like having a tutorial with your lecturer at home, which is a great idea and so I thought it was helpful and convenient. (2019-20 Student 15, semester 2 student log)

One novice learner indicated within his student log that he found the bank reconciliation worked example video “hard to follow” (2019-20 Student 1, student log). However, this student had a poor attendance record which may have impaired his knowledge level in the subject.

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A number of students also commented positively on the clarity and ease of use of the worked examples. Group interview participants stressed the benefit of having online resources to interact with it:

I think that the best part of it [blended learning] is that you're interacting with it, you know you're interacting with questions and stuff. (2019-20 Student 14, group interview)

Interestingly, two students accessed the bank reconciliation worked example videos after the end-of-semester exam, evidence that online resources provide students with an opportunity to access learning material for future learning needs outside of the module. In addition, at the end of the third iteration the lecturer received correspondence from a cycle two participant to regain access to the online resources available on the financial accounting Moodle pages in order to refresh her accounting knowledge before she embarks on an advanced financial accounting module in the coming academic year. This provides further evidence of the re-usability of online content for students' future learning needs.

(N=14) **After using multimedia resource, felt there was no need to attend class**

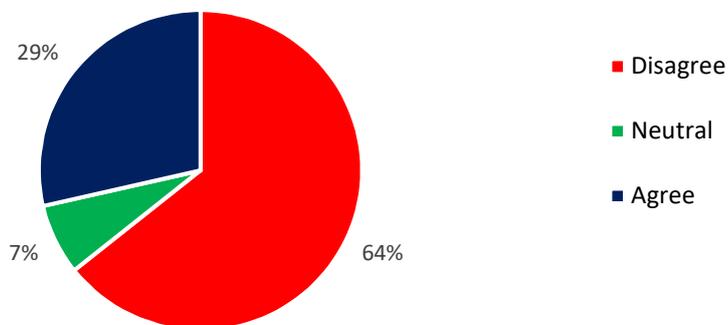


Figure 7.27 Student perceptions of necessity to attend class following multimedia resource use, 2019-20 questionnaire data

While 64% of questionnaire respondents disagreed that there was no need to attend class after viewing the multimedia resource, four students (29%) did express agreement (see Figure 7.27). Three of those who agreed had completed higher level LC Accounting, which would explain a reduced reliance on f2f classes by these students. However, one student who agreed that there was no need to attend class was a novice learner who had a good attendance record in the module.

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The lecturer provided ample questions to students within their question manual along with solutions uploaded to Moodle, and encouraged students to attempt extra questions for supplemental practice (Kelly, 2020). During the group interview, one student stressed the importance for students of practising questions outside of class to advance learning. As in previous cycles, feedback regarding immediate access to question solutions on Moodle was resoundingly positive:

I use these for self correction and to give myself a bit more time to go over it if I'm unsure. (2019-20 Student 5, survey response)

I found around the exams it was good if you were just practising questions to have the answer because some lecturers don't put the answer, they give you questions to do but they don't give you an answer. (2019-20 Student 14, group interview)

7.5.5.2 Interaction with the instructor

When surveyed on their interactions with the lecturer, 80% of survey respondents agreed that BL led to better interaction between lecturer and students and that there were good communication channels with the lecturer (see Figure 7.28). One student who disagreed with both statements regarding good communication channels with the lecturer and more access to the lecturer outside of class indicated that he had a preference for f2f teaching as he felt less motivated when learning at home, so this may have influenced his responses to these question items.

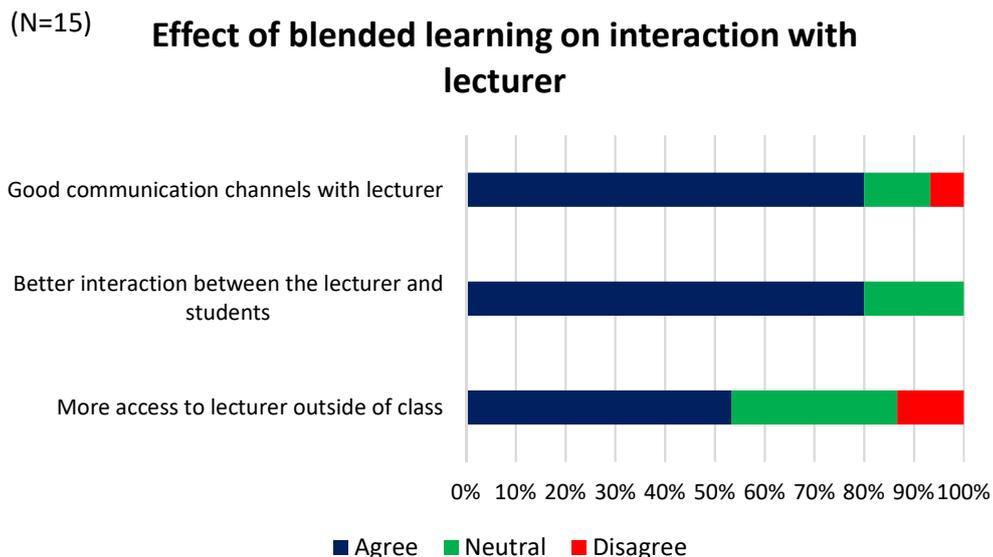


Figure 7.28 Student perceptions of BL effect on interaction with lecturer, 2019-20 questionnaire data

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When asked if BL provided less opportunities to interact with the lecturer, 40% of respondents disagreed; however many students remained neutral, as displayed in Figure 7.29.

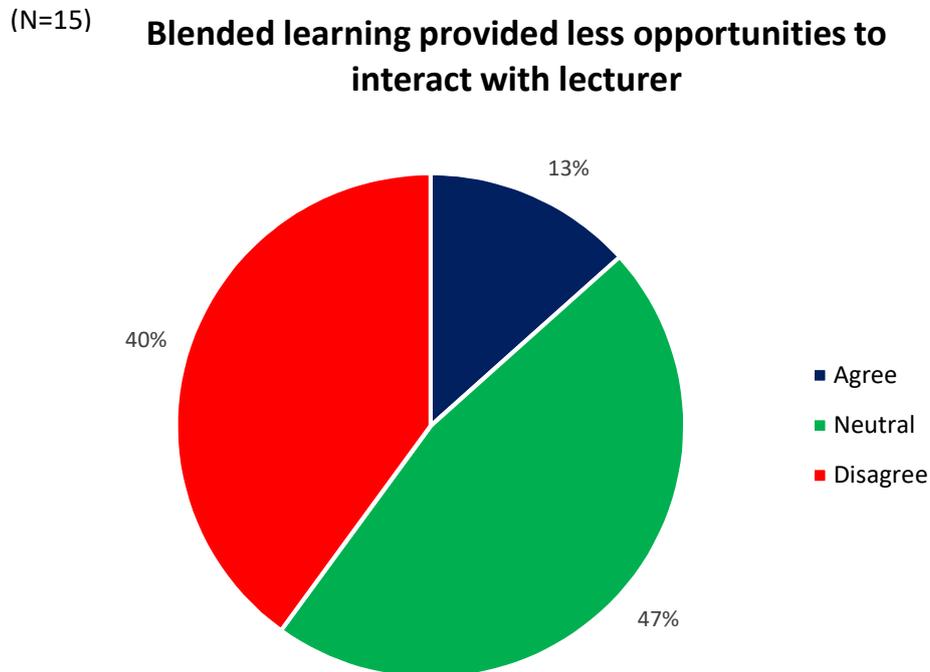


Figure 7.29 *Blended learning effect on opportunities to interact with lecturer, 2019-20 questionnaire data*

Students who remained neutral on survey questions relating to interaction with the lecturer commented:

I feel Orlaith interacts with us perfectly well outside of blended learning and this has not changed. (2019-20 Student 5, survey response)

I think it still remains the same no matter in the class or with the blended learning method. (2019-20 Student 16, survey response)

This may indicate that the large neutral response may have been a result of students comparing teaching during BL topics to those taught in a traditional format and felt that their interactions with the lecturer in terms of her availability remained the same throughout the academic year, regardless of the topic or learning approach. One of the students quoted above clarified her opinion within the group interview:

I think we had more [interaction with the lecturer] because of the answer and response kind of thing in the forum and if we had a question about the forum we could just talk

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to you whereas some lecturers, ‘class time only!’ (2019-20 Student 5, group interview)

Students spoke positively in relation to lecturer availability in survey responses and during the group interview:

If I am struggling I can easily contact Orlaith and would have no reservations about doing so if I felt the need. (2019-20 Student 5, survey response)

They appreciated being able to receive a prompt reply from the lecturer whenever they had a query, and also emphasised the convenience of the reminder messages sent to the group via the class rep, which provided clarity regarding learning and assessment tasks:

It’s just a lot cleaner having it in a text: ‘this is what we’re doing, this is when we’re doing it’ and everybody has it then and you’re not relying on ‘oh is this one in that group chat?’ and ‘I haven’t seen her, how will we tell her?’ (2019-20 Student 5, group interview)

While 64% of questionnaire respondents disagreed with the statement that they disliked not being able to ask questions while viewing the multimedia resource, three students (21%) agreed, as displayed in Figure 7.30.

(N=14) **Disliked not being able to ask questions while viewing multimedia resource**

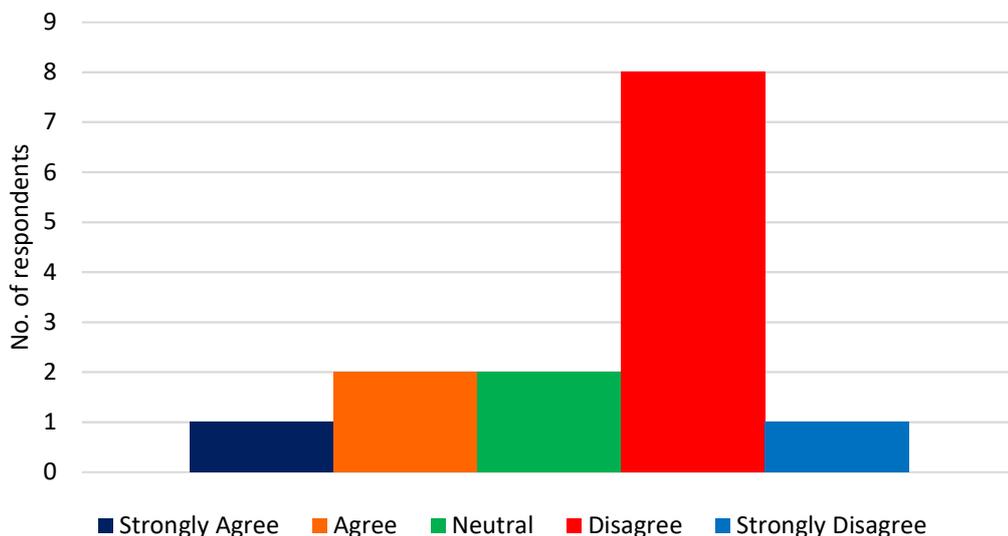


Figure 7.30 Student feelings on inability to ask questions, 2019-20 questionnaire data

One of the students who agreed was an international student who also indicated within another survey response that she would have liked more f2f hours so that she

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could ask the lecturer questions on any areas that she did not understand. Yet, many students valued the opportunities offered by BL to learn independently while also having easy access to the lecturer:

The blended learning gives you a unique opportunity to learn on your own but it still feels like you're interacting with the lecturer. (2019-20 Student 7, survey response)

You have the opportunity to learn on your own time but yet still had the opportunity to ask questions in class. Also by having class you still had deadlines to meet so you still had to learn the subject in a timely manner. (2019-20 Student 2, survey response)

Furthermore, when asked an open-ended question on what they liked least about the BL process, the inability to ask questions was not mentioned as a dislike by any of the respondents. As evidenced in cycle two, the researcher believes that the introductory f2f class on each blended topic coupled with the orientation towards online resource usage provided in the computer lab setting alleviated the need for the majority of students to ask questions.

Group interview participants articulated how lecturers can promote student interaction within class by taking a personalised and caring approach towards students, while one student affirmed the role the financial accounting lecturer played in creating a positive classroom climate in a survey response:

I just thought it was quite clear that the lecturer put in a lot of effort and actually cares about our educational goals being met which I think really makes you want to work harder. It's kind of like, the atmosphere is better in this module than in others, in other modules, it is quite lethargic because the lecturers don't seem to put in as much effort. So, yes the blended learning process is great because it provides the students more to work on rather than just face to face classes. (2019-20 Student 15, survey response)

This confirms the importance of positive student-lecturer relationships along with the role played by the lecturer in fostering student motivation and engagement.

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7.5.5.3 Interaction among peers

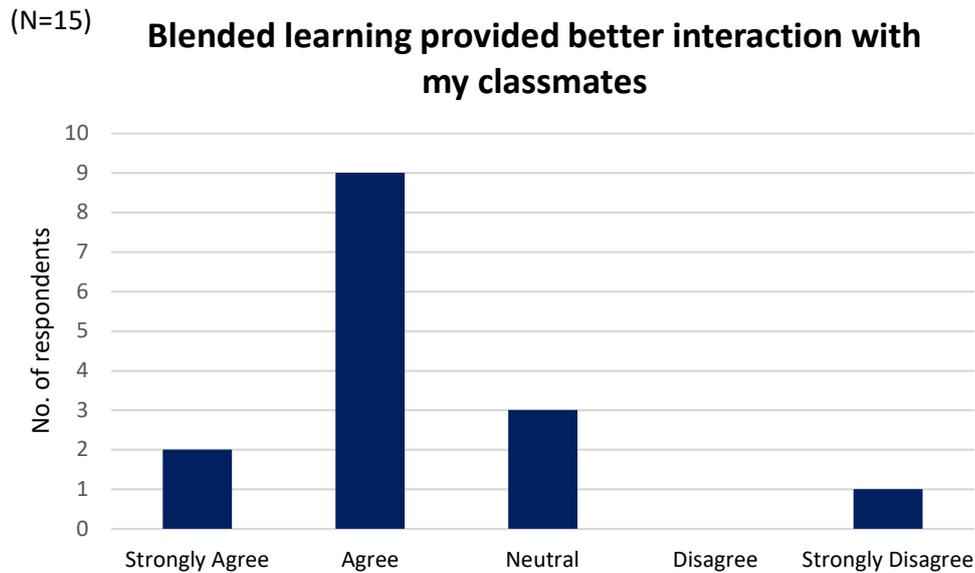


Figure 7.31 Effect of blended learning on interaction with classmates, 2019-20 questionnaire data

A large majority of respondents agreed that BL provided better interaction with classmates (73%), as evident from Figure 7.31. This had increased in cycle two following the f2f collaborative activities provided in that cycle, and has showed a further increase in cycle three, which may be due to the added emphasis the lecturer placed on collaborative tasks early in the programme. Only one student disagreed, commenting that she did not feel that BL had affected interaction between classmates.

Many students commented within their learning logs on the benefits of group work in fostering understanding as well as getting to know one another:

The classroom activity was excellent for helping me understand bank reconciliation statements. I really enjoyed working with fellow course mates. It made me get to know them better and in turn helped me to get a clearer understanding of the subject. (2019-20 Student 12, semester 1 student log)

Having a group to help do the assignment question in class was also very beneficial as you can discuss your answers with other people and you're not sitting there wondering if you got something wrong and ultimately doubting your own answers. (2019-20 Student 14, semester 1 student log)

It was good to do this group-work as you interact with some students you may not normally interact with and it definitely helps them to get to know you and vice versa. I would recommend the group work as it helps you to learn in a fun and friendly environment. (2019-20 Student 7, semester 2 student log)

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For the bank reconciliation assignment group task, the lecturer endeavoured to ensure that students were placed within groups with at least one person with whom they were acquainted (the lecturer was able to establish this due to the small class size). However, one student who was late commencing on the programme noted that:

The class activity was helpful for learning how to do the questions as I could ask other people how to do the question. I think it would been more beneficial for learning to put us next to people we already know as we would feel more comfortable asking them questions rather than asking a somebody you don't know well lots of questions about how they did the question. I would have preferred to sit next to people I already knew well. Although I did get to know them better as I didn't talk to them much before that. I would prefer to work alone as it usually helps me concentrate on my work. (2019-20 Student 10, semester 1 student log)

This student had expressed a preference for usually working alone in the pre-implementation survey. However, it was clear from his remarks that he did obtain a benefit from the exercise in terms of getting to know others within the class.

Interestingly, when a cross-tab is performed comparing respondents' teamwork preferences and their stated level of enjoyment of f2f group activities, it is evident that some students who stated preferences for working alone identified that they enjoyed f2f group activities (see Figure 7.32).

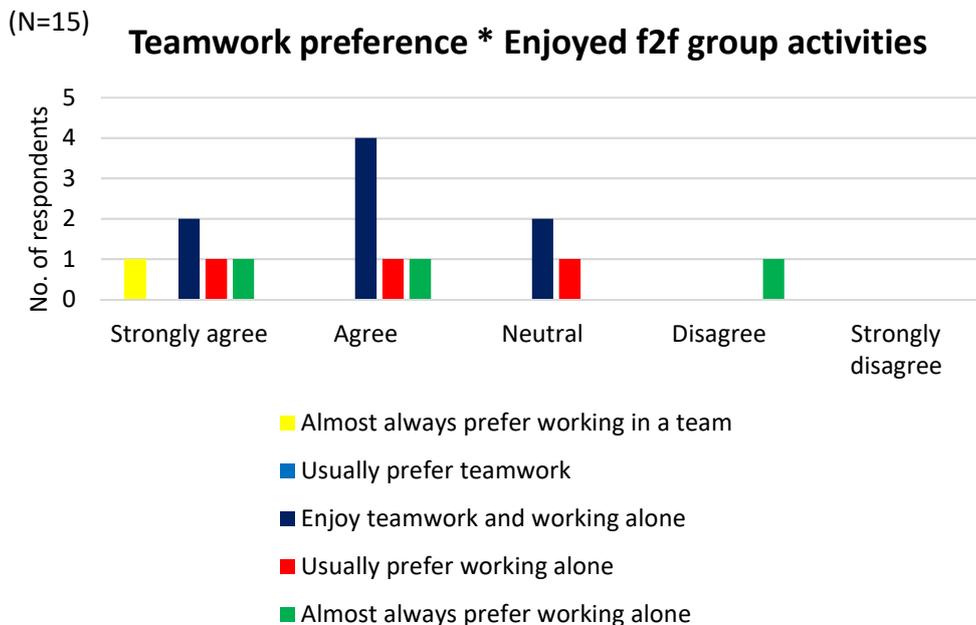


Figure 7.32 Cross-tabulation of teamwork preference with students' expressed enjoyment of f2f group activities, 2019-20 questionnaire data

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This evidence is similar to that obtained in cycle two, that even students who have a preference for working alone seem to enjoy the opportunity to work in groups during f2f classes. One student who stated a strong preference for working alone in the pre-implementation survey agreed that she enjoyed the group work activities. Despite displaying mixed feelings towards group work in her student log, she acknowledged the role of group work in effecting peer learning:

I already was confident in the topic before the group activity so I don't feel it added to my understanding. I don't enjoy group work as a personal issue but I can objectively see the benefits as I explained to others in my group how to do the work. (2019-20 Student 5, semester 2 student log)

indicating that she favoured pair-work over group-work exercises:

I enjoyed the clicker activity and think it benefited from a partner situation rather than a group setting. (2019-20 Student 5, semester 2 student log)

Additionally, the lecturer noted a substantially increased level of peer interaction in the group relative to previous cycles, which is likely to have been influenced by the collaborative opportunities offered through the BL approach.

7.5.5.4 Learner-interface interactions

The bank reconciliation resource had been amended in advance of cycle three based on feedback in previous cycles relating to the quiz questions contained within the resource. Students made no reference to any desired changes to the multimedia resources during this cycle, indicative that changes made to these resources prior to the cycle were effective. Students were affirmative in relation to the ease-of-use features pertaining to the online resources:

The online resource is easy to use which is good as you then don't have to spend time trying to figure out how to use it. (2019-20 Student 2, semester 1 student log)

Online resources were made available using the AIT Moodle platform, with comments in relation to the Moodle page affirming that the straightforward layout and clearly labelled resources provided an easy-to-follow learner interface:

It was nice that it all broke down evenly. So say bank reconciliation, then the next box would be final accounts and the next box would be depreciation. It was just handy knowing where everything was. (2019-20 Student 7, group interview)

with one student asserting that this motivated him to work harder:

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I just thought everything was so clear-cut like. On the Moodle like everything had relevance like, do you know and it just made you want to work more like. (2019-20 Student 15, group interview)

During cycle two, the ratio analysis discussion forums were set up to contain an individual thread for each comment type. Despite this, one student related that she found it challenging to follow the sequence of comments within the forum:

The only thing that was a bit of a nuisance about the forum is that all the comments get jumbled up so it kinda disrupts your train of thought when you're jumping around from comment to comment. (2019-20 Student 14, semester 2 student log)

Ratio analysis, by its nature, involves the synthesis of diverse pieces of information in order to portray a picture of a company's performance. This may have led to difficulties for some students in processing and organising the various information points presented, associating these difficulties with the forum itself rather than the ratio analysis topic. Nonetheless, students within the group interview articulated that the division of the ratio analysis forum into threads assisted them in identifying the location of the information they required. Moreover, there was no further mention within student logs or survey responses of any difficulties encountered.

7.5.5.5 Vicarious interaction

Figure 7.33 illustrates students' responses when surveyed on their learning from using the ratio analysis discussion forum.

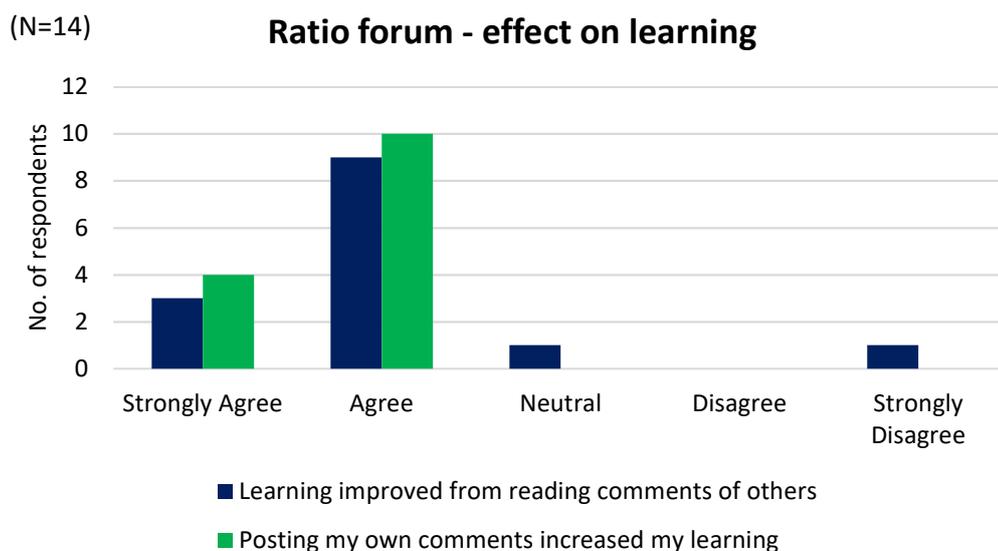


Figure 7.33 Effect of ratio analysis discussion forum comments on learning, 2019-20 questionnaire data

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All respondents agreed that they learned from posting their own comments on the forum. The lecturer had placed a stronger emphasis on ‘knowledge building’ on the forum during cycle three, which is likely to have contributed to the resounding positivity of students in relation to the forum and their learning. Furthermore 86% agreed that their learning improved from reading the comments of others on the forum. This was confirmed further within student logs:

I learned from making my own comments by doing the ratios and comparing both years together. I also learned from reading other peoples comments and seeing their views on the ratios. (2019-20 Student 6, semester 2 student log)

(N=15)

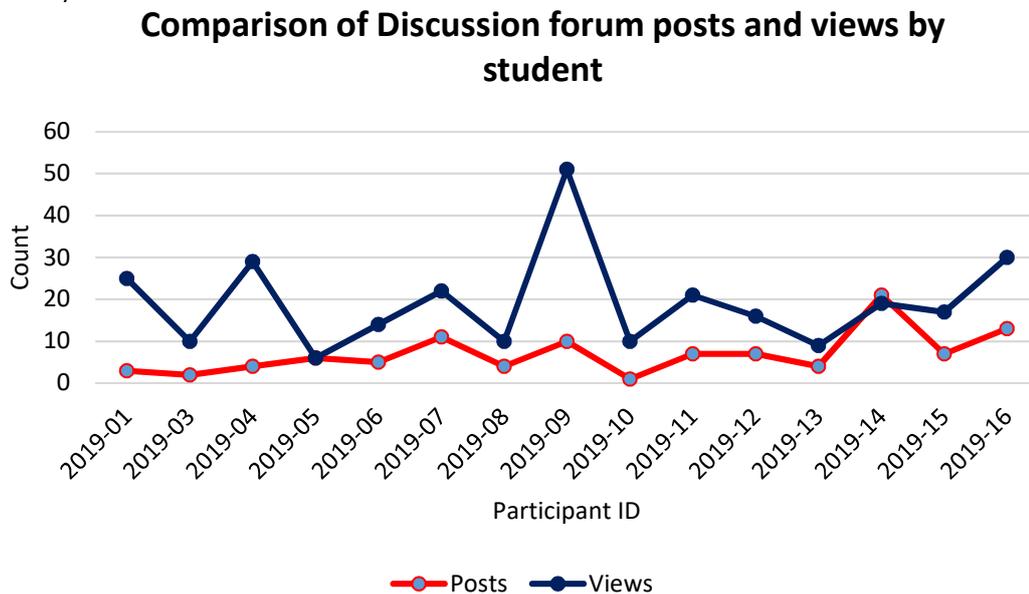


Figure 7.34 Students' ratio analysis discussion forum posting and viewing patterns, 2019-20

During cycle three, there were 105 student posts and 289 views by 15 students. A comparison of forum posting and viewing patterns by student is illustrated in Figure 7.34. The comparison reveals evidence of vicarious interaction; for example, one student who posted 10 comments had viewed the forum 50 times. As in the previous cycle, students viewed the forum more often than they posted; however, the average posting rate per student increased in cycle three to 7 times from 5.5 times in cycle two, while average viewing rate per student in cycle three was 19.2 times, slightly lower than that of cycle two. Furthermore, every student posted at least one comment during this cycle. This is likely to have been boosted by an even greater lecturer presence on the forum in cycle three, with an increase in lecturer posting in

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terms of weaving and summarising comments during the current iteration, along with an emphasis on knowledge building examples within class.

7.5.5.6 International students

While there was evidence of a language barrier across previous cycles, it was less evident during the third cycle. International students (students from abroad studying in Ireland) made little reference to any English language difficulties that they were having during this iteration. One international student made a brief reference to language difficulties in the group interview and the challenge it posed for her in narrative subjects like law. She expressed a preference for calculation-type exercises stating that “calculating is easier than theory” (2019-20 Student 4, group interview). While the lecturer noted that international students tended to sit together during group work activities when they were permitted to self-select their groups (Kelly, 2020), they were positive within their learning logs regarding the advantages offered by group work in allowing them to meet new people and improve their spoken English:

I really like this way [bank rec group activity] to help me to study better, I can get practice by myself and more opportunities to communicate with classmates. (2019-20 Student 3, semester 1 student log)

I think the group discussion is very useful, because I can learn about new students and make friends with them. ... In fact, I like the model very much, because it can make me know more new students and can practice my English. (2019-20 Student 4, semester 1 student log)

Another international student felt that she benefited by being able to offer help to others:

I am fine to work with others that I will feel great if I can help them with their homework. (2019-20 Student 16, semester 1 student log)

Cognisant of the challenges faced by international students during previous cycles, the lecturer spoke with international students early in the third cycle and checked in with them on a regular basis to identify any issues that they may be having, emphasising the importance of the English language classes which the college provides for them (Kelly, 2020). This may have helped to reduce issues around language during this final iteration.

7.5.6 Technology

The majority of students relied on laptops to access the online resources in cycle three, while seven questionnaire respondents (44%) viewed the resources on more than one device, as evident in Figure 7.35

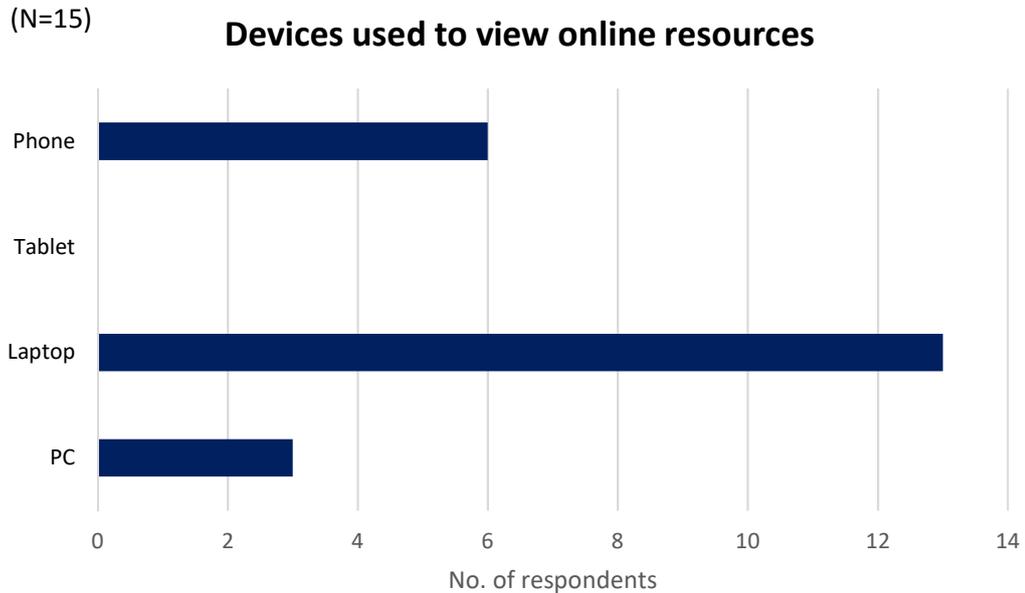


Figure 7.35 Devices used to access multimedia resources, 2019-20 questionnaire data

All students, except for one, indicated they had access to a PC or laptop at home or in their accommodation on a daily basis. There was an increase in the number of students using their phones with 40% stating they used their mobile phones to access the online resources in cycle three. This is likely due to the fact that multimedia resources were re-published for mobile viewing at the commencement of this cycle. Students reacted positively to being able to view the multimedia resources using their mobile phones:

It's just handier than having to take out the laptop. (2019-20 Student 7, group interview)

I like how easy it is to access as it can be accessed on my phone as well as any laptop. (2019-20 Student 10, semester 2 student log)

I liked that I could go over it as much as I wanted and could access it conveniently on my phone. (2019-20 Student 5, semester 2 student log)

While the majority of respondents (60%) disagreed that they would have liked access to technical support during the BL process, Figure 7.36 illustrates that two survey

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respondents (13%) agreed with the statement. These students had also agreed that they had difficulties accessing the online resources. However, they did not elaborate on these issues or make contact with the lecturer in relation to them. As discussed earlier, the sample quiz provided to students in advance of sitting their online assessment contained an incorrect setting that prevented students from accessing the quiz. It is possible that this may have caused some respondents to agree that they had difficulties accessing online resources.

The lecturer uploaded a trial multimedia resource to Moodle at the commencement of the programme and opened a discussion forum to obtain feedback from students in relation to their ability to access the resource both on their laptops and phones. This allowed her to identify any potential problems in advance of the BL topic. Feedback provided via the forum allowed the lecturer to pinpoint any issues that were occurring. Two students who agreed that they had difficulties accessing the online resources in the post-implementation survey provided further information to indicate that they had difficulties at first, but contacted the lecturer who sorted out their issues. Neither of these students reported a need for technical support. It was generally apparent that students were satisfied with the support provided by the lecturer in terms of trialling resources in advance of the BL model to ensure that they worked for everyone.

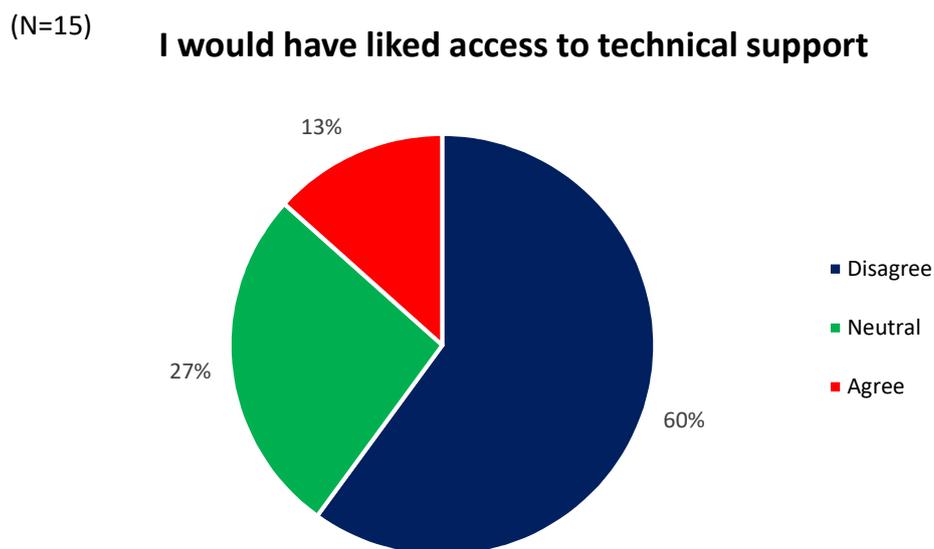


Figure 7.36 Students' preferences for access to technical support, 2019-20 questionnaire data

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Notably, 36% agreed that slow internet speeds reduced the effectiveness of the online multimedia resource, which was an increase based on cycle two. The level of agreement regarding difficulties accessing course materials was also slightly higher in cycle three, despite the fact that the majority of respondents disagreed that they had problems with broadband connectivity at home and in college (see Figure 7.37).

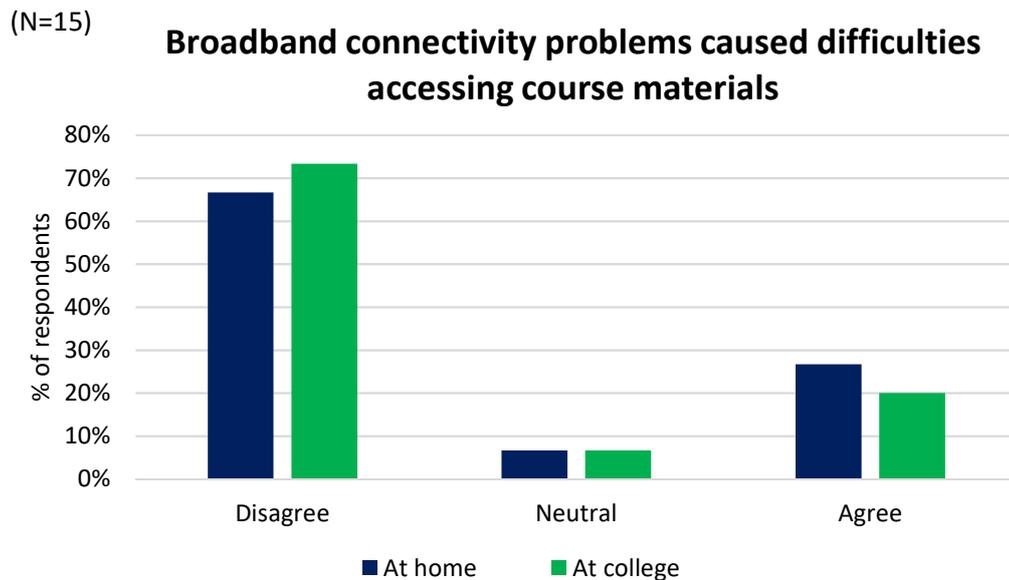


Figure 7.37 Difficulties accessing course materials due to broadband connectivity problems at home or in college, 2019-20 questionnaire data

One student commented that the Wi-Fi connection in the college was slow.

The wifi connection is sometimes very slow especially in the library making it hard to access Moodle on my phone to do the quiz. (2019-20 Student 13, survey response)

All except two students identified that they had access to the internet at home, with one student elaborating on the fact that slow internet speeds at home impacted on her when taking online assessments:

I attempted the quiz both times. ... I didn't really have any issues with it, the only thing that did bother me was that they were only open at certain periods of time (it's hard to get strong enough internet to do them at home) so I think it would have been better if there was no selected times in which the quiz was open and rather just a closing time that it had to be done by. I thought overall though the quiz went well and I think that twice is enough to attempt it. (2019-20 Student 14, semester 2 student log)

It is evident that variations in results relating to internet connectivity between design cycles two and three may be indicative of inconsistent broadband availability and quality throughout the counties where students are located, as identified in a recent

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report by the National Forum for the Enhancement of Teaching and Learning in Higher Education (2020b).

7.5.6.1 Technology self-efficacy

Responses to a question on students' prior experiences of online or blended learning when surveyed at the commencement of the programme are illustrated in Figure 7.38. Students with prior experience across all four areas mainly included individuals from abroad studying in Ireland and a mature student who had studied previously at third level. Six students (38%) admitted no previous experience which was a reduction from the cycle two figure of 46% showing evidence of greater exposure to online and blended formats in this cohort.

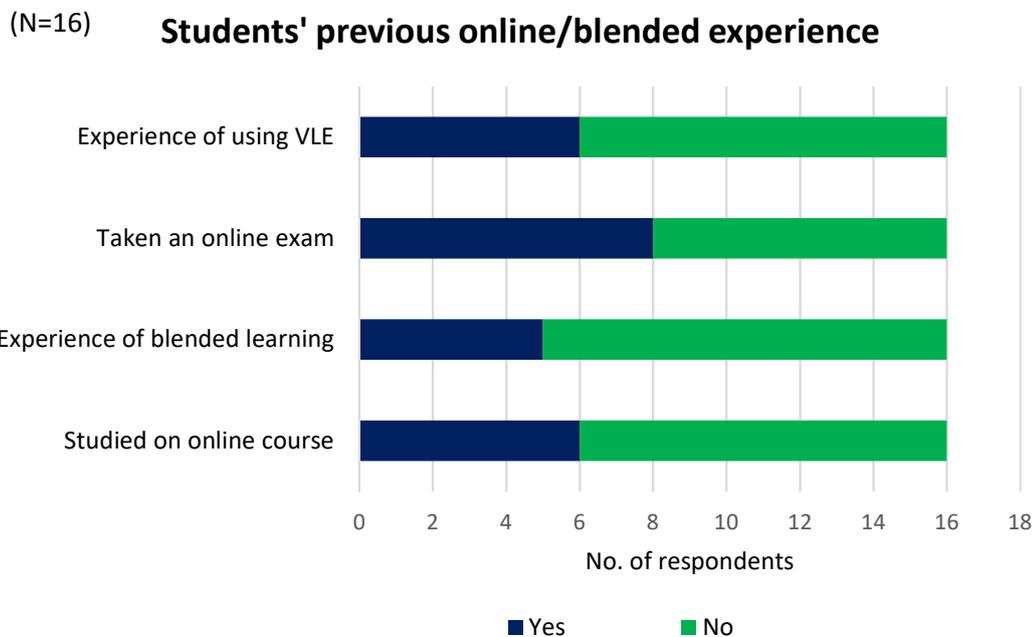


Figure 7.38 Students' prior experiences of blended and online learning, 2019-20 questionnaire data

A comparison of survey responses from pre-implementation and post-implementation questionnaires revealed that there was an overall increase in respondents' perceived skill levels in use of computers, with all students rating themselves as having a moderate or high level of computer skill at the end of the programme (see Figure 7.39), similar to previous cycle findings.

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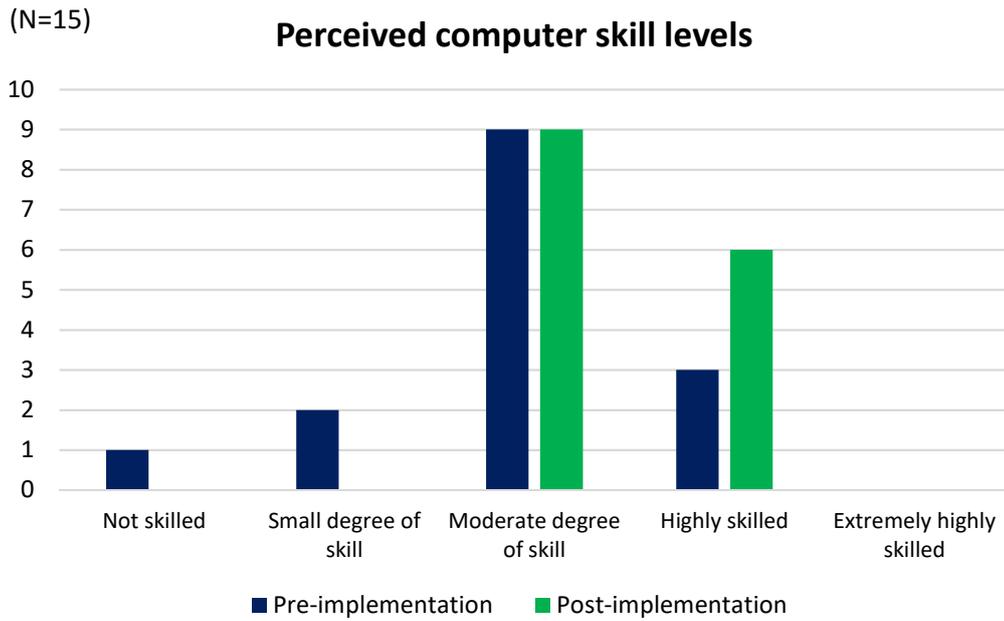


Figure 7.39 Students' perceived skill levels as computer users, 2019-20 questionnaire data

This was corroborated by the response to another post-implementation survey item, as illustrated in Figure 7.40, where all students identified moderate to very high levels of computer skill improvement.

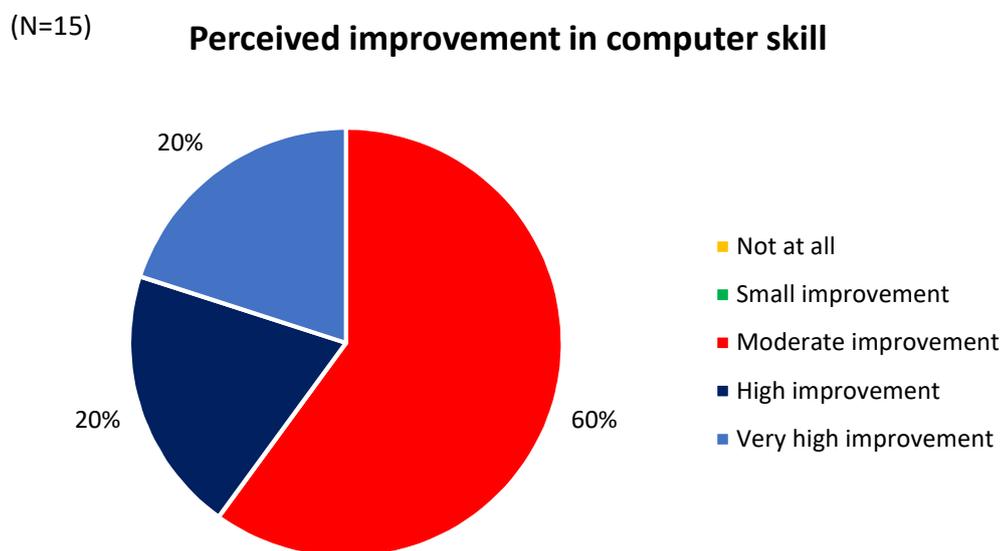


Figure 7.40 Students' perceived improvement in computer skill, 2019-20 questionnaire data

In a similar vein, when students rated their MS Excel skill levels both at the commencement and end of the first year programme, there was evidence of a perceived increase in skill levels, as displayed in Figure 7.41.

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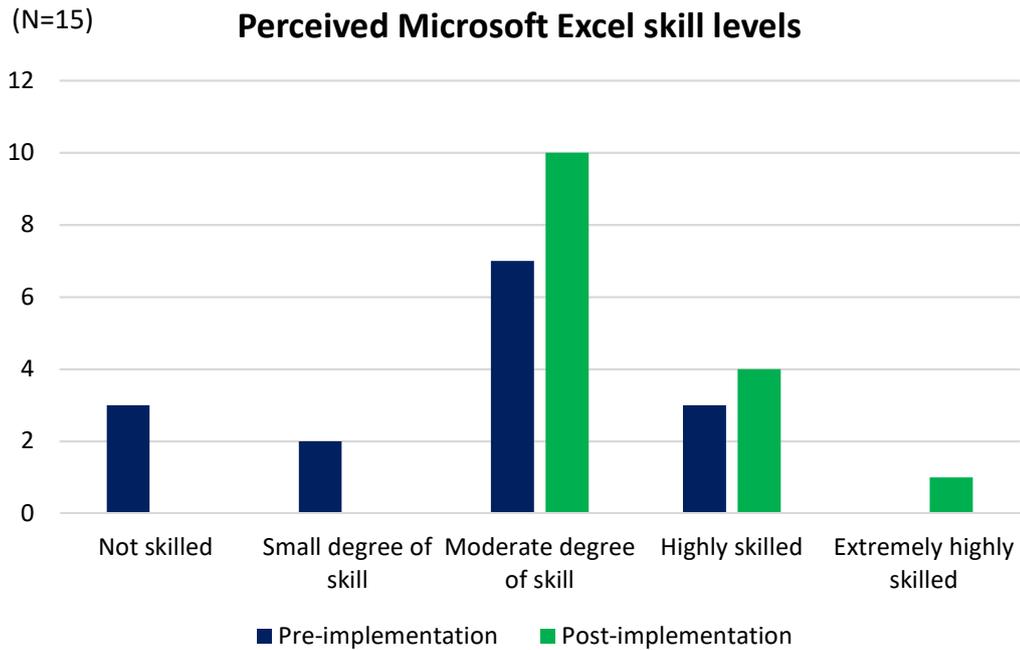


Figure 7.41 Students' perceived skill levels in using MS Excel, 2019-20 questionnaire data

Figure 7.42 illustrates students' responses to a survey item which asks them to identify their perceived improvement in MS Excel skill. 93% of students perceived they had achieved moderate to very high skill improvements. Only one student indicated a small improvement in MS Excel skill attributing her response to the fact that she had a high standard of prior Excel knowledge on commencing the course. One group interview participant acknowledged that his experience of using MS Excel in the financial accounting modules throughout the year increased his confidence when learning Excel in a Computer Applications and IT module at the end of semester 2.

All group interview participants were affirmative in relation to an increased confidence in the use of MS Excel following the financial accounting modules:

It just made you feel more comfortable using Excel. You'd be typing in like 3000 + 4000 + 7000 whereas you can just go click + click + click = and you have it done!
(2019-20 Student 7, group interview)

The use of Excel templates provided by the lecturer to assist them during class was also commended.

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(N=15)

Perceived improvement in Microsoft Excel skill

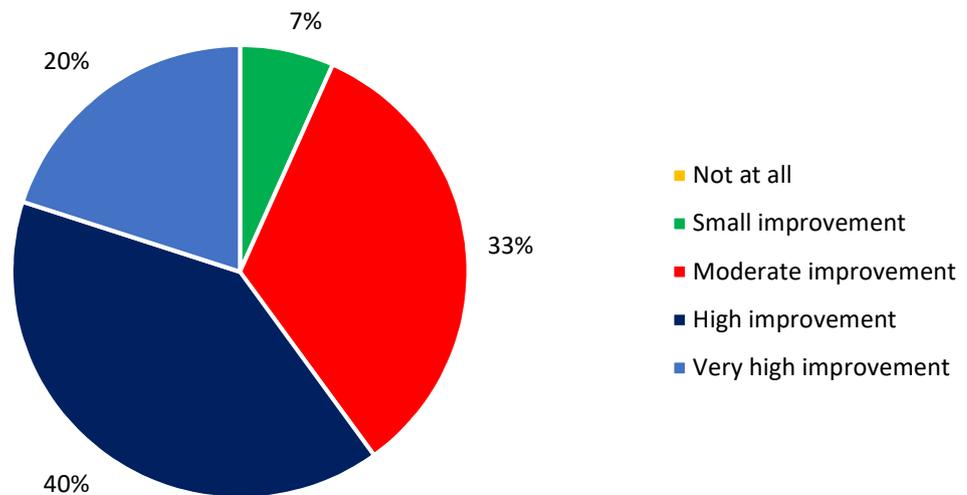


Figure 7.42 Students' perceived MS skill improvement, 2019-20 questionnaire data

Students were required to upload their bank reconciliation assignment solutions to Moodle using Excel during October of semester 1. It was evident from student logs that, in general, students had high levels of confidence regarding uploading assignments to Moodle, as when doing so as part of their bank reconciliation assignment task students reported no issues. Students reported no problems in the use of Excel, despite the fact that a number of students indicated in their semester 1 logs that they had low levels of expertise, as it was a new skill for them:

Typing my answer in Excel was OK but I need more practice using Excel so hopefully next time I'll be a lot better using it. (2019-20 Student 11, semester 1 student log)

I found Excel okay but I am not too skilled at it, so I wasn't too convinced by it and would prefer to write on paper. (2019-20 Student 15, semester 1 student log)

Many of the students indicated in their student logs that they had used Excel previously; however, not all use would have taken place in an accounting context:

I felt that putting the answers in Excel was a good option as it made it clearer when writing the answers and it was also a back up to the calculations as it can be easy to make a mistake. I have used Excel before through work but mainly for tables and not calculations. (2019-20 Student 2, semester 1 student log)

Nonetheless, one student who felt skilled in using Excel, still expressed a preference for writing on paper:

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Typing in Excel was no problem at all as I have used it before. ... This assessment was good as Excel is easier for spotting mistakes before we upload the assignment to Moodle. I preferred doing the bank reconciliation questions in class because I would find it slightly easier to do these exercises on paper rather than on the computer. (2019-20 Student 13, semester 1 student log)

In line with her cycle two observations, the researcher noted that the majority of students in the group used Excel formulae when submitting their bank reconciliation assignment in Excel format, even though this was not a specified task requirement (Kelly, 2020).

One student failed to upload his Excel assignment to Moodle and stated the fact that MS Excel was not installed on his home computer. Despite the lecturer providing him with information on obtaining Excel for free through Office Education 365 for students, he still failed to submit. This student commenced late onto the programme and demonstrated low levels of engagement overall.

Twelve study participants completed a short survey at the end of semester 1 to determine their level of satisfaction with accounting classes held in the computer lab setting. Only one of the students surveyed felt she did not benefit from classes in the lab, stating that she had learned how to use Excel previously and students would not be using computers for their final examination. All other respondents were positive in their responses, with many valuing the opportunity to apply their accounting knowledge when using Excel, appreciative of the authentic real-world knowledge that they were gaining:

Excel is probably used quite often among some accountants. It is important that we learn how to use these kind of programs in college as it prepares us for when we start working. (2019-20 Student 13, survey response)

I got to use Excel which I had little to no knowledge on. It was also a nice break from being in the classroom, getting to apply some of the knowledge into a practical setting. Also the lecturer got to go around to everyone and help them. (2019-20 Student 14, survey response)

There was no evidence of difficulties in using Excel, or requests for further assistance within the various datasets collected during the cycle. This may be due to the tutorial on MS Excel which was deployed at the commencement of the programme to induct students in its use and increase their Excel competency. The lecturer observed an air of confidence among students when working in the computer

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lab from early on in semester 1. Furthermore, as the year progressed, students worked competently inputting their own formulae where required. (Kelly, 2020).

LanSchool was used by the lecturer to demonstrate new learning material to students and focus their attention on workings, usually at the beginning of class before they moved onto attempting a question independently on the PCs. Students remarked positively in relation to their experience of LanSchool in the computer lab commenting on how it allowed them to see the lecturer's workings clearly. One novice learner affirmed:

I think it is pretty effective, especially when the lecturer takes over our screens and gives us demonstrations on how to complete questions. (2019-20 Student 15, survey response)

However, during the group interview a couple of students with high levels of prior accounting experience expressed frustration about their screens being taken over to demonstrate material with which they were already familiar:

You just could be like doing something and then the screen would be taken and then you'd lose focus and you'd just start drifting out, zoning out ... it annoys me that ... let's say some people might not understand but you understand it perfectly. (2019-20 Student 7, group interview)

Students indicated that offering LanSchool as an option which students could avail of, if they so wished, would be preferable. While this shows evidence of the challenge posed when teaching students with mixed prior levels of knowledge, it also reveals a desire among students to work independently at their own pace, as they move away from a pedagogical approach and become more self-directed in their learning.

Students were asked four questions relating to their technology self-efficacy based on an instrument developed and validated by Torkzadeh and van Dyke (2001), as in previous cycles. Responses which were based on a Likert type scale, from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), were largely in line with those in cycle two and are displayed in Table 7.13.

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Table 7.13 Mean self-efficacy scores by question item, 2019-20 questionnaire data

	M (N=15)	SD
The use of blended learning has increased my confidence in using technology.	3.73	0.70
Accounting classes in the computer laboratory have increased my confidence in the use of MS Excel.	4.00	0.66
I feel confident using MS Excel during financial accounting classes.	4.00	0.66
My lack of technology skills made this subject difficult for me (reverse coded).	4.00	0.76
Total Self-Efficacy score	15.73	2.05

A total ‘self-efficacy score’ for each student was obtained by the summation of all four item responses and subsequently coded into low, medium or high self-efficacy categories (low 4-9; medium 10-14; high 15-20). As Figure 7.43 illustrates, all respondents displayed medium to high levels of self-efficacy at the completion of the BL experience.

(N=15)

Technology self-efficacy scores - 2019-20

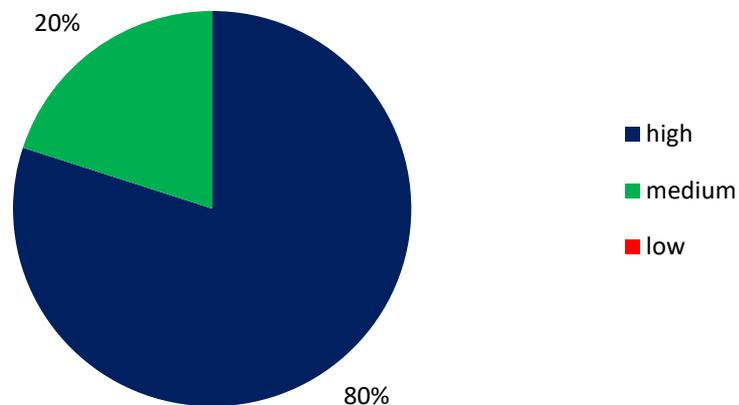


Figure 7.43 Technology self-efficacy scores, 2019-20 questionnaire data

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No student expressed agreement with the statement that ‘a lack of technology skills made this subject difficult for me’, while 73% of respondents disagreed. This corresponded with lecturer observations of high levels of confidence in relation to technology use among students in the group (Kelly, 2020). The MS Excel tutorial introduced in cycle three at the commencement of the programme is likely to have provided scaffolding to students, enabling them to progress quickly onto independent tasks using Excel, leading to positive student perceptions in relation to use of Excel as a learning tool during accounting classes.

7.6 Chapter summary

This chapter used the PACE-IT framework to portray the results of the third and final iteration of the BL design, which was refined based on the preceding two design iterations. Design cycle three results remained consistent with findings from the previous cycle, evidence of optimisation of the design across both cycles. The next chapter engages in a discussion of the research findings illustrating how the learning experience of the introductory accounting student participants was enhanced through the learning activities and interaction pertaining to the refined BL design.

Chapter 8 Discussion of Findings

8.1 Chapter introduction

This thesis seeks to answer the question – how can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level? As discussed in the literature review chapter, the definition of learning experience applicable to this research, adapted from that proffered by the UNESCO International Bureau of Education (2013) is as follows: *an organised learning interaction or activity which transforms learner perceptions, facilitates conceptual understanding, yields emotional qualities, and nurtures the acquisition of knowledge, skills and attitudes.* The UNESCO International Bureau of Education (2013) further elaborates on its definition stating that “in educational settings learning experiences are ideally challenging, interesting, rich, engaging, meaningful, and appropriate to learner needs. Previous learning experiences are considered to be key factors predicting further learning.”

The initial BL design incorporated the following learning activities, aimed at enhancing the learning experience of the introductory accounting student cohorts:

- Use of a BL approach involving a 50/50 split between online and f2f hours (Bleed, 2001; Orhan, 2008) to allow learners space to learn independently (Blaschke, 2012).
- Integration of teaching of MS Excel and financial accounting by timetabling some f2f classes within the computer laboratory setting (Harel and Papert, 1990), while using excel templates to scaffold learners (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976).
- Use of online multimedia resources and online assessment quizzes which are learner-centred to allow independent learning (Soloway *et al.*, 1996; Blaschke, 2012).
- Provision of BL instructions in hard and soft copy formats (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976).

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- Orientation sessions in the computer lab to introduce students to online resource usage (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976).
- Use of email and announcements forum as communication channels with the lecturer (Moore, 1989).
- Ratio analysis assignment task which incorporates discussion forum use, to encourage idea-sharing and extend the discourse on the ratio analysis topic outside of the classroom (Scardamalia and Bereiter, 1994).

Findings from the initial pilot study conducted during design cycle one, which are portrayed in chapter five, demonstrated the potential of BL to enhance the learning experience of introductory accounting students. Following reflection on, and evaluation of design iteration findings, changes were implemented during each subsequent design iteration based on student feedback and informed by the research literature. Accordingly, as the research study evolved and the design was refined and improved, the researcher became increasingly aware of the need to consider the student's perspective in order to achieve a successful design. This chapter presents a summary of findings across all three iterations along with a discussion of same, identifying the measures which were used to assess the impact of the emerging BL design on the students' learning experiences. Finally, it concludes with a conjecture map which provides a summary of the design elements, mediating processes and outcomes across all three design iterations.

8.2 Discussion of findings

8.2.1 Pedagogy

Cognisant that previous learning experiences impact on future learning (UNESCO International Bureau of Education, 2013), the prior accounting knowledge of students was determined at the commencement of each cycle to ensure the design of learning activities appropriate to their needs. While the majority of study participants had completed leaving certificate or equivalent as their highest prior level of education, there was evidence of mixed levels of accounting knowledge within the group across each design iteration. Notably, there was a higher proportion

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of novice learners in the final iteration in comparison with previous cycles (31% with no prior accounting knowledge, compared with 3% and 8% in cycles one and two respectively).

In general, questionnaire respondents exhibited high levels of satisfaction with all elements of the BL design across all three cycles (see Table 8.1).

Table 8.1 Perceived usefulness of BL design elements - 3 cycles

	Rated as very/extremely useful		
	Cycle 1	Cycle 2	Cycle 3
Multimedia resource	71%	90%	100%
Worked examples	n/a	86%	80%
Online assessments	92%	95%	93%
Ratio analysis discussion forum	42%	95%	93%
Announcements/reminders from lecturer	92%	90%	87%
Notes and solutions on Moodle	92%	100%	93%
Assignment information and instructions	96%	90%	100%

The element which showed the greatest level of improvement was the ratio analysis discussion forum, where only 42% rated it as *very* or *extremely useful* in cycle one, compared with 95% and 93% in cycles 2 and 3 respectively. Correspondingly, there was also an increased level of agreement that the ratio analysis forum improved perceived critical thinking skills among students, as evident from Table 8.2. This increase in satisfaction coincided with the amendment to the ratio analysis task in cycle two which required students to perform a comparative performance on two companies, increasing the level of challenge associated with the task (Herrington, Oliver and Reeves, 2003). The researcher also noted a greater level of participation on the ratio analysis forum from cycle two onwards (Kelly, 2019, 2020) following the use of e-moderating strategies promulgated by Salmon (2011) to stimulate greater participation levels, as will be discussed later in this chapter within the *Collaboration* section.

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Table 8.2 Levels of agreement on pedagogy post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL led to better understanding of course content	79%	95%	87%
BL led to more confidence in ability in FA	79%	90%	87%
BL led to greater interest in the FA subject	54%	81%	80%
BL allowed easier revision of previously learned material	83%	71%	60%
BL led to increased learning outside of the classroom	92%	95%	60%
Ratio analysis forum improved critical thinking skills	38%	81%	79%
The assessment methods used evaluated my understanding of the accounting subject	79%	90%	80%
The use of clicker technology increased my understanding and learning of ratio analysis	n/a	88%	86%

Questionnaire data revealed evidence of enhanced understanding as well as greater confidence and interest in financial accounting among participants, having used the online resources pertaining to the module (see Table 8.2), which was corroborated within group interview and student log data where there was evidence of reduced reliance on rote learning, as confirmed by this student:

Being able to take my time with the online resource ... helped with what I had previously learned but not understood at leaving certificate. (2017-18 Student 9, survey response)

While there was reduced agreement that BL allowed easier revision of previously learned material in cycle three, this corresponded with the fact that there was a higher proportion of novice learners in this group in comparison with previous cycles, as discussed earlier in this chapter. Similarly while the percentage of respondents who agreed that BL led to increased learning outside of the classroom

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dropped in cycle three, no student expressed disagreement with this statement during that iteration.

Student performance on the ratio analysis continuous assessment task improved across the three design iterations, as evident from Table 8.3. It is apparent that the provision of a grading rubric to students at the commencement of the ratio analysis task from cycle two onwards (Sadler, 1989; Herrington, Oliver and Reeves, 2003; Hattie, 2012) aided students in achieving higher marks on the assignment.

Table 8.3 Ratio analysis assignment grades - 3 design cycles

Grade	Cycle 1 (N=26)		Cycle 2 (N=23)		Cycle 3 (N=14)	
	Overall result	Higher cognitive skills	Overall result	Higher cognitive skills	Overall result	Higher cognitive skills
First class honours	27%	46%	61%	44%	57%	29%
Second class honours	54%	27%	22%	39%	43%	71%
Pass	15%	15%	13%	13%	0%	0%
Fail	4%	12%	4%	4%	0%	0%

A higher percentage of student comments achieved the maximum mark on the assignment for building on others' ideas and challenging assumptions and perspectives in cycle three, as illustrated in Figure 8.1, following on from the lecturer's emphasis on knowledge-building tasks (Scardamalia and Bereiter, 1994) during class contact hours during the third iteration. Every participant in design cycle three achieved a first or second class honours grade on both the higher cognitive skills element and the overall assignment, evidence of an overall greater learning achievement for the class group when taken as a whole. In addition, student performance on the blended topic questions exceeded the mean result on the end-of-semester exam papers across all three design iterations (see Appendix 15).

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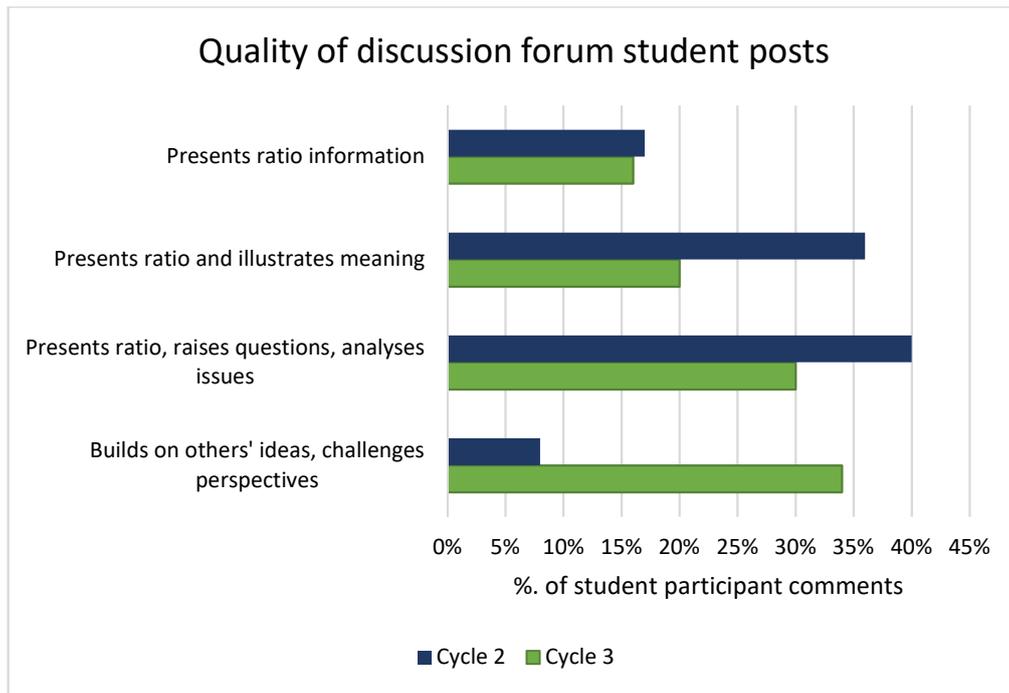


Figure 8.1 Quality of forum posts - cycles 2 and 3

Group interview and student learning log data revealed that students recognised the authenticity of their education, in having the opportunity to use a digital workplace tool such as MS Excel and the introduction of authentic questions from cycle two onwards.

It was clear from qualitative data across all three cycles, that students valued f2f contact with lecturers and peers also. When asked in cycle three, if BL led to better learning experiences compared to f2f learning, 27% agreed, while 60% remained neutral, with participants elaborating on the importance of f2f contact. This reflects the high premium placed by students on the f2f element of the blended learning design, as reflected by this student who was emphatic that f2f interaction be considered as an integral part of any learning experience:

I think one thing we need to make sure of is don't eventually end up with learning that's only online because I think a lot of people do need that time to be able to talk to someone about what they're doing, so just leave it at blended, blended! (2017-18 Student 9, group interview)

Nonetheless, there was evidence that learning activities provided within the BL design were appropriate to learner needs, facilitated conceptual understanding, yielded emotional qualities such as increased confidence, and nurtured a greater

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interest and more positive attitude towards the financial accounting subject, thus enhancing the student learning experience.

8.2.2 *Autonomy*

There existed strong agreement across all three design iterations that BL offered more flexible learning time for learners, culminating in 100% agreement in cycle three (see Table 8.4). Students particularly valued the opportunity provided by online resources to ‘catch up’ when a class was missed.

Table 8.4 Levels of agreement on autonomy post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL allowed me to have more flexible learning time	88%	76%	100%
BL allowed me to take more responsibility for my own learning	n/a	90%	73%

Questionnaire respondents were assigned a ‘flexibility score’ based on their responses to survey items pertaining to the flexibility offered by the BL process. While no student achieved a low ‘flexibility score’, mean scores displayed in Table 8.5 were affected by less positive responses from students in relation to saving time and money on unnecessary travel to college due to BL. This was due to the fact that time and cost savings were not achievable by virtue of BL taking place on a small scale within one module rather than across the entire programme.

Table 8.5 Mean flexibility score - 3 design cycles

	Cycle 1	Cycle 2	Cycle 3
Mean flexibility score (max score = 25)	19.54	17.67	18.53

There was evidence from questionnaire data, student logs and group interview data that students valued the reduction in f2f hours within the BL design, to allow them

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space to work independently. A survey question introduced in cycle two revealed high levels of agreement that BL allowed students to take more responsibility for their learning (see Table 8.4).

The fact that students liked having the ability to work in their own time and at their own pace was a strong theme across qualitative datasets. However, in each cycle there was evidence from student logs of difficulties taking responsibility for their own learning among a minority of students. Nonetheless, it was apparent from student logs and instructor field notes that these difficulties diminished as each academic year progressed, as evident from this student's comment:

It wasn't as nerve-wrecking doing it the second time. The first time you're like, 'Oh my God I'm trying to learn this, there's no teacher here' and the second time you're thinking 'Well I've done this already, so I probably have the capability of doing it again.' (2017-18 Student 2, group interview)

This finding corresponded with research by Canning (2010) and Blaschke (2012) that students need support when progressing from pedagogical to andragogical or heutagogical learning environments.

In addition, strong levels of agreement were expressed among students that they would like to see BL offered across more financial accounting topics and modules (see Table 8.6).

Table 8.6 Students' preferences for extension of BL across more topics/modules

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL offered across more FA topics	71%	57%	87%
BL offered across more modules	88%	71%	80%

The researcher introduced a metacognitive element as part of the ratio analysis continuous assessment task from cycle two onwards, to help build learners' awareness of their own learning strategies (Blaschke, 2012). Student feedback during subsequent group interviews revealed that students were inexperienced at reflecting on their learning but were mindful of the learning gains involved.

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Students were supported in transitioning towards learner autonomy through the use scaffolding mechanisms such as orientation activities to introduce online resources, lecturer availability outside of f2f hours and lecturer e-moderating on the ratio analysis discussion forum. It was evident that students developed positive attitudes towards BL as they became accustomed to its use and gradually began to take responsibility for their own learning and gain autonomy.

8.2.3 Collaboration

Based on student feedback from the first design iteration and further review of the literature, a greater focus was placed on collaborative activities from cycle two onwards. Students were given opportunities to work on authentic class questions as group tasks in the f2f class setting (Kearsley and Shneiderman, 1998; Herrington and Oliver, 2000). Greater emphasis was also placed on increasing participation and collaboration to increase knowledge building on the ratio analysis discussion forum (Scardamalia and Bereiter, 1994), through the use of e-moderating strategies and non-task warm up activities (Salmon, 2011). There was a resultant increase in levels of agreement in relation to participants' ability to collaborate, share ideas and learn from others as evident from Table 8.7.

Table 8.7 Levels of agreement on collaboration post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL allowed collaboration and sharing of ideas	54%	71%	87%
BL allowed me to contribute to course material	50%	81%	93%
BL offered opportunities to learn from others	25%	67%	67%
BL improved team-working skills	n/a	71%	73%

The researcher became aware of the need to consider student apprehensions; for instance, she was mindful of the presence of a high OCA level among some students in the group (cycle two 13%; cycle three 19%) which needed to be taken into

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account when conducting collaborative group work. Nonetheless, there was evidence that the ability to work in groups improved team-working skills while helping students to get to know one another and exposing them to the ideas of others, as one student affirmed:

There was more of a discussion about the comparisons. Do you remember that class we were all in fours working together? There was more comparison, like, 'oh I didn't think of that.' (2019-20 Student 5, group interview)

As stated, the lecturer placed an even greater emphasis on collaboration in cycle three, with the use of pair work tasks from the very outset to provide scaffolding support (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976). There was a resultant higher sense of community in cycle three, with evidence of higher levels of connectedness and learning, as evident in Table 8.8.

Table 8.8 Classroom community scale - design cycles two and three

	2018-19 (cycle two) N=21		2019-20 (cycle three) N=15	
	Mean	SD	Mean	SD
Connectedness subscale	22.52	4.77	26.73	3.73
Learning subscale	27.00	5.10	28.07	5.16
Classroom community	49.52	8.09	54.80	8.46

As alluded to earlier, participation on the ratio analysis discussion forum increased in cycles two and three following lecturer use of introductory discussion forums in addition to e-moderating strategies promulgated by Salmon (2011). Moodle tracking logs revealed considerable increases in frequency of posting and viewing by students in cycle two, following implementation of these design changes. Furthermore, while eight students refrained from posting to the forum in cycle one, this had reduced to zero by cycle three (see Table 8.9).

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Table 8.9 Ratio analysis discussion forum usage - 3 design cycles

	Cycle 1	Cycle 2	Cycle 3
Average posts per student	2.9	5.7	7.0
Average views per student	8.4	21.9	19.2
Number of students who failed to post on forum	8	1	0

Qualitative datasets across cycles two and three indicated that the ratio analysis discussion forum exposed students to the ideas and perspectives of others. While there was some anxiety regarding commenting at the outset, student logs revealed that this was alleviated as time progressed and students became accustomed to its use.

Overall, study findings revealed that the BL design contributed to a learning experience which included increased collaboration, sharing of ideas and learning from others. Students' team-working skills were fostered and their perceptions were transformed, having been exposed to the ideas of others, thus providing a rich and meaningful learning experience.

8.2.4 Engagement

In each design cycle, a user engagement score was calculated based on questionnaire items to determine participants' levels of engagement with the online multimedia resources. Mean engagement scores are displayed in Table 8.10. During cycles two and three, all respondents exhibited high or medium levels of engagement with the resources. Similarly, an intrinsic motivation score was also calculated for each questionnaire respondent, with all respondents exhibiting medium or high levels of motivation across all three design cycles. Qualitative datasets revealed that BL led to more enjoyable learning experiences for students, making topics "more engaging and easier to learn" (2019-20 Student 14, survey response).

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Table 8.10 Mean user engagement scores - 3 design cycles

	Cycle 1	Cycle 2	Cycle 3
Mean user engagement score (max score = 20)	13.80	15.15	14.68

Participants appreciated the diverse range of learning resources which assisted in advancing their understanding of financial accounting, leading to enjoyment, motivation and enthusiasm among participants:

I found the clicker activity very useful. I think interactive learning activities such as this that encourage discussion while adding an element that's not usually used in the classroom are an excellent way of engaging. It ensures the content discussed will be remembered as it was discussed in a unique way. I also think group work encourages new ideas allowing you to gain an insight you may not have had before. (2018-19 Student 8, semester 2 student log)

Moodle tracking logs revealed high levels of engagement with online assessment quizzes across all three cycles, with students expressing satisfaction with the quizzes and calling for an increased level of online assessment within student logs and group interviews.

Questionnaire respondents demonstrated an increased level of agreement that BL encouraged participation in class activities from cycle two onwards, as evident from Table 8.11. These increased participation levels corresponded with the introduction of f2f collaborative group tasks from cycle two onwards, as discussed earlier, coupled with the introduction of clicker technology aimed at boosting student engagement (Kearsley and Shneiderman, 1998). As Table 8.11 illustrates, questionnaire respondents were affirmative in relation to clickers allowing more active participation in class. The researcher also observed a sense of enjoyment among students during the clicker class along with more active discussion and participation, as well as greater evidence of 'knowledge building' among students rather than 'knowledge-transmission' from the lecturer. This was particularly evident in cycle three when one clicker was assigned between a pair of students rather than each student using their own clicker, allowing greater student discussion in advance of submitting answers. The researcher noted the class running more smoothly in cycle three also when software testing took place within the room in advance of the class (Kelly, 2020).

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Table 8.11 Levels of agreement on engagement post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL encouraged participation in class activities	33%	81%	73%
Clickers allowed more active class participation	n/a	88%	86%

The three design cycle chapters reported on likes and dislikes of the BL design. Cycle one data were based on information gleaned from student logs, as these logs were specifically used during cycle one for determining what students liked and disliked, and recommended changes pertaining to the design. In subsequent cycles, data on likes and dislikes were based on responses to survey items. Thus, there was an overall decrease of both likes and dislikes from cycle two onwards due to the restricted nature of a survey response in comparison to a log entry. Nonetheless, it is evident from the summary data displayed in Table 8.12 that the number of dislikes dropped more significantly relative to the drop in the number of likes across the three design iterations.

Table 8.12 Summary of participant 'likes' and 'dislikes' across 3 design cycles

	Cycle 1 (N=25)	Cycle 2 (N=21)	Cycle 3 (N=15)
Number of 'likes'	71	24	20
Number of 'dislikes'	19	8	4

Data analysis revealed increasing levels of satisfaction with the BL design as the study iterations evolved. The provision of a diverse range of learning activities, along with the addition of f2f collaborative activities and clicker technology from cycle two onwards, contributed to a student learning experience which was enjoyable, interesting and engaging.

8.2.5 Interaction

Moodle tracking logs revealed high levels of interaction with the multimedia resources pertaining to the BL design. The researcher was cognisant of the fact that there was a mixed level of prior accounting knowledge within the class, so diverse resources were provided to cater for varying student needs. Albeit some students had completed the accounting topics under study previously at leaving certificate higher level, nonetheless there was evidence of high levels of interaction with the online multimedia resources (see Table 8.13). Additional worked example videos were provided from cycle two onwards to provide a set of graded challenges for learners in line with flow theory (Csikszentmihalyi, 1990). While these videos were widely used, their use was predominantly among novice learners, in line with the research literature on the worked example effect (Sweller and Cooper, 1985; Sweller, 2006).

Table 8.13 Usage of online resources - 3 design cycles

	Cycle 1	Cycle 2	Cycle 3
% of students who viewed at least one multimedia resource	93%	91%	88%
% of students who viewed at least one worked example video	n/a	87%	75%

Group interview and student learning log data revealed that participants valued the use of group work in both fostering understanding, as well as getting to know one another. Questionnaire respondents revealed increasingly higher levels of agreement that BL led to better interaction with classmates as the research study progressed (see Table 8.14). This was also observed by the researcher (Kelly, 2020) and corresponded with an increased emphasis on both f2f and online collaborative activities (from cycle two onwards) and pair work (in cycle three) as discussed earlier in this chapter.

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Table 8.14 Levels of agreement on interaction post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
BL provided better interaction with classmates	17%	52%	73%
BL provided good communication channels with the lecturer	75%	76%	80%
I disliked not being able to ask questions	33%	16%	21%

There were also high levels of satisfaction across all three cycles in relation to the communication channels with the lecturer (see Table 8.14). The lecturer was available via email and an announcement forum initially, followed by the addition of Whats App messaging via the class rep from design cycle two onwards. Students remarked positively on the lecturer’s availability and interest in their welfare:

I just thought it was quite clear that the lecturer put in a lot of effort and actually cares about our educational goals being met which I think really makes you want to work harder. It’s kind of like, the atmosphere is better in this module than in others. (2019-20 Student 15, survey response)

This raised the researcher’s awareness of the key role played by the lecturer in the execution of the design, particularly in showing a genuine interest in students, cultivating a positive classroom climate and expressing a willingness to build a learning community within the group.

From cycle two onwards, questionnaire respondents exhibited a reduction in discomfort in relation to not being able to ask questions when viewing the multimedia resource (see Table 8.14). In design cycle three, when surveyed on what they disliked most about the BL process, the inability to ask questions was not mentioned as a dislike by any participant. It is likely that levels of support put in place from cycle two onwards, including the addition of an introductory class on each topic and timetabling adjustments to reduce the gaps between f2f hours, acted to scaffold learners (Luria and Vygotsky, 1930; Bernstein, 1947; Wood, Bruner and Ross, 1976). This may have reduced the need for the lecturer’s presence during learning time, and allowed learners to progress towards learning independently.

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Multimedia resources were updated during the study, based on think aloud protocols carried out during cycles one and two. By the third design iteration, students made no reference to any desired changes to these resources within any of the datasets, evidence that changes to the resources were effective. The Moodle page layout and ratio analysis discussion forum thread layout were also improved at the commencement of the second iteration based on student feedback to provide easy access and navigation in subsequent cycles and improve learner-interface interactions (Hillman, Willis and Gunawardena, 1994). Student feedback in relation to the Moodle page and discussion forum layout was generally positive from cycle two onwards, matched with higher participation levels on the discussion forum, as discussed earlier in this chapter.

Moodle tracking logs revealed evidence of vicarious interaction on the ratio analysis discussion forum, as illustrated earlier in Table 8.9, where average student views on the ratio analysis discussion forum were higher than average student posts. This corresponds with the literature on vicarious interaction and witness learning (Sutton, 2000; Goldman et al., 2005) which asserts that students not directly participating in online discussion can benefit from observing and processing cognitively the interactions of others, allowing learners who are shy to progress their learning without the fear of rejection that they may associate with exposing their own ideas.

While there was evidence of language barrier problems for international students in cycles one and two, this was less evident in cycle three following intervention by the lecturer in checking in with international students on a regular basis. Qualitative datasets revealed that international students benefited from the group work and discussion forum in relation to interacting with and getting to know other students, and improving their spoken and written English.

Data analysis revealed that the provision of online resources, including worked examples, provided learning content which resulted in learning experiences which were challenging, yet appropriate to learners' needs. The ability to interact with peers through the BL design facilitated opportunities for students to transform their attitudes and perceptions. In addition, as discussed earlier, the support provided to learners acted to transform their perceptions of learning independently.

8.2.6 Technology

Multimedia resources were re-published for mobile viewing in advance of the third design iteration, with a resultant increase in the number of respondents who indicated that they used their mobile phone to view online resources. Additionally, qualitative data revealed positive reactions from students in relation to this design change.

In general, during all three cycles students exhibited a low desire for technical support (see Table 8.15). Orientation activities were provided in the computer lab setting in advance of the blended topics and the lecturer was accessible via email or using Whats App via the class rep outside of f2f hours (from cycle two onwards), all of which acted to negate the demand for technical support.

Table 8.15 Levels of agreement on technology post-questionnaire items - 3 design cycles

	Levels of agreement		
	Cycle 1	Cycle 2	Cycle 3
I would have liked access to technical support	17%	14%	13%
Slow internet speeds made the multimedia resources less effective	50%	16%	36%

There was some evidence to suggest that slow internet speeds affected online resource usage (see Table 8.15), although this varied across the three cycles and was most likely determined by the home location of the students and the accessibility of broadband within their local area, consistent with the findings of the National Forum for the Enhancement of Teaching and Learning in Higher Education (2020). Some students mentioned difficulties regarding wifi quality within the college, evidence that the BL design can be constrained by institutional factors such as wifi quality and availability of technology, among others.

A comparison of responses to pre-implementation and post-implementation survey items revealed increases in perceived computer and MS Excel skill levels across participant groups in all three design iterations. When surveyed at the end of design

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cycle one, the majority of respondents indicated moderate to very high levels of perceived skill improvement for both computer and MS Excel skills, with increasing levels of perceived improvement across subsequent cycles, as displayed in Table 8.16. This corresponded with the introduction of LanSchool classroom management software and increased use of excel templates in design cycle two informed by the TPACK model (Mishra and Koehler, 2006) and the addition of a MS Excel tutorial at the commencement of the academic year in design cycle three. Qualitative data revealed higher levels of satisfaction with computer laboratory classes from design cycle two onwards. As discussed earlier, students particularly liked the ability to use a digital workplace tool:

I liked the fact that after completing the question we brought it one step further and used the computer because it made it more relatable to the work we will be doing in the future. (2018-19 Student 22, semester 1 log)

Table 8.16 Technological self-efficacy - 3 design cycles

	Cycle 1	Cycle 2	Cycle 3
Moderate to very high perceived improvement in computer skill	58%	76%	100%
Moderate to very high perceived improvement in MS Excel	71%	76%	93%
Mean technological self-efficacy score (max = 20)	14.75	15.81	15.73
% with high technological self-efficacy score	54%	71%	80%
% with medium technological self-efficacy score	42%	29%	20%
% with low technological self-efficacy score	4%	0%	0%

A technological self-efficacy score was computed for questionnaire respondents at the end of each design cycle based on their responses to four survey items. The mean technological self-efficacy score increased in design cycle two, following on from the aforementioned design changes. Additionally, no respondent exhibited a low technological self-efficacy score from design cycle two onwards (see Table 8.16).

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Levels of technological self-efficacy among questionnaire respondents were generally high at the end of each design iteration, following a learning experience which integrated financial accounting and MS Excel within the computer laboratory setting. However, the researcher was cognisant that scheduling classes within a computer laboratory is governed by timetabling constraints within the local institutional context. Nonetheless, the incorporation of classes scheduled in the computer laboratory nurtured the acquisition of computer and MS Excel skills among study participants, thereby enhancing the learning experience while equipping students with digital workplace skills.

8.3 Chapter summary

This chapter discusses the main outcomes of the research and links them to changes within the design. Sandoval (2014) advocates the use of conjecture mapping as a systematic design technique to identify and foreground the main signature features, processes and impacts in a complex learning design process. The PACE-IT conjecture map, illustrated in Figure 8.2 overleaf, adapts the conjecture map provided by Sandoval (2014) to retrospectively show the design elements, mediating processes and outcomes of the BL design across all three design cycles, as discussed in this chapter. Within Figure 8.2, design cycle two changes to design elements, processes and outputs are highlighted in red, with subsequent cycle three changes marked in green.

The aim of this research was to provide a BL design which enhanced the learning experience of introductory accounting students at tertiary level. Throughout this chapter, the researcher has endeavoured to illustrate how the BL design acted to enhance the learning experience of students by transforming learner perceptions, facilitating conceptual understanding, yielding emotional qualities, and nurturing the acquisition of knowledge, skills and attitudes. Analysis and interpretation of data illuminated that student participants encountered learning experiences which were “challenging, interesting, rich, engaging, meaningful, and appropriate to learner needs” in line with the definition proffered by the UNESCO International Bureau of Education (2013).

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Throughout the study, findings emerged which revealed that certain elements influence the success of a BL intervention. These include the commitment of the lecturer, learner characteristics and the issues pertaining to the local institutional context among others. These factors must be afforded due consideration when putting an intervention in place within the educational setting and will be elaborated on further within the next chapter. The ensuing chapter concludes the thesis by presenting a set of design guidelines emerging from the PACE-IT model, which can be used to inform the design of BL within introductory accounting education settings.

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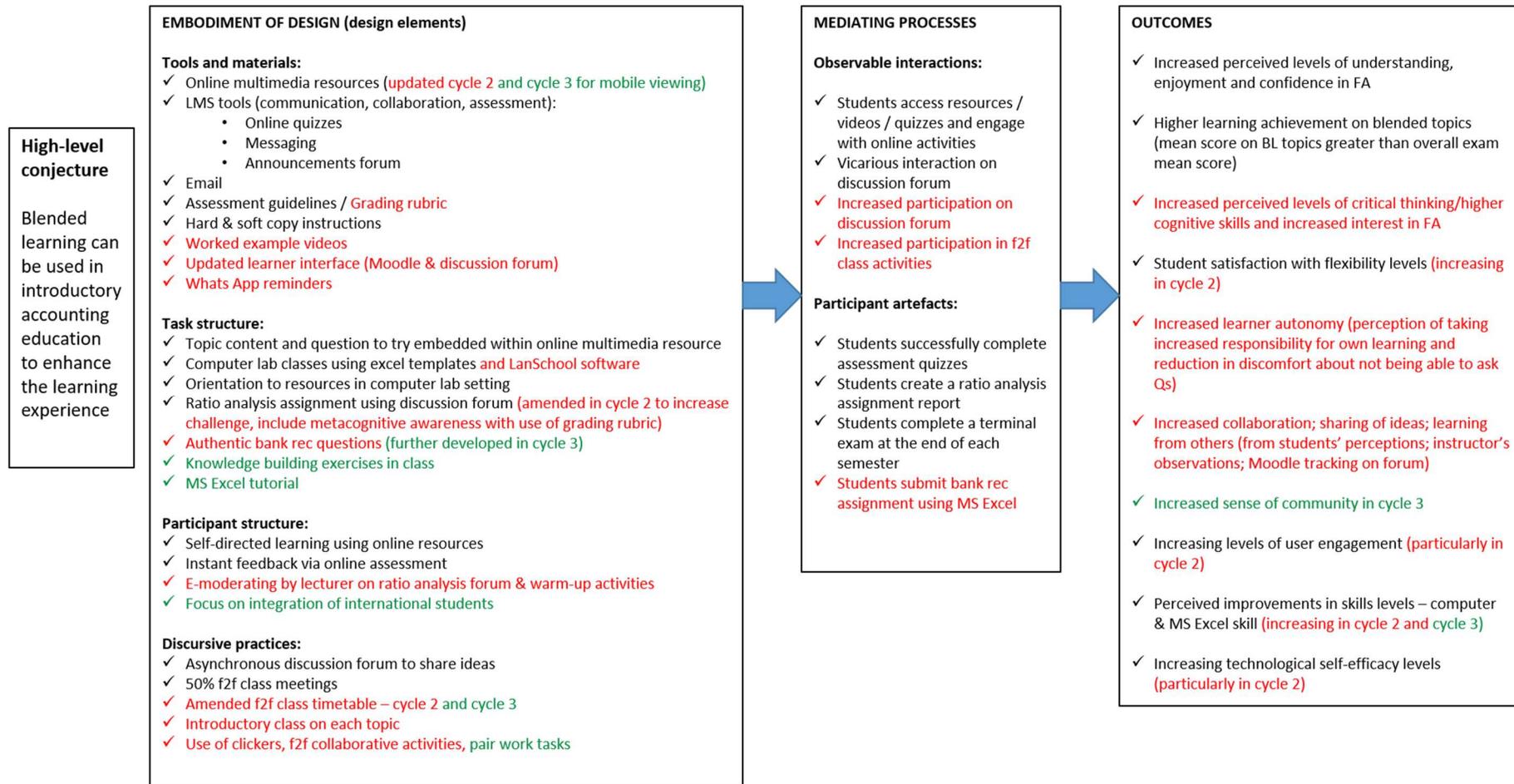


Figure 8.2 PACE-IT conjecture map: Evolution of BL model over three design cycles (based on Sandoval, 2014)

Chapter 9 Conclusions

9.1 Summary of thesis structure

The introduction to this thesis sets the scene for the research by defining the researcher's interest in the design of a BL intervention to enhance the learner's experience in introductory accounting at tertiary level. The set of research questions to be addressed in subsequent chapters were proposed as follows:

1. How can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?
 - a. Does blended learning create new engaging and collaborative possibilities for learners of introductory accounting to enhance their learning experience?
 - b. If so, what are these new engaging and collaborative possibilities?
2. What are the characteristics of an effective blended learning intervention in introductory accounting at tertiary level?

Chapter two reviewed relevant literature on blended learning, the learning experience, and accounting education with a specific focus on the use of educational technology in accounting education. While there has been considerable research into the use of blended learning, the review of literature demonstrates the paucity of research which exists into BL in accounting education.

Chapter three presented the rationale for the choice of DBR as an appropriate methodology to address the study's research questions, based on the methodological requirements identified in the preceding chapter.

A key feature of DBR is the orienting theoretical framework which is used to support the emergent design. The theoretical framework, which guided the design process and iterative implementations, is detailed in chapter four.

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Chapters five, six and seven relate details of the design implementation over the three iterative design cycles, along with data analysis and findings from each iteration. Throughout these chapters, a picture was portrayed of the way in which the design was influenced by emerging design themes, backed by theory and practical findings, to finalise the BL intervention.

Chapter eight presents a discussion of the findings over the three design cycles, detailing how the learning experience of the introductory accounting students was increasingly enhanced as the BL intervention was refined in each subsequent iteration.

The analysis of learners' experiences having partaken in the BL intervention has led to the development of the PACE-IT design model with associated design guidelines for designing a BL intervention for introductory accounting education at tertiary level. This chapter proceeds to describe the PACE-IT model which has emanated from the research.

9.2 PACE-IT design model and guidelines

The PACE-IT design model and design guidelines have emerged and evolved over the three design cycles covering this study.

9.2.1 Design guidelines

Embodied within the design guidelines are six design criteria or 'design sensitivities' (Ciolfi and Bannon, 2003) along with five fundamental design informants and resources which emerged through the course of the study. When developing a BL intervention in introductory accounting at tertiary level, consideration must be afforded to these design informants to ensure a successful implementation.

9.2.1.1 Design criteria or 'sensitivities'

1. Pedagogy

- The BL intervention should allow learners to undertake learning tasks which impel them to contemplate the underlying theory, while also offering opportunities to share, discuss and reflect on their outputs with peers in order

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to improve both their practice and theoretical understandings (Laurillard, 2002, 2007, 2008a, 2008b, 2009). This was facilitated through the use of collaborative f2f class activities and online discussion forums within this study. Students remarked on how their understanding of ratio analysis improved through the availability of online resources and interactions on the discussion forum allowing them to move away from rote learning. The researcher witnessed knowledge-building among students on the forum, while there was evidence that grading rubric use provided direction and transparency to students with regard to marking of assignments.

- Applying cognitive load theory (CLT) principles in the design of online multimedia resources (Mayer, 2002) and scheduling an introductory f2f class on each topic before students embark on online learning act to reduce cognitive overload (Sweller, 1994; Mayer and Moreno, 2003; Kirschner, Sweller and Clark, 2006; Sweller, Ayres and Kalyuga, 2011; Blayney, Kalyuga and Sweller, 2015). Students valued the step-by-step approach taken during online and f2f learning content delivery. Use of an introductory class ensured that students were comfortable when subsequently encountering learning material online in the absence of the lecturer.
- Use of worked example videos provide ‘fadeable layers of scaffolding’ (Jackson, Krajcik and Soloway, 1998) before students move onto independent problem solving (Sweller and Cooper, 1985; Sweller, 2006), facilitating learning in accounting. Students remarked that their levels of confidence increased as a result of having a range of online resources to work on independently outside of class.
- Use of discussion forums for discursive areas of financial accounting, such as ratio analysis, offers students the prospect of extending their critical thinking skills while also affording opportunities for them to learn from one another both directly, and vicariously (Scardamalia and Bereiter, 1994). While introductory topic material proved particularly suitable for online delivery in this study, students valued the role of f2f contact time in effectively exploring advanced learning material. Participants in this study expressed a preference for f2f classes to be spread evenly so that long gaps with no f2f contact were avoided.

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2. Autonomy

- In order to facilitate knowledge-acquisition rather than knowledge-transmission, learning tasks should build on learners' prior experiences with a focus on context and relevance of tasks (Knowles, 1984; McAuliffe *et al.*, 2008). Students appreciated the use of authentic tasks with everyday relevance, and a lecturing style which allowed them to establish connections between learning content elements and fostered understanding, rather than encouraging rote memorisation.
- Establishment of a learner-centred environment, incorporating online resources which allow students to work at their own pace and in their own time, provides for students' diverse levels of prior experience while also affording them the time to gain a greater understanding of the content. Blaschke (2012) identifies learner-centeredness as pivotal to the development of a heutagogical learning environment. Both advanced and novice learners commended the affordances of the BL intervention in allowing them to work independently at their own pace.
- In order to support learners in becoming autonomous, they must be offered opportunities to reflect on their learning processes to support them in building awareness of their own learning strategies (Wenden, 1998; Blaschke, 2012; Blaschke and Hase, 2016). "Without awareness [learners] will remain trapped in their old patterns of beliefs and behaviors and never be fully autonomous" (Wenden, 1998, p. 90). Despite having limited prior exposure to reflective learning, students appreciated the benefits of pausing to reflect on the learning strategies which they had previously deployed, to ensure more effective learning in the future.
- Learners must be supported in transitioning to independent learning, particularly when they may have previously been accustomed to a passive learning approach. Responsibility for learning independently must be transferred gradually to ensure that learners remain comfortable in the learner-centred environment (Higgs, 1988; Hase and Kenyon, 2000; Herrington, Oliver and Reeves, 2003; Canning, 2010; Blaschke and Hase, 2016). Use of a grading rubric supported students by providing transparency around evaluative criteria used in assignment grading. The lecturer provided

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scaffolding to learners in the online environment through use of regular reminder messages, monitoring of online activities and by maintaining a continual lecturer presence on the forum.

3. Collaboration

- In the online environment, the use of non-task collaborative activities and asynchronous discussion forums, incorporating frequent and purposeful instructor participation, fosters learning community formation and knowledge-building. This is further supported by collaborative group work activities in the f2f setting, which are planned and implemented systematically (Vygotsky, 1978; Scardamalia and Bereiter, 1994). Students affirmed the opportunities offered by asynchronous discussion forums to gain new insights and learn from one another. Working collaboratively in f2f classes cultivated new friendships enabling peer scaffolding to occur, while advancing students' understanding.
- Discussion forum 'warm-up' activities are essential to familiarise students with discussion forum use (Kreijns, Kirschner and Jochems, 2003; Salmon, 2011), particularly for students who have no previous forum experience. The researcher found that engagement with the ratio analysis discussion forum increased in cycle two when students were exposed to non-task 'warm-up' activities at the commencement of the module. Furthermore, offering students an opportunity to post their first comment to the forum within a f2f class can stimulate a greater level of forum participation from the outset.
- A positive classroom climate must be cultivated by the lecturer, who should remain sensitive to any communication apprehensions that may exist among students. Initial group work in class should aim to facilitate learners who are familiar with one another to sit together to reduce any uncomfortable feelings that learners might have when meeting new people. Allowing students to work frequently in pairs with those sitting nearby facilitated this and proved convenient, with minimal disruption or set-up time required.
- Instructor scaffolding is important to ensure learners are confident in their ability to learn on their own (Wood, Bruner and Ross, 1976; Vygotsky, 1978). Provision of learning materials in hardcopy as well as softcopy format, availability of problem solutions online, along with clear and detailed

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instructions on the BL timetable and tasks, provided clarity and support to learners.

4. Engagement

- The BL intervention must incorporate problem-based tasks with real-life features to stimulate and sustain student engagement (Kearsley and Shneiderman, 1998; Herrington and Oliver, 2000; Reeves, Herrington and Oliver, 2002; Herrington, Oliver and Reeves, 2003), while also preparing them for the workplace. Allowing students to work collaboratively on authentic tasks coupled with the integration of MS Excel, a workplace digital tool (Harel and Papert, 1990), fostered engagement while also adding to the ‘authenticity’ of learners’ education.
- The provision of tasks of increasing complexity acts to scaffold learners, as they move from the use of worked examples to independent problem-solving, while also sustaining engagement (Csikszentmihalyi, 1990). This also provides for diverse student needs as students with no prior accounting experience were more likely to use online worked examples in this study, while advanced learners moved directly to independent problem solving.
- Cognisance must be taken of student workload when scheduling f2f contact hours to provide learners with the space to learn independently while also managing their ‘lifeload’ (Kahu, 2013; Kahu and Nelson, 2018). Students valued the 50% reduction in f2f contact hours provided under the BL model as it allowed them to utilise their time productively in accessing online resources and managing outside commitments.
- The BL intervention should incorporate a variety of learning activities to promote learner engagement with the subject. In this study, the use of online multimedia resources, worked example videos, assessment quizzes, discussion forums and clickers provided a rich and varied learning experience for learners, adding to their sense of enjoyment, motivation, and enthusiasm for the subject.
- Online quizzes scheduled during the semester promote engagement with assessment activities. Many students indicated expending a greater study effort due to online assessments, noting the reduced stress associated with out-of-class online assessments.

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5. Interaction

- Online resources furnished must be learner-centred, easily accessible and mobile-compatible to optimise student interaction with learning content (Moore, 1989; Soloway, Guzdial and Hay, 1994). Students expressed a desire for resources which can be accessed on their phones for viewing at any time.
- The lecturer should act as a partner in the learning process (Blaschke and Hase, 2016; Hase, 2016). Thus, the BL intervention must incorporate appropriate channels to facilitate communication with the lecturer outside of f2f contact hours, to provide necessary support to the learner while he or she works independently (Moore, 1989). Students appreciated the instant nature of reminder messages received via the class rep from the lecturer. In particular, the lecturer must maintain a presence on discussion forums through the use of ‘summarising’ and ‘weaving’ comments to maintain the discourse level (Salmon, 2011).
- High-quality course interfaces which are simple to navigate must be rendered (Hillman, Willis and Gunawardena, 1994). The VLE layout must ensure ease of access to online learning and assessment materials due to the multitude of resources which are provided in a BL format, thereby facilitating learners in taking responsibility for their own learning. Similarly, while online discussion forums offer opportunities for peer and vicarious interaction (Sutton, 2000), there is a necessity to structure complex discussion forum threads to facilitate an easy-to-follow layout to encourage maximum student participation.

6. Technology

- The instructor’s pedagogical approach must be adapted to facilitate learning with technology (Mishra and Koehler, 2006; Koehler and Mishra, 2009). This can be achieved through use of classroom management software, such as LanSchool, and pre-prepared templates using MS Excel, when teaching in the computer laboratory setting. Recognition of topic areas unsuited to computer laboratory delivery which require timetabling in a traditional classroom setting is also necessary.

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- Orientation opportunities must be provided at the outset to support students in transitioning to the use of online learning and assessment resources (Vygotsky, 1978; Soloway *et al.*, 1996). Online resource demonstrations in the computer laboratory at the programme outset offered students an opportunity to trial resources in advance of BL. An initial tutorial class in MS Excel scaffolded learners in becoming familiar with use of the software before applying its use in financial accounting classes.
- Support must be provided to students in order to address any technological issues that they may be having when accessing resources. Support can be furnished in the form of discussion forums where students can post queries or feedback on resource accessibility, or lecturer availability to deal with queries via email or during f2f class time. Local internet availability and connectivity must also be considered when furnishing online resources. While, the majority of participants in this study had no problems, a couple of students did indicate slow internet speeds at home or in college.

9.2.1.2 Design informants and resources

As the study evolved, it became clear that certain design informants and resources are essential in ensuring the success of a BL intervention. This research proposes that the following five elements should be consulted during the design process, to realise an effective BL intervention in introductory accounting in the tertiary sector:

1. **Student's perspective:** meeting the needs of the student and responding to student feedback is crucially important to achieving a successful design. Students' prior experiences and accounting knowledge, levels of technology self-efficacy, motivation and any apprehensions regarding communication should be given due consideration during the design process.
2. **Lecturer's perspective:** the lecturer plays a key role in design execution. The lecturer's own technology self-efficacy, interest in student welfare, and willingness to build trusting relationships, create a positive classroom climate and foster a learning community are key to ensuring student motivation and an optimal design.

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3. **Curricular requirements:** the design process must address the specifications, aims and structure of the accounting programme itself. As an accredited programme providing exemptions from professional accounting exams of Chartered Accountants Ireland, Chartered Institute of Management Accountants (CIMA), Association of Chartered Certified Accountants (ACCA) and the Institute of Certified Public Accountants (CPA Ireland), the design must remain sensitive to the requirements of these bodies, particularly in relation to learning content and assessment.
4. **Institutional context:** the design and implementation of the BL intervention must consider influencing factors within the local college context, including the academic calendar, timetabling constraints, availability of technology, wifi quality, and support of management. For example, within the BL design, timetabling constraints were considered when scheduling classes within the computer lab; the selection of TurningPoint polling software when using clickers was affected by licence availability within the institution.
5. **External influences:** The design should remain sensitive to local, national, and international educational trends in blended and online education, which are influenced by the continually evolving nature of online learning technologies. In addition, the requirements of potential employers who demand a certain skill-set from accounting graduates, also warrant consideration.

9.2.2 The PACE-IT model

The design criteria previously outlined and supporting five design informants synthesised to form the PACE-IT model, as displayed in Figure 9.1. The design criteria or ‘sensitivities’ are depicted as overlapping circles, indicative of the commonalities which prevail among the themes, with the collaboration theme central to the success of the model in achieving engagement, understanding, and learner autonomy. The design informants which emerged through the course of the study are portrayed along the outer edges of the pentagon, representing their influence on the design process.

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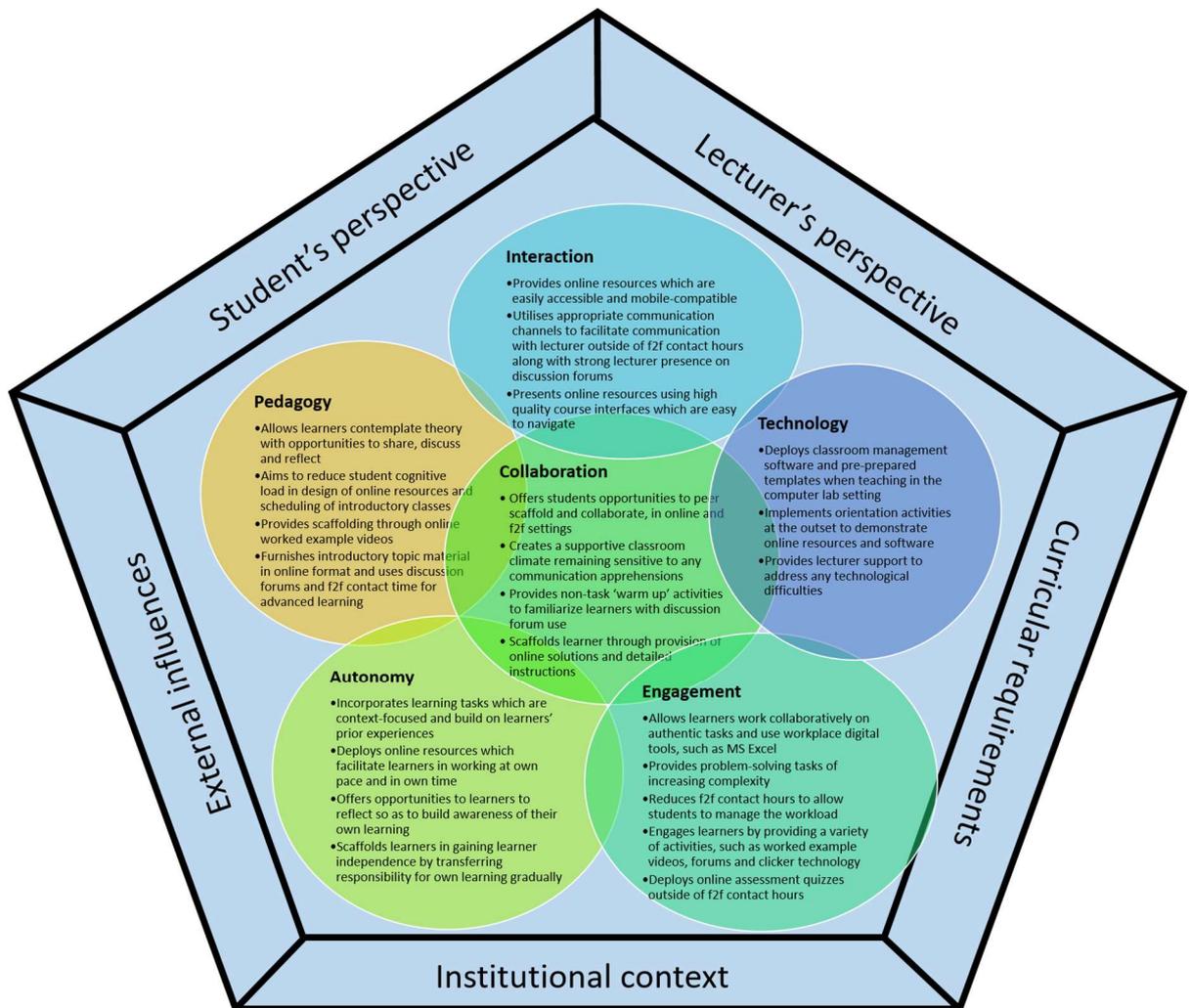


Figure 9.1 *The PACE-IT model for blended learning in accounting*

9.3 Summary of findings

The research questions, as set out in the introductory chapter, have been answered through the thesis as follows.

1. *How can blended learning be designed to enhance the learning experience of introductory accounting students at tertiary level?*
 - a. *Does blended learning create new engaging and collaborative possibilities for learners of introductory accounting to enhance their learning experience?*
 - b. *If so, what are these new engaging and collaborative possibilities?*

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A comprehensive narrative account of how BL can be designed to enhance the learning experience of tertiary level introductory accounting students has been provided within this thesis. The BL approach adopted within this study was defined in chapter two as follows: *the thoughtful integration of classroom f2f learning experiences and online learning experiences, to achieve synergies between innovative pedagogical and technological approaches* derived from the definition proposed by Garrison and Kanuka (2004). Chapter four elucidates the theoretical framework underpinning the BL design. A BL approach which offered f2f and online interactive, engaging and collaborative experiences, incorporating lecturer and peer scaffolding, along with a diversity of high-quality authentic learning activities and resources was rendered. The three iterative design cycles depicted within chapters five, six and seven, detail findings from multiple datasets which reveal an enhanced learning experience for learners engaging in the BL approach. As discussed in chapter eight, modifications actualised within the design led to optimised effects as the design evolved over the three cycles. The output at the end of the third DBR cycle was a robust, adaptable and adoptable design framework for utilisation in the development of a BL intervention to enhance the learning experience for introductory accounting students in tertiary education, as detailed within the current chapter.

2. *What are the characteristics of an effective blended learning intervention in introductory accounting at tertiary level?*

This thesis provides a set of design criteria or ‘design sensitivities’ which characterise the design of an effective BL intervention in introductory accounting education, under the headings of pedagogy, autonomy, collaboration, engagement, interaction, and technology. These criteria are embodied within the newly developed multi-dimensional PACE-IT framework. Grounded in the theories propounded within chapter four, they formed the basis upon which the prototype PACE-IT model was developed. The draft criteria were evaluated and refined based on the empirical study findings and further reviews of the literature throughout the three iterative design cycles, and are portrayed in detail within Section 9.2.1.1 of this chapter.

9.4 Contribution of the study

DBR is associated with the production of dual outcomes, whereby both theoretical and practical outputs are realised in the educational setting. This study has made the following significant contributions within the field of accounting education.

Firstly, the research has demonstrated, in methodological fashion, the potential of BL to enhance the learning experience of introductory accounting students in tertiary education. Cobb *et al.* (2003) suggest that contributing to a theory of learning is a key feature of design research studies, describing them as “crucibles for the generation and testing of theory” (p. 9), their purpose being to “generate theories of teaching and learning” (p. 10). Within this monograph, the researcher has acknowledged the paucity of research which exists in accounting education, which has hampered innovations in learning and teaching in the domain. Moreover, a notable absence of theoretically-grounded research within blended learning has been recognised, particularly in the accounting education field, a dearth which is even more evident within the Irish accounting education context. This study has advanced knowledge by making a tangible contribution to learning theory in the area of accounting education, as the emerging theoretical understandings will act to inform others who may wish to reproduce the BL intervention within their own setting. The researcher has contributed to the discourse around teaching and learning in accounting (see details of publications arising from this research in Appendix 1) and plans to further disseminate research findings to enact educational change in the accounting field. Therefore, this study makes a significant contribution to knowledge of learning and teaching, including use of educational technology, within the accounting education field.

Additionally, while design-based research studies achieve an advancement in learning theory, the designed solutions that are generated and refined through the DBR process represent practical, empirically-grounded solutions developed in response to a problem within a particular context. Accounting educational research has been further criticised for its disconnection to practice. This study provides a practical research output in the form of the BL intervention which was designed within the introductory financial accounting modules to enhance learner experiences.

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The PACE-IT conjecture map provided earlier in Figure 8.2 acts as an output of the research, as it provides an overview of the elements, processes and outcomes of the BL design model. A number of other valuable learning resources which stand in their own right as important practical research outputs, and could be shared with others and used independently of the BL intervention, include the online learning resources and assessment quizzes, f2f learning tasks, MS Excel tutorial and reflection handouts, and assessment grading rubric.

Finally, the rich detailed account of the longitudinal DBR process within this thesis, demonstrates how a BL intervention was designed and developed to enhance the learning experience in an introductory accounting module. This detailed narrative account, along with the PACE-IT design model and guidelines can be adapted and adopted by other design researchers, educators and educational technologists, in designing BL interventions for use in accounting education at tertiary and other levels of education.

9.5 Conclusion

The three cycles of BL design implemented with first-year undergraduate students demonstrated the impact of a BL intervention on the learning experience of introductory accounting students, particularly in providing collaborative opportunities which enhanced their perceived levels of understanding, engagement and autonomy.

The majority of students who participated in this study reported enhanced understanding following use of a teaching approach embodying authentic learning tasks where students could “see the connections” between learning content. This resulted in students attesting a reduced reliance on rote learning. The ability to engage in authentic tasks and use digital workplace tools added to students’ levels of understanding and allowed them to appreciate the relevance of the learning tasks being undertaken. Students revealed augmented confidence levels in financial accounting, which they attributed to the immediate, continuous accessibility and diversity of online resources coupled with the peer scaffolding support provided

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through online and f2f class interactions. Furthermore, improvements were exhibited in confidence levels pertaining to use of technology and MS Excel.

The BL model provided an adequate mix of f2f and online learning time, allowing direct access to the lecturer while also affording students the time to learn independently. This offered students a degree of flexibility around their learning time, conducive to managing their other time commitments. Students used online resources in diverse ways, for revision or first-time learning, depending on their levels of prior knowledge, allowing each student to carve a unique learning path. The opportunities afforded by online learning and assessment resources for students to work in their own space and time devolved control to learners, allowing them to take a greater level of responsibility for their own learning.

Students articulated how BL led to more enjoyable learning experiences, and that they demonstrated a greater level of interest in the financial accounting modules as a result. Students were affirmative in relation to the collaborative in-class activities which allowed them to participate more actively in f2f classes, with novel activities such as clickers described by students as “fun” and “engaging”. As first-year students, f2f collaborative tasks proved conducive for getting to know one another, helping to build a “community feeling” within the class group. Online discussion forums facilitated the sharing of ideas, cultivated understanding, and encouraged collaboration and critical thinking. They acknowledged the support provided by the lecturer through maintaining a constant scaffolding presence on forums. Students articulated that they learned, from both interacting directly with one another and vicariously, using discussion forums. Many students referred to the insights achieved from being exposed to the ideas of others through f2f group activities and online forums.

It is evident that the BL design has acted to enhance the learning experience of the introductory accounting students by transforming learner perceptions, facilitating conceptual understanding, yielding emotional qualities, and nurturing the acquisition of knowledge, skills and attitudes.

9.6 Limitations of the study

The findings of this research study support the design and implementation of a BL model for use with introductory accounting students within tertiary education using a DBR approach. Nonetheless it must be acknowledged that the following limitations may have impinged upon the study findings.

Firstly, study participants were studying financial accounting in first year of BA in Accounting and BA in Accounting and Law programmes, the majority of whom planned on pursuing careers in the accountancy field following graduation. Once they achieve their Level 8 degree, most of these students engage in contracts with accountancy firms and pursue further accounting training in order to attain a professional accountancy qualification. Many other non-accounting student groups undertake compulsory introductory accounting modules as part of their college programmes, for example, students on general business or hospitality programmes. However, this study is limited by the fact that it did not investigate the BL experiences of such students when undertaking introductory accounting modules.

Another limitation was posed by the fact that the current study excluded participants who were aged under 18 at the commencement of the study due to the additional ethical requirements which would be imposed, including the need for parental consent. Despite the fact that these students reached the age of 18 during the course of the study, data thereafter in relation to these students were not included as they had not completed the pre-implementation survey. While these students were in a minority, and the researcher believes that the data collection and analysis revealed the overall views of the group, nonetheless, exclusion of their views may be perceived as a study limitation.

On the contrary, limitations that impacted on the current study also reveal areas for further research, and these are outlined in the next section.

9.7 Recommendations for future research

To address the limitations discussed above, future research could explore how a BL intervention may be designed to support students on non-accounting specific

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programmes when learning introductory accounting. In addition, research which included the perspectives of participants aged under eighteen years may also add further insights into the BL intervention design.

The focus of this study was the design of a BL intervention for use when teaching introductory accounting in the tertiary education sector. There exists potential for future research into the use of BL at advanced accounting levels. This would throw light onto challenges which may be encountered, and adaptations necessary, when delivering more complex accounting material in a blended format.

Many commonalities exist between introductory accounting programmes at tertiary level and the leaving certificate accounting subject, due to the number of students commencing accounting programmes who have not completed the leaving certificate accounting subject. Research in the future could examine the use of online learning materials or BL in the accounting subject at secondary level and produce an online set of shareable resources which would benefit students at that level.

The covid-19 pandemic arose at the end of this study's final design iteration, following data collection in cycle three, with resultant implications for all levels of education in terms of learning and assessment practices. The tertiary sector will be particularly affected in the ensuing academic year, due to the substantial presence of international students coupled with the necessity to meet social distancing requirements within Irish HEIs. Delivery mechanisms are being rapidly catapulted into blended and online formats with limited time available for planning and preparation. There exists huge scope for research into suitable models of delivery for accounting in light of this new and unfamiliar educational context.

9.8 Researcher influences and learning path

My journey through this research process has not only extended my research skills, but also transformed my attitude towards teaching practices. I embarked on a postgraduate diploma in education at age 23 with just one year's teaching experience. While admittedly, my study of education theories at that time was less in-depth than presently, my PhD research coupled with the vast teaching experience

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I have since gained, have enabled me to wholly appreciate the relevance of these learning theories.

As a PhD student, tertiary-level lecturer and parent of five primary and secondary school-going children, I have had multiple opportunities to observe and reflect on learning instances and effects at various education levels. Having immersed myself in the writings of many learning theorists, I began to realise the valuable learning which can be gained from everyday experiences. These learning theories stood me in good stead, as a parent, during the recent home-schooling efforts imposed due to the covid-19 pandemic. On sunny days in early summer, the maths book often lay neglected on the kitchen table. However, in Dewey-like thinking, I was re-assured that there was learning involved in estimating the space to allow when planting seedlings in a raised-bed, or when standing in front of goal and figuring out the force and angle at which the ball must be kicked in order to score a point or achieve a conversion! When the kids were so engrossed in the football match on the front lawn that they did not want to come in for dinner, I could hear Csikszentmihalyi declaring that they were in a 'state of flow'! We, as educators, often fail to consider the 'present life-experience' of our students when planning learning activities. We should harness every opportunity to adapt our learning materials to the interests, needs, and capacities of our learners in order to bring their learning to life!

As a tertiary-level lecturer who previously taught in the second-level system, the pressure to deliver learning content has been deeply ingrained within me. The leaving certificate curriculum, with its vast content and short delivery timeframe, lends itself to a rote-learning approach, something which featured prominently in student feedback during this study. The covid-19 pandemic has shed much light on the challenges within our second-level system, with a resultant intensification of pressure to change the current leaving certificate terminal assessment system.

Likewise, accounting module syllabi at tertiary level are heavily influenced by requirements of professional accountancy bodies, in order to meet accountancy certification. This causes a similar pressure in relation to learning content coverage. For this reason, initially I often felt guilty when allowing students time to reflect in class using learning journals due to the diminished time available for content

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delivery. However, as I became acquainted with the work of learning theorists such as Piaget who argued that learning was perceived by each student in an individual way, I realised that what the teacher taught was not always identical to what the student learned. Dewey's claim that "almost everyone has had occasion to look back upon his school days and wonder what has become of the knowledge he was supposed to have amassed during his years of schooling" (Dewey, 1938, p. 47) resonated strongly with me. These assertions made me question whether the content I was 'delivering' was actually being 'received' by students! By the third design iteration, through linking theory with practice, I could see the metacognitive benefits for students in building an awareness of their thinking and learning processes in order to take control of their own learning. I realised that it is important to allow learners to step back from their learning sometimes to survey what, and how, they have actually learned. My transformation as a lecturer during the PhD journey in handing control over to the students, while supporting them in becoming autonomous, became apparent.

When presenting my research in accountancy circles and exploring the literature, I became aware of the value attached to accounting research which measures and controls variables with the aim of achieving statistical significance. Accountants have an innate tendency towards quantitative areas where they use numerate information to measure and control business performance. However, just as many business decisions are influenced by non-financial factors, any study of accounting education should not ignore the qualitative factors that influence a student's education. These are difficult to measure, and even more so if you are striving for accuracy, but that does not mean that they should be ignored! The unique role I played as designer/lecturer offered deep, qualitative insights into many aspects of my students' lives. As time progressed, I realised that there are a myriad of influences in a student's life which impact on learning which are outside of my control, as Kahu's engagement framework epitomises (Kahu, 2013; Kahu and Nelson, 2018). One capable study participant, who under-performed in his semester 1 exams, spoke to me about a recent health condition diagnosis which was impacting on his ability to play sport with a resultant loss of interest in his academic studies. I began to realise that the unique characteristics and situation of each individual student within a

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cohort made it virtually impossible for any researcher to conduct a ‘controlled experiment’. I could appreciate the view of Ann Brown (1992) when she proposed ‘design experiments’, which involved “a trade-off between experimental control and richness and reality” to deal with the multivariate, multifaceted nature of an educational investigation (p. 152). We, as researchers, can only strive in camera-crew style to view the interwoven aspects of the students’ learning experience from as many angles as possible, and portray a picture with sufficient detail to allow us decipher what is working well and what needs to change.

While engrossed in this in-depth longitudinal educational investigation, I became aware, from reading the work of Vygotsky among others, of the paramount importance of the social context of learning. In particular, the influence of the lecturer on each individual student’s life became increasingly evident to me. As a daughter of a primary school infants class teacher, I was perpetually aware of the influential role of ‘mother figure’ which she played in the life of the young child commencing on his or her path in education. I held a strong belief that this role lessened to near insignificance as the student progressed through advanced tiers of education. However, this research has highlighted for me the influential role that the tutor continues to play throughout all levels of the education system. I observed, with a discerning eye, as my own teenagers were positively impacted by the teacher who enquired about their camogie match at the weekend, or the work that was ongoing on the home farm. Student feedback during this research highlighted to me that students are more motivated to work when they perceive their lecturer as being organised and expressing a genuine interest in them as people, as encapsulated by one student when he noted:

I just thought it was quite clear that the lecturer put in a lot of effort and actually cares about our educational goals being met which I think really makes you want to work harder. It's kind of like, the atmosphere is better in this module than in others. (2019-20 Student 15, survey response)

I am overwhelmed by the ability we hold, as educators, to influence each student’s path in life. The impact the lecturer has, particularly on the vulnerable student who may be struggling with some issue or apprehension, has become palpable, succinctly put into words by Palmer (1998, p. 22) when he stated “that the imprint of good teachers remains long after the facts they gave us have faded”. My role is of

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paramount importance in terms of the efforts I can make to incite learners' interests and meaningfully engage them, placing them on the path towards positive career and life outcomes. I feel it is my duty, as an educator, to strive continually to make a valuable impact!

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Appendices

Appendix 1: Publications arising from this research

Conference presentations:

Kelly, O. (2018) 'Blended learning – incorporating innovation in course delivery in accounting in tertiary education', *Paper presented at the School of Education postgraduate research seminar*. 11 April 2018, NUI Galway, Ireland.

Kelly, O. (2019) 'Blended learning design in accounting – theory-informed practice', *Paper presented at the School of Education postgraduate research seminar*. 10 April 2019, NUI Galway, Ireland.

Kelly, O. (2019) 'Blended learning – incorporating innovation in accounting education', *Paper presented at CESI annual conference*. 2 March 2019, Athlone Institute of Technology, Athlone, Ireland.

Kelly, O. (2019) 'Innovative and interactive accounting education using blended learning design', *Paper presented at the Irish Accounting and Finance Association doctoral colloquium*. 15 May 2019, Dublin City University, Dublin, Ireland.

Kelly, O. (2020) 'Incorporating CLT principles in online video production', *Paper presented at the Irish Accounting and Finance Association teaching and learning seminar*. 15 January 2021, Online.

Appendix 2: Participant information sheets

01 October 2019

Participant Information Sheet

Title: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Objective of study: To use information and communication technologies (ICT) in innovative and interactive ways to investigate if blended learning can be used to improve the teaching and learning experience in introductory accounting.

You are being invited to take part in a research study. The study is being conducted by Orlaith Kelly as part of her postgraduate studies at National University of Ireland, Galway (NUIG) and supervised by Dr Tony Hall (tony.hall@nuigalway.ie) and Dr Cornelia Connolly (cornelia.connolly@nuigalway.ie) from the School of Education at NUIG.

Before you decide, it is important for you to understand why the research is being done and what it will involve. This Participant Information Sheet will tell you about the purpose, risks and benefits of this research study. If you agree to take part, I will ask you to sign a Consent Form. If there is anything that you are not clear about, I will be happy to explain it to you. Please take as much time as you need to read it. You should only consent to participate in this research study when you feel that you understand what is being asked of you, and you have had enough time to think about your decision.

My study is concerned with investigating if blended learning can be used to improve the teaching and learning experience in introductory accounting. You have been asked to take part because you are studying introductory financial accounting at first year level in a third level college where you will experience the use of blended learning. I will be teaching two topics this year using blended learning and request your opinion on your experience.

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your rights in any way and in particular, will not affect the final grade which you will achieve in the financial accounting modules.

Appendices

If you decide to take part you will be asked to complete two online questionnaires – one at the beginning of the process and one at the end and complete a student journal during the weeks in which the blended learning is taking place. I will be recording your usage of the online resources on moodle and analysing your exam results. You may also be photographed during the learning process, provided you consent to do so. If you consent, these photographs may be used as part of the PhD thesis, included in academic journal articles and conference presentations. At the end of the process, a number of students will be requested to take part in a group interview which will be recorded on audio tape. Again, participation will be completely voluntary and if you agree to partake in the group interview, you will be asked to sign an additional consent form at that time.

Partaking in this research will allow you to voice your opinion on blended learning and influence its use in the future teaching of Accounting. There are no foreseeable risks attached to taking part. The results of the research will be included in a PhD thesis.

All information that is collected about you during the course of the research will be kept strictly confidential and will not be shared with anyone else. The information collected in this research study will be stored in a way that protects your identity. The recordings will be transcribed for analysis. I will store the original recordings securely until the end of the research study after which they will be destroyed. Results from the study will be reported as group data and will not identify you in any way. Your anonymity will also be protected in any photographs published.

If you do decide to take part you will be given this information sheet and a signed consent form to keep. I wish to re-emphasise that you are free to refuse to take part in the study without any disadvantage and if you do agree to take part, you can change your mind at any point during the study and decide not to continue in the study without any disadvantage.

If you have any questions, requests or concerns regarding this research, please contact me via email at okelly@ait.ie or by telephone at 087 2372450.

If you have any concerns about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie or the Chairperson of the AIT Research Ethics Committee, c/o Office of the Vice President for Research, AIT, ethics@ait.ie

Thank you for agreeing to take part in this study.

Sincerely

Orlaith Kelly

Date: _____

Think Aloud - Participant Information Sheet

Title: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Objective of study: To use information and communication technologies (ICT) in innovative and interactive ways to investigate if blended learning can be used to improve the teaching and learning experience in introductory accounting.

You have already agreed to take part in a research study being conducted by Orlaith Kelly as part of her postgraduate studies at National University of Ireland, Galway (NUIG) and supervised by Dr Tony Hall (tony.hall@nuigalway.ie) and Dr Cornelia Connolly (cornelia.connolly@nuigalway.ie) from the School of Education at NUIG. The study is concerned with investigating if blended learning can be used to improve the teaching and learning experience in introductory accounting. As part of this study, I am now requesting a participant to volunteer to take part in a think aloud protocol.

This Participant Information Sheet outlines what the think aloud protocol involves. It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your rights in any way and in particular, will not affect the final grade which you will achieve in the financial accounting modules.

The think aloud protocol will take place in a classroom within the college at a time which is convenient to you and the time commitment will be approximately one hour. During this time you will be asked to use a multimedia resource and speak your thoughts aloud as you work your way through the resource. For example, you may indicate elements of the resource which you find easy or difficult, which you like or dislike or parts which are confusing to follow.

You will also be recorded while I observe you using the multimedia resource. The recording will be transcribed for analysis and stored securely. If you wish, I can provide you with a copy of the transcript of the recording afterwards. All information obtained in the think aloud protocol will be kept strictly confidential. All identifying information will be removed from the collected materials, and all materials will be stored securely in a way that protects your identity.

If you have any questions, requests or concerns regarding this research, please contact me via email at okelly@ait.ie or by telephone at 087 2372450.

Appendices

If you have any concerns about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie or the Chairperson of the AIT Research Ethics Committee, c/o Office of the Vice President for Research, AIT, ethics@ait.ie

Thank you for agreeing to take part in the think aloud protocol element of the study.

Sincerely

Orlaith Kelly

Date: _____

Group Interview - Participant Information Sheet

Title: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Objective of study: To use information and communication technologies (ICT) in innovative and interactive ways to investigate if blended learning can be used to improve the teaching and learning experience in introductory accounting.

You have already agreed to take part in a research study being conducted by Orlaith Kelly as part of her postgraduate studies at National University of Ireland, Galway (NUIG) and supervised by Dr Tony Hall (tony.hall@nuigalway.ie) and Dr Cornelia Connolly (cornelia.connolly@nuigalway.ie) from the School of Education at NUIG. The study is concerned with investigating if blended learning can be used to improve the teaching and learning experience in introductory accounting. As part of this study, I am now requesting participants to volunteer to take part in a group interview.

This Participant Information Sheet outlines what the group interview involves. It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect your rights in any way and in particular, will not affect the final grade which you will achieve in the financial accounting modules.

I am requesting a small number of students to partake in a group interview to ask them questions relating to their views and experiences of the blended learning process in the financial accounting module. The time commitment will be approximately one hour. The group interview location will take place in the college at a time which is convenient to the participants and will most likely be in a classroom or meeting room, so you will not have to travel or incur any personal costs.

All information obtained in the group interview will be kept strictly confidential. All participants will be asked not to disclose anything said within the context of the group interview discussion. All identifying information will be removed from the collected materials, and all materials will be stored securely in a way that protects your identity. The recordings will be transcribed for analysis. I will store the original recordings securely until the end of the research study after which they will be destroyed.

Appendices

If you have any questions, requests or concerns regarding this research, please contact me via email at okelly@ait.ie or by telephone at 087 2372450.

If you have any concerns about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie or the Chairperson of the AIT Research Ethics Committee, c/o Office of the Vice President for Research, AIT, ethics@ait.ie

Thank you for agreeing to take part in the group interview element of the study.

Sincerely

Orlaith Kelly

Date: _____

Appendix 3: Consent forms

Participant Identification Number: _____

CONSENT FORM

Title of Project: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Name of Researcher: Orlaith Kelly

Please initial box:

1. I confirm that I have read the information sheet dated 01/10/2019 Version 4 for the above study and have had the opportunity to ask questions.
2. I am satisfied that I understand the information provided and have had enough time to consider the information.
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my legal rights being affected.
4. I consent to be photographed as part of this study.
5. I consent that the photographs may be published in a PhD thesis, academic journal articles or conference presentations.
6. I confirm that I am aged 18 years or over.
7. I agree to take part in the above study.

Name of Participant: _____

Date: _____

Signature : _____

Researcher: _____

Date: _____

Signature : _____

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Participant Identification Number: _____

CONSENT FORM - PARTICIPATION IN THINK ALOUD PROTOCOL

Title of Project: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Name of Researcher: Orlaith Kelly

Please initial box

1. I am satisfied that the think-aloud protocol has been fully explained to me and I understand that I will be audio-taped as I take part.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my legal rights being affected.
3. I agree to take part in the think-aloud protocol.

Name of Participant: _____

Date: _____

Signature : _____

Researcher: _____

Date: _____

Signature : _____

Appendices

Participant Identification Number: _____

CONSENT FORM – PARTICIPATION IN GROUP INTERVIEW

Title of Project: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Name of Researcher: Orlaith Kelly

Please initial box:

- 1. I confirm that I am participating in the above study and have previously given consent to same.
- 2. I now agree to take part in the group interview element of this study.
- 3. I agree to be recorded during the group interview.
- 4. I agree to be photographed during the group interview.
- 5. I agree to be quoted directly if a made-up name (pseudonym) is used.
- 6. I agree that the researcher may publish documents that contain quotations by me.

Name of Participant: _____

Date: _____

Signature : _____

Researcher: _____

Date: _____

Signature : _____

Appendices

Appendix 4: Ethical approval



Leas-Uachtarán
um Thaighde

Vice President
for Research

13 September 2017

Ref: 17-Sep-13

Orlaith Kelly
School of Education
NUI Galway

Dear Orlaith,

Re: 'Blended learning – incorporating innovation in course delivery in Accounting in the Institute of Technology sector'

I write to you regarding the above proposal which was submitted for ethical review. I am pleased to inform you that at the meeting of the Research Ethics Committee, held on 28 June 2017, your proposal was granted APPROVAL, with the following terms:

1. The application states that records will be destroyed after the viva. These should be stored for 5 years, in accordance with institution guidelines.

Please confirm your acceptance of the terms above by emailing ethics@nuigalway.ie within 14 days of receipt of this letter, quoting the reference number 17-Sep-25.

When the decision was taken, Brian Hallahan was chairing the meeting and the following members were also present:

Dr Kevin Davison

Dr Cormac Forkan

Dr Brian Hallahan

Dr Martina Kelly

Dr Kiran Sarma

Mr Patrick Towers

All NUI Galway Research Ethic Committee approval is given subject to the Principal Investigator submitting annual and final statements of compliance. The first statement is due on or before 3 July 2018. See annual and final statement of compliance forms below.

Section 7 of the REC's Standard Operating Procedures gives further details, and also outlines other instances where you are required to report to the REC.

Yours sincerely

Jane Walsh

Acting Chair, Research Ethics Committee

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Appendices



4 October 2017

Orlaith Kelly
Faculty of Business and Hospitality
AIT

Re: Blended learning – incorporating innovation in course delivery in Accounting in tertiary education

Dear Orlaith

I write to you regarding the above proposal which was submitted for ethical review. I am pleased to inform you that at the meeting of the Research Ethics Committee, held on 29th September 2017, your proposal was granted APPROVAL, with the following terms:

- This application was very well presented.
- The committee noted that the information sheets made mention of an additional consent form. The committee would like to get sight of this additional consent form.

Please confirm your acceptance of the terms above by emailing ethics@ait.ie on or before the 20th October 2017.

We wish you every success with your research.

If you have any questions please do not hesitate to contact me.

Kind Regards

Dr Mary McDonnell Naughton
CHAIR
Research Ethics Committee

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Appendices

Appendix 5: Ethical approval – cycle 2 questionnaire amendment



Leas-Uachtarán
um Thaighde

Vice President
for Research

5 October 2018

Ref: 17-Sept-13; Amend 1810

Orlaith Kelly
NUIG

Dear Orlaith,

Re: 'Blended learning – incorporating innovation in course delivery in Accounting in the Institute of Technology sector'

I write to you regarding amendment to the above proposal. I am pleased to inform you that your amendment, as described below, has been **APPROVED**:

- to collect additional data from participants investigating students' experience of blended learning including their interaction with the technology, the instructor and their classmates, using the Personal Report on Communication Apprehension (PRCA-24)

All NUI Galway Research Ethics Committee approval is given subject to the Principal Investigator submitting annual and final statements of compliance.

See annual and final statement of compliance forms below. Section 7 of the REC's Standard Operating Procedures gives further details, and also outlines other instances where you are required to report to the REC.

Yours sincerely

Kevin Davison
Chair, Research Ethics Committee

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Wednesday, 10 October 2018

Dear Orlaith,

Re: 'Blended learning – incorporating innovation in course delivery in Accounting in the Institute of Technology sector'.

We acknowledge receipt of your requested amendment to the above proposal.

I am pleased to inform you that your amendments, as described below, have been **APPROVED:**

'to collect additional data from participants investigating students' experience of blended learning including their interaction with the technology, the instructor and their classmates, using the Personal Report on Communication Apprehension (PRCA-24)

If you require this letter of approval in hard copy, please email researchethics@ait.ie

Yours Sincerely

Dr Mary McDonnell Naughton
Chair, Research Ethics Committee
Athlone Institute of Technology

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**Appendix 6: Pre-implementation survey questionnaire – 2019-20
(design cycle 3)**

No.	Question	Question type
Q1	Please state your AIT student ID number.	Open-ended
Q2	What is your age?	<ul style="list-style-type: none"> • Less than 18 yrs; • 18-22 yrs; • 23-32 yrs; • 33 yrs and over
Q3	What is your gender?	Male/Female
Q4	Please state your nationality	Open-ended
Q5	Are you an international student (a student from abroad who is currently studying in AIT)?	Yes/No
Q6	Where do you stay during the college week?	<ul style="list-style-type: none"> • Living at home and commuting to college • Living in student accommodation in Athlone • Other
Q7	How do you travel to college each day?	<ul style="list-style-type: none"> • Walk • Cycle • Bus • Driving own car • Getting a lift in someone else's car • Train • Other
Q8	What distance (one-way) do you commute to college each morning?	<ul style="list-style-type: none"> • Less than 10km; • 10-20km; • Greater than 20 km
Q9	How long does it take you to commute to college each morning?	<ul style="list-style-type: none"> • Less than 15 mins; • 15-30 mins; • 30 mins – 1 hr; • 1-2 hrs; • Over 2 hrs
Q10	Do you have any other time commitments, apart from studying on this course (please tick all boxes that apply)?	<ul style="list-style-type: none"> • No other time commitments; • Part-time job; • Dependent children; • Carer for a sick relative; • Heavy involvement in sport; • Other (please specify)
Q11	What programme are you currently studying on?	<ul style="list-style-type: none"> • BA in Accounting yr1; • BA in Accounting & Law yr1

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Q12	Prior to embarking on the BA in Accounting / BA in Accounting & Law, what is the highest level of education you have completed?	<ul style="list-style-type: none"> • Leaving certificate; • Third-level access/foundation programme; • FETAC Level 5 certificate programme; • Undergraduate Level 6 certificate programme; • Undergraduate Level 7 ordinary degree programme; • Undergraduate Level 8 honours degree programme; • Other (please specify)
Q13	Prior to commencing on the BA in Accounting course, what is the highest level at which you had studied Accounting?	<ul style="list-style-type: none"> • Junior Certificate Business Studies; • Leaving Certificate Accounting – ordinary level; • Leaving Certificate Accounting higher level; • Certificate in Accounting (post-leaving cert); • Other (please specify)
Q14	Have you previously studied on an online course?	Yes/No
Q15	Have you any previous experience of learning using a mix of online and face-to-face classes ('blended learning')?	Yes/No
Q16	Prior to commencing on the BA in Accounting or BA in Accounting & Law course, have you ever taken an online exam?	Yes/No
Q17	Prior to commencing on the BA in Accounting or BA in Accounting & Law course, have you had any previous experience of using a VLE (virtual learning environment) eg Moodle, Blackboard?	Yes/No
Q18	How would you rate your skill as a computer user?	5 point likert scale (not skilled, small degree of skill, moderate degree of skill, highly skilled, extremely highly skilled)
Q19	How would you rate your skill in the use of Microsoft Excel, before commencing on this course?	5 point likert scale (not skilled, small degree of skill, moderate degree of skill, highly skilled, extremely highly skilled)
Q20	Please select ONE statement below which best describes you.	<ul style="list-style-type: none"> • I almost always prefer working in a team • I usually prefer working in a team

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		<ul style="list-style-type: none"> • I enjoy both teamwork and working alone • I usually prefer working alone • I almost always prefer working alone
Q21	<p>This section is composed of 24 statements about communicating with other people. Please indicate the degree to which each statement applies to you:</p> <ul style="list-style-type: none"> • I dislike participating in group discussions • Generally, I am comfortable while participating in group discussions • I am tense and nervous while participating in group discussions • I like to get involved in group discussions • Engaging in a group discussion with new people makes me tense and nervous • I am calm and relaxed while participating in group discussions • Generally, I am nervous when I have to participate in a meeting • Usually I am calm and relaxed while participating in meetings • I am very calm and relaxed when I am called upon to express an opinion at a meeting • I am afraid to express myself at meetings • Communicating at meetings usually makes me uncomfortable • I am very relaxed when answering questions at a meeting • While participating in a conversation with a new acquaintance, I feel very nervous • I have no fear of speaking up in conversations • Ordinarily I am very tense and nervous in conversations • Ordinarily I am very calm and relaxed in conversations 	5 point likert scale (strongly disagree, disagree, undecided, agree, strongly agree)

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	<ul style="list-style-type: none"> • While conversing with a new acquaintance, I feel very relaxed • I'm afraid to speak up in conversations • I have no fear of giving a speech • Certain parts of my body feel very tense and rigid while giving a speech • I feel relaxed while giving a speech • My thoughts become confused and jumbled when I am giving a speech • I face the prospect of giving a speech with confidence • While giving a speech, I get so nervous I forget facts I really know 	
Q22	Please identify any worries you may have in relation to studying the Financial Accounting subject (please tick all boxes that apply)	<ul style="list-style-type: none"> • Worried that I may not have enough time to properly study for the subject • Worried about the large quantity of material which must be learned in this subject • Worried that I may find it difficult to keep up with the rest of the class • Fear of not being competent in using technology • Worried that I may not like the financial accounting subject • Worried about sitting the final two-hour exam • Worried about taking online continuous assessments • Fear of not passing the financial accounting subject • Other (please specify)
Q23	Please rate your level of worry in relation to studying on the Financial Accounting subject	Rate on a scale from 0 (not worried) to 10 (extremely worried)
Q24	Have you any idea about what area you would like to work in on completion of your degree? If so, please tell me about it here.	Open-ended
Q25	If you have any additional comments you would like to make, please enter them here.	Open-ended

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**Appendix 7: Post-implementation survey questionnaire – 2019-20
(design cycle three)**

No.	Question	Question type
Q1	Do you consent to participate in this questionnaire?	Yes/No
Q2	Please state your AIT student ID number.	Open-ended
Q3	Please rate the usefulness of the following course elements on the Financial Accounting moodle page: <ul style="list-style-type: none"> • Multimedia videos (on Bank Reconciliation and Ratio Analysis) • Additional worked example videos (eg ratio analysis videos on Deacy question) • Continuous Assessment Quizzes • Ratio Analysis Discussion Forum • Course announcements and reminders from the lecturer • Course notes and solutions (in Excel) on moodle • Information about assignments and instructions for completing them 	5 point likert scale (Not at all useful, slightly useful, moderately useful, very useful, extremely useful)
Q4	Approximately how many hours did you spend viewing the Ratio Analysis multimedia resource?	0 hrs up to 7 hours or more
Q5	On average, how many hours did you spend on ONE moodle quiz? (include the time taken to complete the two attempts of the quiz AND the time spend studying for the quiz also)	0 hrs up to 7 hours or more
Q6	Identify where you have access to a computer, laptop or tablet. You may tick more than one box	At home or at student accommodation – on weekdays and at the weekend / At home but only on weekend / At college / Other
Q7	Identify where you have access to the internet. You may tick more than one box	At home or at student accommodation – on weekdays and at the weekend / At home but only on weekend / At college / Other
Q8	Which of the following did you use when viewing the online multimedia resources? You may tick more than one box	PC / Laptop / Tablet / Phone / Other
Q9	On average, how often do you access the Internet?	More than once per day / once per day / 4-6 times per week / 2-3

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		times per week / once per week / less frequently than once per week
Q10	On average, how often do you access moodle (for the financial accounting module and all your other modules)?	More than once per day / once per day / 4-6 times per week / 2-3 times per week / once per week / less frequently than once per week
Q11	After taking part in this blended learning course . . . <ul style="list-style-type: none"> • Do you think your skill as a computer user improved? • Do you think your skill in the use of Microsoft Excel improved? 	5 point likert scale (Not at all, small improvement, moderate improvement, high improvement, very high improvement)
Q12	How would you rate your current skill as a computer user?	5 point likert scale (not skilled, small degree of skill, moderate degree of skill, highly skilled, extremely highly skilled)
Q13	How would you rate your current skill in the use of Microsoft Excel, having completed this course?	5 point likert scale (not skilled, small degree of skill, moderate degree of skill, highly skilled, extremely highly skilled)
Q14	The following statements are concerned with your view on the flexibility of the blended learning process. Blended learning allowed me to: <ul style="list-style-type: none"> • Have more flexible learning time • Take more responsibility for my own learning • Save time on unnecessary travel to college • Better manage my other commitments outside of college • Access lessons on moodle on days when I am absent from class • Save money on unnecessary travel to college 	5 point likert scale (strongly disagree to strongly agree)
Q15	The following statements are concerned with your view on the effect of the blended learning process on how you interacted with your lecturer and classmates. Blended learning provided: <ul style="list-style-type: none"> • More access to the lecturer outside of class 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • Better interaction between the lecturer and students • Better interaction with my classmates • Less opportunities to interact with my lecturer • Good communication channels with my lecturer (email, discussion forum etc.) • An improvement in my team-working skills 	
Q16	<p>The following statements are concerned with your view on the effect that the blended learning process had on your learning in Financial Accounting. Blended learning led to:</p> <ul style="list-style-type: none"> • Better understanding of the course content • Better learning experiences compared to face-to-face classroom only • Easier revision of previously learned material • Increased learning outside of the classroom • Higher learning achievement in this course • Difficulties for me in learning the course content • More opportunities for me to learn from others • Out-of-class activities that were too demanding • An improvement in my critical thinking skills • Greater interest for me in the financial accounting subject • More confidence in my ability in financial accounting 	5 point likert scale (strongly disagree to strongly agree)
Q17	<p>The following statements are concerned with your participation and engagement in the blended learning process. Blended learning encouraged me to:</p> <ul style="list-style-type: none"> • Engage in the learning activities • Skip face-to-face classes • Participate in class activities • Contribute to course materials (eg comment and participate in discussions) • Collaborate and share ideas • Decrease my productivity in class (eg less participation in activities in class) 	5 point likert scale (strongly disagree to strongly agree)
Q18	<p>The following statements are concerned with your experience of using the online multimedia (video) resources on Bank Reconciliation and Ratio Analysis.</p> <ul style="list-style-type: none"> • The screen layout of the resource was visually pleasing 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • I liked the graphics and images used in the resource • I blocked out things around me when I was using this resource • I was so involved in using this resource that I lost track of time • Using this resource was worthwhile • I would recommend that others use this resource • I felt frustrated while using this resource • Using this resource was stimulating • Using this resource was difficult • I continued to use this resource out of curiosity • This resource is useful for revision of a topic before the final exam • This resource helped to improve my accounting knowledge of bank reconciliation / ratios • Using this resource was quite enjoyable • I disliked not being able to ask the lecturer questions while watching the resource • After using the resource, I felt that there was no need to attend class • Using this resource was a boring activity • I took notes while watching the resource • I was anxious while using the resource • This resource allowed me to work at my own pace • This resource was fun to use • Slow internet speeds made this resource less effective 	
Q19	<p>The following statements are concerned with your experience of the use of online moodle quizzes for continuous assessment.</p> <ul style="list-style-type: none"> • The moodle assessment quizzes were effective in assessing my level of knowledge • I prefer continuous assessment using an in-class assessment rather than a moodle quiz • I liked being able to sit the assessment in my own time • I liked being able to have more than one attempt at the online assessment 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • I studied more in order to increase my score on the second attempt • I liked getting instant feedback on my result once I completed the quiz • The moodle assessment quizzes prepared me well for the end-of-semester exam • Moodle assessment quizzes result in better feedback to students than in-class assessments • I used the moodle quizzes as a revision aid before the final exam 	
Q20	Before commencing on this course, had you ever used an online discussion forum?	Yes/No
Q21	<p>The following statements are concerned with your experience of the use of discussion forums during SEMESTER ONE</p> <ul style="list-style-type: none"> • The introductory discussion forum in September helped me to get to know others in my class • Experience of posting comments on discussion forums in semester 1 made it easier to use the ratio analysis discussion forum in semester 2 • Using discussion forums in semester 1 was not helpful for me 	5 point likert scale (strongly disagree to strongly agree)
Q22	Did you post a comment on the ratio analysis discussion forums during SEMESTER TWO?	Yes/No
	If you did not post a comment, why not?	Open-ended
Q23	<p>The following statements are concerned with your experience of the use of the ratio analysis discussion forum for continuous assessment.</p> <ul style="list-style-type: none"> • My learning improved from reading the comments of others on the discussion forum • The discussion forum made it easier for me to complete the ratio analysis report • Posting my own comments on the discussion forum increased my learning • I felt that the discussion forum did not improve my learning • The discussion forum improved my critical thinking skills 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • I felt anxious about commenting on the discussion forum • The discussion forum increased my study time on ratio analysis outside of the classroom • The discussion forum improved my written communication skills • The discussion forum allowed me to collaborate and share ideas 	
Q24	<p>The following statements are concerned with your experience of the use of technology as part of the blended learning course format.</p> <ul style="list-style-type: none"> • The use of blended learning has increased my confidence in using technology • Accounting classes in the computer laboratory have increased my confidence in the use of Microsoft Excel • I felt confident using Microsoft Excel during financial accounting classes • My lack of technology skills made this subject difficult for me • I had difficulties accessing the online resources • Broadband connectivity problems at home made access to online course materials and quizzes difficult for me • Broadband connectivity problems at college made access to online course materials and quizzes difficult for me • I would have liked access to technical support while taking part in this blended learning course 	5 point likert scale (strongly disagree to strongly agree)
Q25	<p>The following statements are concerned with your experience of the face-to-face teaching used in the Financial Accounting module.</p> <ul style="list-style-type: none"> • The lecturer had a sufficient knowledge of the subject to answer students' questions • The lecturer adjusted her teaching approaches based on the students' level of understanding • The questions we worked on in class are similar to problems I might encounter in my future career as an accountant • The teaching approaches used made me stay interested in the content of the accounting subject • The assessment methods used evaluated my understanding of the accounting subject 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • I enjoyed the use of group-work activities during face-to-face classes • Use of group-work activities during financial accounting classes increased my learning • I felt uncomfortable during group-work activities during financial accounting class • Working in groups during financial accounting class allowed me to learn from others • The use of ‘clicker’ technology in this module made the teaching of ratio analysis more effective • The use of ‘clicker’ technology increased my understanding and learning of ratio analysis • I disliked using the ‘clickers’ during the financial accounting class • The ‘clicker’ technology was fun to use • Using ‘clickers’ allowed me to take part more actively in financial accounting class 	
Q26	In relation to the bank reconciliation topic, select the statement which best describes how you feel.	I would have liked less F2F hours / I would have liked more F2F hours / I received the correct amount of F2F hours
	Please give reasons for your answer	Open-ended
Q27	In relation to the ratio analysis topic, select the statement which best describes how you feel.	I would have liked less F2F hours / I would have liked more F2F hours / I received the correct amount of F2F hours
	Please give reasons for your answer	Open-ended
Q28	<p>Below, you will see a series of statements concerning your learning experiences to date. Read each statement carefully and indicate your level of agreement by selecting 1-5 on the scale below each statement.</p> <ul style="list-style-type: none"> • I feel that students in this class group care about each other • I feel that I am encouraged to ask questions • I feel connected to others in this class group • I feel that it is hard to get help when I have a question • I do not feel a spirit of community • I feel that I receive timely feedback 	5 point likert scale (strongly disagree to strongly agree)

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	<ul style="list-style-type: none"> • I feel that this class is like a family • I feel uneasy exposing gaps in my understanding • I feel isolated in class • I feel reluctant to speak openly • I trust others in this class group • I feel this module results only in modest learning • I feel that I can rely on others in this class • I feel that other students do not help me to learn • I feel that members of this class group depend on me • I feel that I am given ample opportunities to learn • I feel uncertain about others in this class group • I feel that my educational needs are not being met • I feel confident that others will support me • I feel that this module does not promote a desire to learn 	
Q29	<p>Please indicate whether you agree with the following statement relating to blended learning and face-to-face teaching:</p> <ul style="list-style-type: none"> • I prefer to learn using blended learning (mix of online and face-to-face teaching) rather than face-to-face teaching only 	5 point likert scale (strongly disagree to strongly agree)
	Please give reasons for your answer to this question	Open-ended
Q30	Would you like to see blended learning offered across more topics in the Financial Accounting module?	Yes / No / Don't know
	Why?	Open-ended
Q31	Would you like to see blended learning offered in other subjects/modules on your course?	Yes / No / Don't know
	Why?	Open-ended
Q32	From your experience studying on the financial accounting module, what did you like most about the blended learning process?	Open-ended
Q33	From your experience studying on the financial accounting module, what did you like least about the blended learning process?	Open-ended
Q34	Is there anything that could be done differently next year to ensure blended learning is a positive experience for students?	Open-ended

Appendix 8: Group interview schedule – March 2020 (design cycle 3)

Accounting

- How does learning financial accounting (or accounting) differ from other subjects on your course?
- Have you noticed any changes to the way you learn accounting using blended learning?

Interaction

- Has the blended learning process changed the way you interact with the lecturer?
- Has blended learning changed the way you interact with your classmates?

Collaboration

- Did blended learning have any effect on the way you work together?
- What effect did blended learning have on the way you learn from one another?

Participation / engagement

- Did blended learning have any effect on in-class participation?
- Did blended learning have any effect on your engagement with the accounting subject?
- Did blended learning affect the level of effort you made when studying financial accounting?

Flexibility

- Did the BL approach offer you any added flexibility when studying on this course?

Assessments

- What are your thoughts on the assessment methods used in the blended learning approach (moodle quizzes, discussion forum, ratio analysis report)?

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Design of blend

- Did you feel that the f2f hours were reduced by the correct amount for the blended learning topics?
- Do you feel that the f2f hours and online hours could have been structured in a better way, and if so, what way would you recommend?

Technology

- Were there any issues / obstacles in relation to technology for you around taking part in the blended learning approach?
- How did you feel about learning in the computer laboratory with MS Excel?

General

- Were there any other issues / obstacles for you when taking part in the blended learning approach?
- What would you consider to be the positive aspects / benefits of the blended learning approach?
- What would you consider to be the negative aspects / disadvantages of the blended learning approach?
- How did you feel about learning using the blended learning approach?
- What recommendations would you make to improve the blended learning approach

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Appendix 9: RUBRIC – RATIO ANALYSIS CONTINUOUS ASSESSMENT – design cycles two & three

	Excellent to Supreme (8 – 10)	Good to Very Good (6-7)	Satisfactory (4-5)	Unacceptable (0-3)	Score
RATIO ANALYSIS REPORT					
Selection and application of appropriate ratios	Ratio formulae (x 11) correctly presented covering all headings: Profitability, Liquidity, Efficiency, Gearing Applies ratio formulae to calculate correct financial ratios for the company.	Ratio formulae (x 11) correctly presented covering all headings: Profitability, Liquidity, Efficiency, Gearing Applies ratio formulae to calculate financial ratios for the company with minor inaccuracies.	Ratio formulae (x 11) correctly presented covering all headings: Profitability, Liquidity, Efficiency, Gearing Applies ratio formulae to calculate financial ratios for the company with some inaccuracies.	Ratio formulae incorrectly presented. Not all headings covered. Inaccurately or inappropriately applies formulae to calculate financial ratios for the company	/10
Analysing company results	Presents and interprets ratio information for each company accurately and appropriately.	Presents and interprets ratio information with minor inconsistencies, irrelevancies or omissions.	Presents and interprets ratio information with some inconsistencies, irrelevancies or omissions.	Presents and interprets ratio information inaccurately, incompletely or with major omissions.	/10
	Presents relevant additional information and relates it to ratios calculated, drawing connections between various information points.	Presents additional information and relates it to ratio results, but does not draw connections between various information points.	Presents some additional information but does not relate it to ratio results.	Additional information is absent or irrelevant.	/10

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	Makes relevant and meaningful comparisons between ratios calculated and industry average ratios.	Makes relevant comparisons between ratios calculated and industry average ratios.	Makes some comparisons between ratios calculated and industry average ratios.	Comparisons with industry average ratios are inappropriate or not made.	/10
Evaluating company performance	Student evaluates the comparative performance of the companies, drawing a detailed conclusion that is well-supported, logically consistent, and complete.	Student evaluates the comparative performance of the companies drawing a conclusion that is logical and consistent with the evidence, justified by some supporting evidence.	Student evaluates the comparative performance of the companies drawing a conclusion that is logical but fails to justify conclusion with supporting evidence.	Student evaluates the comparative performance of the companies presenting a conclusion that is illogical or inconsistent with the evidence presented.	/10
Creating a financial analysis report	Student assembles arguments and creates a report with ideas and conclusions that are exceptionally clear, cohesive and coherent.	Student assembles arguments and creates a report with ideas and conclusions in a clear and coherent order.	Student creates a report presenting ideas and solutions with some degree of order.	Student creates a report presenting ideas and solutions in a fragmentary manner, without clear, coherent order.	/10
	Correct report format used. Suitable fonts and paragraphing used. Writing is free of spelling and grammatical errors. Report is within the 1,200 – 1,600 word count.	Correct report format used. Suitable fonts and paragraphing used. Occasional spelling or grammatical errors. Report is 5% above or below the expected word count.	Correct report format used. Unsuitable fonts or paragraphing used. A number of spelling or grammatical errors. Report is 10% above or below the expected word count.	Sloppy or incorrect format, not written in full sentences. Inappropriate fonts and paragraphing. Many spelling or grammatical errors. Report is 20% above or below the expected word count.	/10

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Metacognition and Self awareness: (Analysis and expression of individual processes of thinking and learning)	Reflections reveal a strong awareness of the learning and thinking process, as well as an ability to plan, address problems, evaluate progress, and consider ways to improve.	Reflections reveal an awareness of learning and some awareness of thinking process (HOW the student learned or addressed a problem).	Reflections reveal some awareness of learning, but little or no awareness of the thinking process (HOW the student learned or addressed a problem).	Reflections reveal little about the learning or thinking process.	/10
DISCUSSION FORUM					
Frequency	More than five relevant and useful contributions to the discussion	Four to five relevant and useful contributions to the discussion forum	Two to three relevant and useful contributions to the discussion forum	One relevant and useful contribution to the discussion forum	/10
Quality	Presents ratio information, raises thoughtful questions, analyses relevant issues, builds on others' ideas and appropriately challenges assumptions and perspectives	Presents ratio information, raises thoughtful questions, analyses relevant issues, but fails to build on others' ideas or challenge assumptions and perspectives	Presents ratio information, illustrating the meaning associated with the ratio information presented	Presents ratio information without developing it any further	/10
Total marks (out of 100):					

Appendix 10: Personal Report of Communication Apprehension (PRCA-24)

Personal Report of Communication Apprehension (PRCA-24)

This instrument is composed of twenty-four statements concerning feelings about communicating with others. Please indicate the degree to which each statement applies to you by marking whether you: **Strongly Disagree = 1; Disagree = 2; are Neutral = 3; Agree = 4; Strongly Agree = 5**

- _____ 1. I dislike participating in group discussions.
- _____ 2. Generally, I am comfortable while participating in group discussions.
- _____ 3. I am tense and nervous while participating in group discussions.
- _____ 4. I like to get involved in group discussions.
- _____ 5. Engaging in a group discussion with new people makes me tense and nervous.
- _____ 6. I am calm and relaxed while participating in group discussions.
- _____ 7. Generally, I am nervous when I have to participate in a meeting.
- _____ 8. Usually, I am comfortable when I have to participate in a meeting.
- _____ 9. I am very calm and relaxed when I am called upon to express an opinion at a meeting.
- _____ 10. I am afraid to express myself at meetings.
- _____ 11. Communicating at meetings usually makes me uncomfortable.
- _____ 12. I am very relaxed when answering questions at a meeting.
- _____ 13. While participating in a conversation with a new acquaintance, I feel very nervous.
- _____ 14. I have no fear of speaking up in conversations.
- _____ 15. Ordinarily I am very tense and nervous in conversations.
- _____ 16. Ordinarily I am very calm and relaxed in conversations.
- _____ 17. While conversing with a new acquaintance, I feel very relaxed.
- _____ 18. I'm afraid to speak up in conversations.

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- _____ 19. I have no fear of giving a speech.
- _____ 20. Certain parts of my body feel very tense and rigid while giving a speech.
- _____ 21. I feel relaxed while giving a speech.
- _____ 22. My thoughts become confused and jumbled when I am giving a speech.
- _____ 23. I face the prospect of giving a speech with confidence.
- _____ 24. While giving a speech, I get so nervous I forget facts I really know.

SCORING:

Group discussion: 18 - (scores for items 2, 4, & 6) + (scores for items 1,3, & 5)

Meetings: 18 - (scores for items 8, 9, & 12) + (scores for items 7, 10, & 11)

Interpersonal: 18 - (scores for items 14, 16, & 17) + (scores for items 13, 15, & 18)

Public Speaking: 18 - (scores for items 19, 21, & 23) + (scores for items 20, 22, &24)

Group Discussion Score: _____

Interpersonal Score: _____

Meetings Score: _____

Public Speaking Score: _____

To obtain your total score for the PRCA, simply add your sub-scores together. _____

Scores can range from 24-120. Scores below 51 represent people who have very low CA. Scores between 51-80 represent people with average CA. Scores above 80 represent people who have high levels of trait CA.

[Reproduced by permission from McCroskey (1982)]

Appendix 11: Participant descriptive statistics – three design cycles

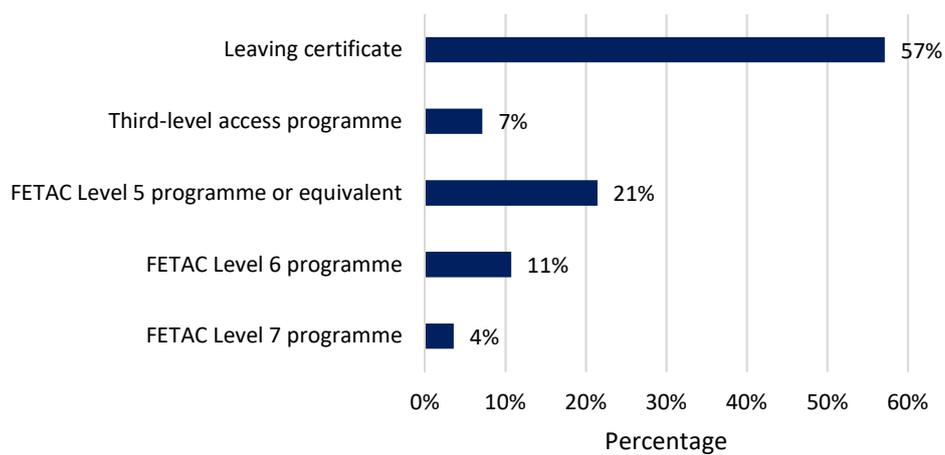
Participant descriptive statistics 2017-18 – design cycle one

Participants’ demographic details, 2017-18 questionnaire data

Age profile	No. of participants (N=28)	%
18 – 22 years	19	68%
23 – 32 years	5	18%
33 years and over	4	14%
Gender		
Male	15	54%
Female	13	46%

(N=28)

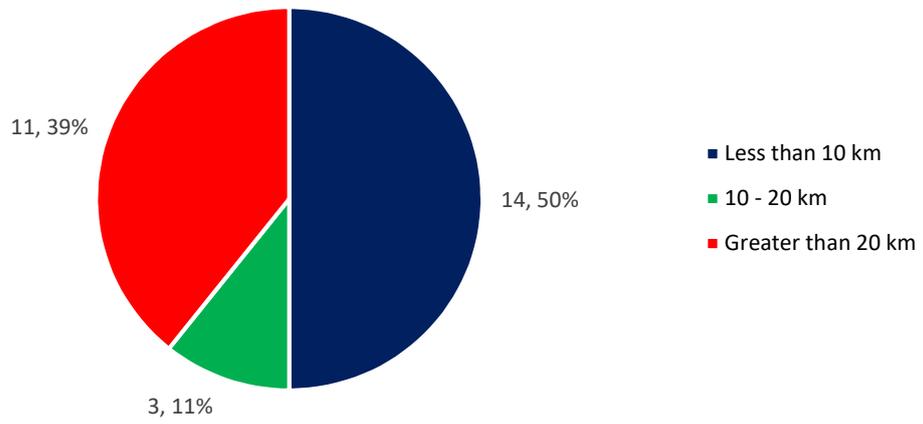
Previous highest level of education



Students’ previous highest level of education achieved, 2017-18 questionnaire data

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Commute distance to college



(N=28)

Students' daily one-way commute distance to college, 2017-18 questionnaire data

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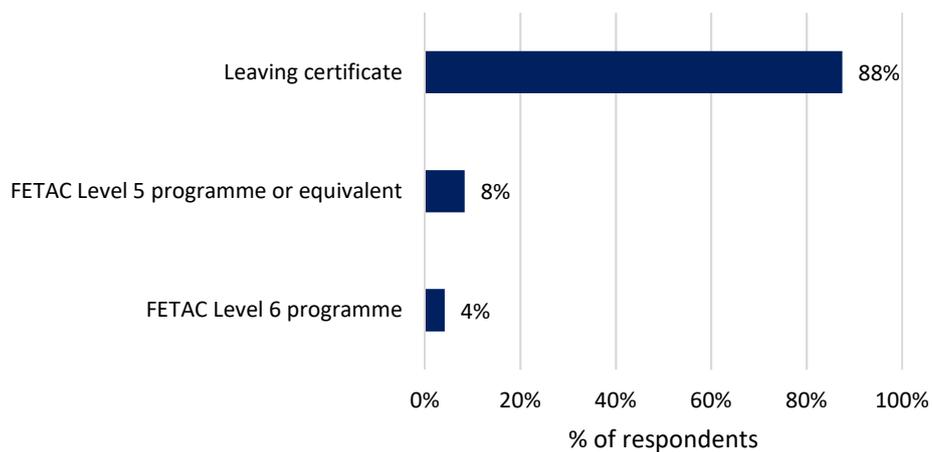
Participant descriptive statistics 2018-19 – design cycle two

Participants' demographic details, 2018-19 questionnaire data

Age profile	No. of participants (N=24)	%
18 – 22 years	20	83%
23 – 32 years	4	17%
33 years and over	0	0%
Gender		
Male	9	37%
Female	15	63%

(N=24)

Previous highest level of education

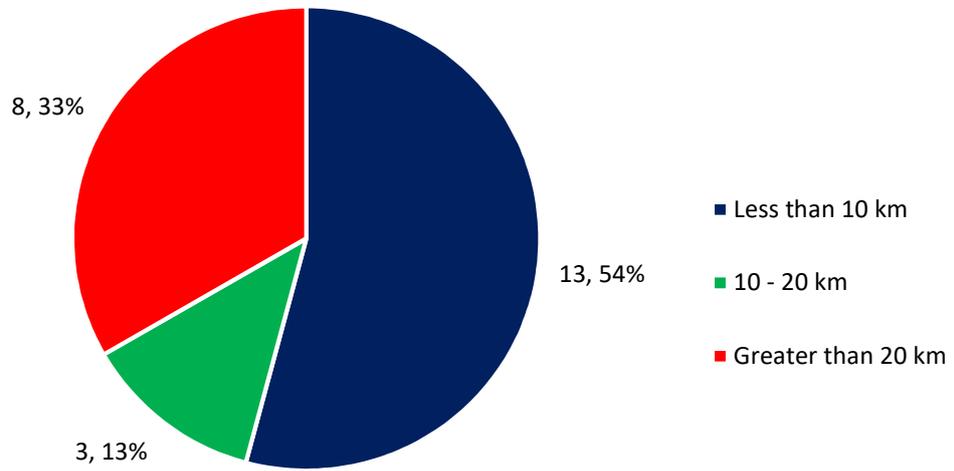


Students' previous highest level of education achieved, 2018-19 questionnaire data

Appendices

(N=24)

Commute distance to college



Students' daily one-way commute distance to college, 2018-19 questionnaire data

Appendices

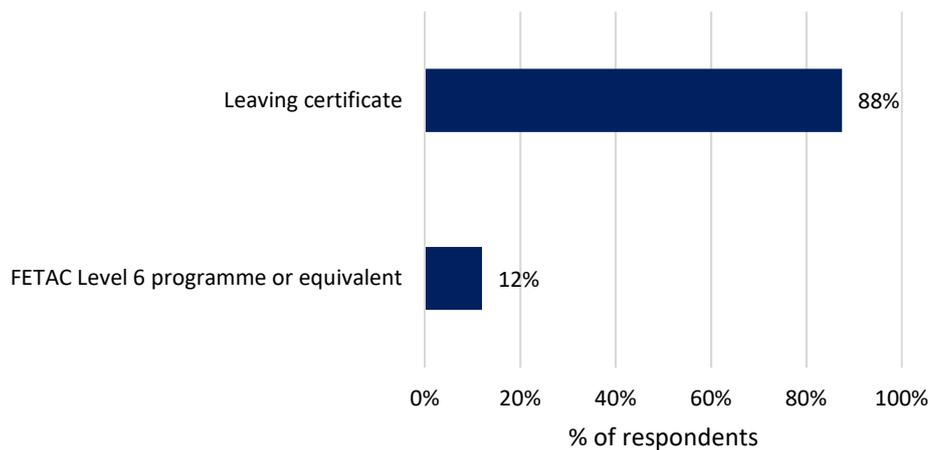
Participant descriptive statistics 2019-20 – design cycle three

Participants' demographic details, 2019-20 questionnaire data

Age profile	No. of participants (N=16)	%
18 – 22 years	15	94%
23 – 32 years	1	6%
33 years and over	0	0%
Gender		
Male	9	56%
Female	7	44%

(N=16)

Previous highest level of education

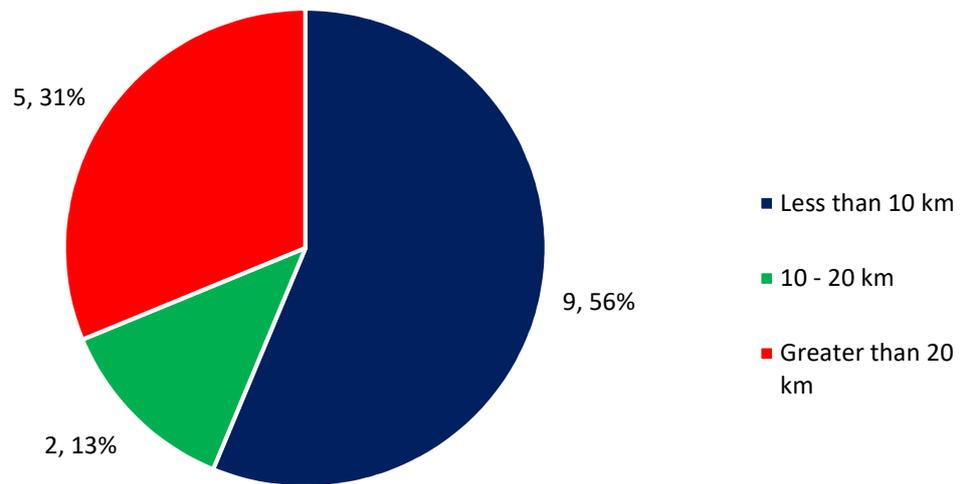


Students' previous highest level of education achieved, 2019-20 questionnaire data

Appendices

(N=16)

Commute distance to college



Students' daily one-way commute distance to college, 2019-20 questionnaire data

Appendix 12: Blended learning student instructions – design cycle 3

BL instructions: semester 1, Oct 2019

Blended Learning – Information Sheet for Students

This information sheet will tell you about the learning activities and assessments you will be undertaking in the Financial Accounting 1A module over the next three weeks. Bank reconciliation statements will be taught using a blended learning approach, which means that there will be a mix of online and face-to-face teaching. This sheet outlines what you need to know in order to take part in the blended learning process.

Financial Accounting 1A – Lecture schedule for October:

Week	Date	Topic	Out-of-class learning and assessment activities
Week 5	Tues 8 th Oct 11 am	Accruals and prepayments	
	Thur 10 th Oct 11 am	Introduction to BANK RECONCILIATION topic	
	Thurs 10 th Oct 3 pm (ONE HOUR class)	Conclude Accruals and prepayments	View online multimedia resource
Week 6	Tues 15 th Oct 11 am	NO CLASS	View worked example video
	Thur 17 th Oct 11 am	Bank Reconciliation	Complete bank reconciliation quiz
	Thur 17 th Oct 3 pm	Bank Reconciliation Statements – learning activity	Complete bank reconciliation assignment question on Microsoft Excel template and upload Assignment to moodle
Week 7	Tues 22 nd Oct 11 am	NO CLASS	
	Thur 24 th Oct 11 am	Conclude Bank Reconciliation Statements	
	Thur 24 th Oct 3 pm	Depreciation of NCA	

The following three areas in moodle will be relevant for you while you learn about bank reconciliation statements using a blended learning approach:

Appendices

Continuous Assessment

Continuous assessment for this module is available here and consists of online quizzes and an assignment as follows:

Quiz 1:	Bank reconciliation topic	- worth 5%	(October)
Assignment Upload:	Bank reconciliation topic	- worth 5%	(October)
Quiz 2:	Various other topics	- worth 10%	(November)



Quizzes: 3 Files: 4 Assignment: 1

Bank Reconciliation (blended learning)

A bank reconciliation is performed regularly in business. It is needed when the bank balance of the business disagrees with the amount shown on their bank statement. The business will need to check why the bank statement is showing a different balance compared to the business's own records.

This topic will be taught using a BLENDED LEARNING format - with a mix of face-to-face classes and online learning. You will use the multimedia resource uploaded here as part of your online learning along with the extra Worked Example video.



SCORM packages: 2 Files: 8

Blended Learning Surveys

This section contains the surveys and learning journals which I will be requesting that you complete over the semester to obtain feedback on **your experience** of learning using a blended approach.



Online learning using Moodle:

There is an online resource available on Moodle – Bank Reconciliation multimedia resource (in the Bank Reconciliation topic on moodle). You are required to **view this resource BEFORE Thursday 17th October**. The online resource will explain the background knowledge you require to complete a bank reconciliation question. It will illustrate how to approach a question using videos. There is also a question for you to try (**it is VERY IMPORTANT that you attempt this question**) and a short quiz for you to use to assess your knowledge at the end.

There is also a **Worked Example video** which is based on the 'Rogerson' question on pg 64 of your manual. This video will show you how to prepare a more difficult question on bank reconciliation statements. Please view this video **BEFORE Thursday 17th October** also.

Appendices

Financial Accounting 1A



← Continuous Assessment

Bank Reconciliation (blended learning)

Blended Learning Surveys ▶

A bank reconciliation is performed regularly in business. It is needed when the bank balance of the business disagrees with the amount shown on their bank statement. The business will need to check why the bank statement is showing a different balance compared to the business's own records.

This topic will be taught using a BLENDED LEARNING format - with a mix of face-to-face classes and online learning. You will use the multimedia resource uploaded here as part of your online learning along with the extra Worked Example video.



Multi-media resource

- [Bank Reconciliation multimedia resource](#)
- [Worked Example Video \(pg 64 Rogerson\)](#)

Questions

You must also complete the **online bank reconciliation quiz** on moodle. This quiz is available **under the Continuous Assessment heading** in moodle.

- Quiz will open during the following times: Saturday 12th October 9am - Wednesday 17th October 11 pm
- You have 30 minutes to complete the quiz
- You will get 2 attempts at this quiz
- Your highest mark will count towards your continuous assessment
- Quiz is worth 5% of your final course grade

← Depreciation of Non Current Assets

Bank Reconciliation (blended learning) ▶

Continuous Assessment

Continuous assessment for this module is available here and consists of online quizzes and an assignment as follows:

Quiz 1:	Bank reconciliation topic	- worth 5%	(October)
Assignment Upload:	Bank reconciliation topic	- worth 5%	(October)
Quiz 2:	Various other topics	- worth 10%	(November)



Quiz - sample

[Sample Quiz](#)

This quiz contains 8 questions for you to try out in advance of the Continuous Assessment Bank Reconciliation Quiz which will open soon. You have 30 minutes to complete this sample quiz and you can attempt it as many times as you wish. Marks obtained will not be included in your continuous assessment mark.

Quiz 1

[Bank Reconciliation Quiz](#)

This quiz contains **10 questions** and is worth 5%. It must be completed before Wednesday 16th October at 11 pm.

[Instructions for completing Bank Reconciliation Quiz](#)

Class Assignment - Upload

Appendices

The activities identified above must all be completed **BEFORE you come to class on Thursday 17th October.**

During class on Thursday 17th October, I will be moving on to more difficult Bank Reconciliation questions **so it is essential that you view all parts of the online resource BEFORE YOU ATTEND THIS CLASS.** Please note that there will be no class at the following times:

- Tuesday 15th Oct 2 pm
- Tuesday 22nd Oct 2 pm

Also the 3pm class on Thursday 10th October will only run for one hour (3 – 4 pm). This is to compensate you for the extra time you will be investing into using the online Bank Reconciliation resources.

Face-to-face learning – Class Thursday 17th October:

During class at 3pm on Thursday 17th October, there will be a bank reconciliation learning activity which students will complete. After class, the completed answer must be typed onto an excel template which will be available on moodle **under the Continuous Assessment heading** and uploaded to moodle by 11am Thursday 24th October. 5% of your continuous assessment marks will be awarded for this learning activity. Marks will be awarded for participation in class and submission of the solution on moodle.

Continuous Assessment

Continuous assessment for this module is available here and consists of online quizzes and an assignment as follows:

Quiz 1:	Bank reconciliation topic	- worth 5% (October)
Assignment Upload:	Bank reconciliation topic	- worth 5% (October)
Quiz 2:	Various other topics	- worth 10% (November)



Quiz - sample

 [Sample Quiz](#)

This quiz contains 8 questions for you to try out in advance of the Continuous Assessment Bank Reconciliation Quiz which will open soon. You have 30 minutes to complete this sample quiz and you can attempt it as many times as you wish. Marks obtained will not be included in your continuous assessment mark.

Quiz 1

 [Bank Reconciliation Quiz](#)

This quiz contains **10 questions** and is worth 5%. It must be completed before Wednesday 16th October at 11 pm.

 [Instructions for completing Bank Reconciliation Quiz](#)

Class Assignment - Upload

 [Bank Reconciliation Question - Class Assignment](#)

Please upload your completed solution to the class assignment on bank reconciliation here. (using the Microsoft Excel template file)

 [Bank Reconciliation Assignment - solution template](#)

Use this template to prepare your solution to the bank reconciliation class assignment.

Appendices

Blended learning surveys

In order for me to obtain feedback from you on your learning experiences using blended learning, I am requesting that you complete the following:

1 Blended Learning Pre-implementation Survey

I am asking you to now complete a 'Blended learning pre-implementation survey' which is now available in Moodle under the Blended learning topic.

2 Blended Learning Student Journal

I am also asking you to keep notes on your experience of the blended learning process in the form of a student journal. You may keep this journal online via Moodle under the 'Blended Learning' topic.

Financial Accounting 1A



← Bank Reconciliation (blended learning)

Blended Learning Surveys

Accruals and Prepayments →

This section contains the surveys and learning journals which I will be requesting that you complete over the semester to obtain feedback on your experience of learning using a blended approach.



 Blended learning - pre-implementation survey

 Blended Learning Journal

Student Queries: Discussion Forum / Email

These instructions will also be available under a new topic on the discussion forum called Bank Reconciliation. If students wish to discuss anything on the bank reconciliation topic, you may use the forum to post a question and I will reply. If I need to inform you about anything in relation to the Bank Reconciliation topic, I will post it in this forum. You may also contact me by email at okelly@ait.ie

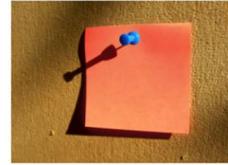
Appendices

Introduction and Announcements

Welcome to Financial Accounting 1A.

This page will be used for all course notes and question solutions for Bachelor of Arts in Accounting and Bachelor of Arts in Accounting and Law Year 1 groups. You will also be provided with some online multimedia resources which you will be required to view as part of your learning in this course.

Continuous Assessment throughout the semester will take the form of online quizzes which will be made available on this page during specified weeks during this course.



 [Introductory Discussion Forum](#)

 [Attendance](#)

 [Announcements](#)

Summary of what you must do:

Dates	Learning activities and assessment	Surveys
Thurs 10 Oct – Wed 16 Oct	<ul style="list-style-type: none"> • View online multimedia resource • View Worked Example Video (pg 64 on question manual) • Complete online bank reconciliation quiz 	<ul style="list-style-type: none"> • Complete pre-implementation survey • Record your experience in the online learning journals
Thurs 17 Oct	Attend face-to-face classes and complete question assignment	(see Blended Learning survey section on moodle)
Fri 18 Oct – Thurs 24 Oct	Complete solution to assignment in Microsoft Excel template and upload to moodle	

BL instructions – semester 2, Jan 2020

Blended learning – Information sheet for students - Financial Accounting 1B

This information sheet will tell you about the learning activities and assessments you will be undertaking in the Financial Accounting 1B module over the next three weeks. Ratio analysis will be taught using a blended learning approach, which means that there will be a mix of online and face-to-face teaching. This sheet outlines what you need to know in order to take part in the blended learning process.

Week	Date	Topic	Out-of-class learning and assessment activities
Week 1	Tues 14 th Jan 2 pm	Company final accounts	
	Thurs 16 th Jan 11 am	Company final accounts	
Week 2	Tues 21 st Jan 2 pm	Company final accounts / Ratio Analysis introduction	View online multimedia resource View worked example videos (pg 83 manual) Complete 1st attempt on ratio analysis quiz (Fri 24 – Mon 27 Jan)
	Thurs 23 rd Jan 11 am	NO CLASS	
Week 3	Tues 28 th Jan 2 pm	Ratio Analysis	Complete 2nd attempt on ratio analysis quiz (Wed 29 Jan – Sat 1 Feb)
	Thurs 30 th Jan 11 am	NO CLASS	
Week 4	Tues 4 th Feb 2 pm	Ratio Analysis	Complete ratio analysis assessment report and post to the ratio analysis discussion forum
	Thurs 6 th Feb 11 am	Depreciation	
Week 5	Tues 11 th Feb 2 pm	Depreciation	
	Thurs 13 th Feb 11 am	Depreciation	

The following three areas in moodle will be relevant for you while you learn about ratio analysis using a blended learning approach:

Appendices

Ratio Analysis - Blended learning

Ratio analysis uses the data contained within the financial statements of a business to analyse and interpret the financial performance and position of the business. Ratios also help to make comparisons between the performance of different businesses along with tracking the performance of a business over time.

This topic will be taught using a BLENDED LEARNING format - with a mix of face-to-face classes and online learning. You will use the multimedia resource uploaded here as part of your online learning along with the three extra Worked Example videos. The three videos illustrate the solution to the question Deacy Ltd on pg 83 of your manual.



SCORM package: 1 Files: 6

Continuous Assessment

Continuous assessment for this module consists of a quiz and an assignment as follows:

Quiz: Ratios worth 5%

Assignment report:

(including Discussion forum participation) worth 15%



Quiz: 1 Files: 6 Forums: 3 Assignment: 1

Blended Learning Surveys

This section contains the surveys and learning journals which I will be requesting that you complete over this semester to obtain feedback on **your experience** of learning using a blended approach.



Online learning using Moodle:

There is an online resource available on Moodle – Ratio Analysis online multimedia resource (in the Ratio Analysis topic on moodle). You are required to **view this resource during WEEK 2 of the semester.**

The online resource will explain the background knowledge and ratio formulae that you will require to complete a ratio analysis question. It will illustrate how to approach a question using videos. There is also a question for you to try (**it is VERY IMPORTANT that you attempt this question**) and a short quiz for you to use to assess your knowledge at the end.

There are **three Worked Example videos** based on the 'Deacy' question on pg 83 of your manual. These videos will show you how to prepare a more difficult question on ratio analysis (the videos illustrate the answer to the Deacy question under the headings of Profitability / Liquidity and Efficiency / Gearing). Please view these videos **during WEEK 2** also.

I will then be moving on to more advanced Ratio Analysis questions **so it is essential that you view all parts of the online resource BEFORE YOU ATTEND CLASS in week 3.**

Appendices

← Final Company Accounts

Continuous Ass

Ratio Analysis - Blended learning

Ratio analysis uses the data contained within the financial statements of a business to analyse and interpret the financial performance and position of the business. Ratios also help to make comparisons between the performance of different businesses along with tracking the performance of a business over time.

This topic will be taught using a BLENDED LEARNING format - with a mix of face-to-face classes and online learning. You will use the multimedia resource uploaded here as part of your online learning along with the three extra Worked Example videos. The three videos illustrate the solution to the question Deacy Ltd on pg 83 of your manual.



Online multimedia resource

 [Ratio Analysis 2020](#)

Worked Example Videos

 [Profitability Ratios - Worked Example - Deacy Q on pg 83](#)

 [Liquidity & Efficiency Ratios - Worked Example - Deacy Q on pg 83](#)

 [Gearing Ratios - Worked Example - Deacy Q on pg 83](#)

Solutions

Online assessment quiz

You must also complete the **online ratio analysis quiz** on moodle. This quiz is available **under the Continuous Assessment heading** in moodle.

- You will get TWO attempts at this assessment BUT it will open at two different times for these attempts:
 - Friday 24th January 9 am - Monday 27th January 11 pm - 1st attempt
 - Wednesday 29th January 9 am – Saturday 1st February 11 pm - 2nd attempt
- You have 1 hour to complete the quiz
- Your highest mark will count towards your continuous assessment
- Quiz is worth 5% of your final course grade

← Ratio Analysis - Blended learning

Continuous Assessment

Blended Learning surveys →

Continuous assessment for this module consists of a quiz and an assignment as follows:

Quiz: Ratios worth 5%

Assignment report:
(including Discussion forum participation) worth 15%



Quiz

 [Ratio Analysis - Continuous Assessment Quiz](#)

 [Moodle CA QUIZ Instructions](#)

Ratios Discussion Forum

 [SPRITE Ltd - company performance - Discussion forum](#)

 [GVA Ltd - company performance - Discussion forum](#)

Appendices

The activities identified above must all be completed **BEFORE you come to class on Tuesday 28th January.**

During class on Tuesday 28th January I will be moving on to more difficult Ratio Analysis questions **so it is essential that you view all parts of the online resource BEFORE YOU ATTEND THIS CLASS.** Please note that there will be no class at the following times:

- Thursday 23rd January 11 am
- Thursday 30th January 11 am

This is to compensate you for the extra time you will be investing into using the online Ratio Analysis resources.

Blended learning surveys

In order for me to obtain feedback from you on your learning experiences using blended learning, I am requesting that you complete a **Blended Learning Student Journal**. In this journal I want you to keep notes on your experience of the blended learning process in the same way as you did in semester 1 (see attached form for keeping notes). You may also keep this journal online via Moodle under the 'Blended Learning' topic.

Continuous Assessment

Blended Learning Surveys

Depreciation of Non-Current Assets ▶

This section contains the surveys and learning journals which I will be requesting that you complete over this semester to obtain feedback on **your experience** of learning using a blended approach.

 Blended Learning Journal - Ratio Analysis



Ratio Analysis Discussion Forum and Report

The other 15% of the Continuous Assessment for this semester will be based on ratio analysis also. You will be given final company accounts for two companies and required to compare their performance using ratio analysis at the beginning of **week 4 of the semester**. You will be required to discuss the performance of the companies on a discussion forum and prepare a written report on the company. More details on this will be provided in week 3.

Appendices

Student Queries: Discussion Forum / Email

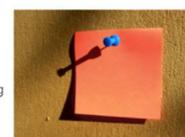
A copy of these instructions will also be available under the **Announcements and Queries** forum at the top of my moodle page. If students wish to discuss anything on the ratio analysis topic, you may use the forum to post a question and I will reply. If I need to inform you about anything in relation to the Ratio Analysis on topic, I will post it under 'Announcements and Queries'. You may also contact me by email at okelly@ait.ie

Introduction and Announcements

Welcome to Financial Accounting 1B!

This page will be used for all course notes and question solutions for Bachelor of Arts in Accounting and Bachelor of Arts in Accounting and Law Year 1 groups. You will also be provided with some online multimedia resources which you will be required to view as part of your learning in this course.

Continuous Assessment throughout the semester will take the form of an online quiz and an assignment which you will upload to moodle and which also involves participation in a discussion forum.



-  Attendance
-  Announcement and Queries

Summary of what you must do:

Dates	Learning activities and assessment	Surveys
Tues 21 Jan – Tues 28 Jan	<ul style="list-style-type: none"> • View online multimedia resource • View Worked Example Videos (pg 83 on question manual) • Complete 1st attempt on online ratio analysis quiz (Fri 24 – Mon 27 Jan) 	Record your experience in the online learning journals (see Blended Learning survey section on moodle)
Tues 28 Jan	Attend face-to-face class	
Wed 29 Jan – Sat 1 Feb	<ul style="list-style-type: none"> • Review your notes and online resources on ratio analysis. • Complete 2nd attempt on online ratio analysis quiz (Fri 24 – Mon 27 Jan) 	
Tues 4 Feb	Attend face-to-face class	

Appendix 13: Ratio analysis continuous assessment task – cycle 3

Ratio Analysis Continuous Assessment - February 2020

BAA 1

Your company is a drinks manufacturer and is considering acquiring one of two companies. The board will be considering the acquisition at a forthcoming meeting and the financial director has asked you to put together a preliminary analysis for them on the relative profitability, liquidity and gearing of the two target companies.

You have been given financial statements for both companies, Sprite Ltd and Cola Ltd, for the financial years ended 31 December 2018 and 2019.

Assessment:

Assessment will be based on submission of a typed report and your participation in the discussion forum as per the attached grading rubric.

Report

Write a report to the directors of your company evaluating the comparative performance of both companies under the headings:

- Profitability
- Liquidity and Efficiency
- Gearing

Your analysis should be supported by relevant ratios where appropriate and your report should contain a list of the ratios that you have calculated. You should use any relevant additional information along with the industry average ratios provided to you.

Your report should also include a '**Reflection**' section where you will reflect on the learning and thinking process you undergo while engaging with any one element of the blended learning ratio analysis topic (eg discussion forum, clickers, online assessment, ratio report preparation)

The report should be typed in size 12 font, presented using a correct report format and should be 1,200 - 1,600 words in length. The reflection is excluded from the word count.

Appendices

Discussion Forum

As part of the assessment, you are requested to participate in a discussion forum on moodle regarding the performance of the companies. You will be assigned to one of two groups to discuss the performance of the companies (Sprite group or Cola group).

Each group will have its own discussion forum on moodle where you will be required to discuss the performance of one company only (Sprite or Cola).

The discussion forum will **open on Tuesday 11th February** and you will have access to the forum relating to one company only. The forum will contain the following threads:

1. Profitability
2. Liquidity and Efficiency
3. Gearing
4. Other comments

You are asked to calculate ratios and post them under the relevant threads along with your analysis of the ratios you have calculated. **Please feel free to reply to other students' comments as well as posting new comments of your own. Also, post questions on any issues you are unsure about or on areas where you would like the opinion of other group participants.**

On Tuesday 25th February, I will open a new discussion forum where you will be able to discuss the comparative performance of both companies. I will also make both the Sprite and Cola discussion forums open to all students to assist you in your comparisons. The forum will remain open until the report submission date.

Report submission

The report must be submitted ON or BEFORE Monday 9th March 2020 at 9 pm.

(Note: Reports submitted up to one week late will have their marks reduced by 10%. Reports submitted more than one week late will receive zero marks.)

Reports should be uploaded into the 'Ratio Analysis Assignment Upload' under the Continuous Assessment topic on moodle.

Appendices

SPRITE Ltd

Statement of profit or loss for the years ended 31 December

	2019 €000's	2018 €000's
Sales Revenue	6,900	5,600
Cost of Sales	4,190	3,650
Gross Profit	2,710	1,950
Expenses	980	740
Net Profit before interest and tax	1,730	1,210
Interest	364	280
Profit before Taxation	1,366	930
Taxation	206	130
Profit for the year	1,160	800

Statement of financial position as at 31 December

	2019 €000's	2018 €000's
Non-current assets	6,100	4,710
Current assets		
Inventory	1,300	1,020
Receivables	2,030	1,650
Cash	180	80
<i>Total assets:</i>	9,610	7,460
Capital and reserves		
Share Capital	1,600	1,600
Retained profits	1,750	1,140
	3,350	2,740
Non-current liabilities		
Debentures	3,640	2,800
Current Liabilities		
Payables	1,250	1,040
Dividend due	550	540
Overdraft	820	340
	2,620	1,920
<i>Total equity and liabilities:</i>	9,610	7,460

Appendices

You are provided with the following additional information:

1. Additional debentures were issued by Sprite on 1 January 2019.
2. Credit Sales: 90% of Sprite Ltd's sales are sold on credit.
3. Sprite rents its business premises. Non-current assets represent owned equipment which is being used at their manufacturing facilities. A breakdown of the cost and accumulated depreciation of non-current assets is as follows:

Non-current assets	2019	2018
Cost	22,500	19,410
Accumulated Depreciation	<u>- 16,400</u>	<u>- 14,700</u>
Net Book Value at 31 Dec 2019	<u>6,100</u>	<u>4,710</u>

4. The following industry average ratios have been provided to assist you with your analysis:

	2019 Industry Average
Return on Capital Employed	23%
Gross Profit %	27%
Net Profit %	16%
Expenses %	11%
Current Ratio	1.4 times
Acid Test Ratio	0.8 times
Receivables days	90 days
Payables days	81 days
Inventory days	98 days
Gearing ratio (debt / total capital)	54%
Interest Cover	7 times

Appendices

COLA Ltd

Statement of profit or loss for the years ended 31 December

	2019	2018
	€000's	€000's
Sales Revenue	4,100	3,650
Cost of Sales	2,950	2,480
Gross Profit	1,150	1,170
Expenses	420	460
Net Profit before interest and tax	730	710
Interest	48	40
Profit before Taxation	682	670
Taxation	85	82
Profit for the year	597	588

Statement of financial position as at 31 December

	€000's	2019	€000's	2018	€000's
Non-current assets		2,750		1,800	
Current assets					
Inventory	805		650		
Receivables	890		753		
Cash	140	1,835	260	1,663	
<i>Total assets:</i>		4,585		3,463	
Capital and reserves					
Share Capital		1,200		1,000	
Retained profits		595		198	
		1,795		1,198	
Non-current liabilities					
Debentures		600		500	
Current Liabilities					
Payables	1,010		910		
Dividend due	200		165		
Overdraft	980		690		
		2,190		1,765	
<i>Total equity and liabilities:</i>		4,585		3,463	

Appendices

You are provided with the following additional information:

1. Additional debentures were issued by Cola on 1 January 2019. €250,000 debentures are due for repayment in June 2021.
2. Credit Sales: 70% of Cola Ltd's sales are sold on credit.
3. Cola rents its business premises. Non-current assets represent owned equipment which is being used at their manufacturing facilities. A breakdown of the cost and accumulated depreciation of Non-current assets is as follows:

Non-current assets	2019	2018
Cost	3,550	2,160
Accumulated Depreciation	- 800	- 360
Net Book Value at 31 Dec 2019	2,750	1,800

4. The following industry average ratios have been provided to assist you with your analysis:

	2019 Industry Average
Return on Capital Employed	23%
Gross Profit %	27%
Net Profit %	16%
Expenses %	11%
Current Ratio	1.4 times
Acid Test Ratio	0.8 times
Receivables days	90 days
Payables days	81 days
Inventory days	98 days
Gearing ratio (debt / total capital)	54%
Interest Cover	7 times

Appendices

Guidelines for assessment report format – used in design cycles 2 and 3

Report

To: Directors of Drinks Manufacturer Ltd
From: Orlaith Kelly
Re: Comparative performance of Sprite Ltd and Cola Ltd
Date: 05 March 2020

Introductory paragraph – what the report is addressing (what is it about?)

Main body - comparing both companies; can use the following headings:

Profitability / Liquidity and Efficiency / Gearing / Other comments

Concluding paragraph – drawing together the main ideas in the report and coming to a conclusion

Signed: Orlaith Kelly

APPENDIX

- Reflection section - what and **how you learned** while engaging in any element of the Blended learning ratio analysis topic: how you planned, addressed problems, things you can improve on for the future
- List of the ratios you calculated for both companies (can use a table for this if you wish)

Appendix 14: Ratio analysis discussion forum – scaffolding handout

Discussion forum - Please use the points below for ideas on additional comments you might make.

Profitability	Liquidity & Efficiency	Gearing	Other
ROCE	Current ratio	Gearing ratio (debt/total capital)	Dividend cover
GP%	Acid test ratio	Interest cover	
NP%	Receivables days		
Exps %	Inventory days		
	Payables days		

Review all the ratios which have been posted and see:

- if they have been **compared to the industry** average for that ratio (eg Sprite’s interest cover in 2019 is 15 times which is well above the industry average of 7 times)
- has a **general explanation** been given of what each ratio means (eg interest cover displays how well a company can meet / afford its interest payments)
- has a **specific explanation** been given of what the ratio result means for this company (eg Sprite’s interest cover of 15 times indicates that the company can easily afford its interest payments. Therefore, if profits were to drop the company should not be at risk of not being able to afford its interest)
- have **ratio results been linked with one another and with items in the SOFP** (eg Sprite has a high receivables days and a high inventory days – both are well above the industry average. This may be causing the fact that the company has a high bank overdraft due to holding inventory for a long time before being able to sell it and then waiting a long time to receive payment from customers – placing pressure on the cashflow of the company)
- if there **are any questions you might ask** regarding information which is not available to you (eg I wonder if the increase in payables days might be due to the fact that the company is struggling to pay its suppliers due to having a high bank overdraft? Perhaps the bank are not allowing any further credit to the company?)
- could you **offer any solutions to the company** (eg if the company decided to issue more shares they would be in a position to repay some of their debt and in this way reduce the gearing of the company)

Appendices

Appendix 15: Examination results – three design cycles

Examination results, 2017-18 – design cycle one:

Exam paper results - analysis by question, 2017-18

Question type	No. of student attempts	Mean score (%)	SD
Semester 1 exam		(N=27)	
Q1 Sole trader final accounts	27	81.30%	18.72%
Q2 Bank reconciliation statements	27	78.84%	22.50%
Q3 Correction of errors and suspense account	2	64.00%	16.97%
Q4 Control accounts	22	66.09%	26.95%
Semester 1 exam - mean score		75.76%	17.08%
Semester 2 exam		(N=26)	
Q1 Company final accounts	26	69.23%	14.27%
Q2 Ratio analysis	25	68.80%	20.35%
Q3 Depreciation; Allowance for receivables	17	42.00%	22.58%
Q4 Accounting theory	11	42.55%	21.04%
Semester 2 exam – mean score		61.71%	16.02%

Student scores on ratio analysis assignment, 2017-18

	M (N=26)	SD
Final assignment mark	60.29%	14.39%
Higher level cognitive score	61.54%	16.54%

Appendices

Examination results, 2018-19 – design cycle two:

Exam paper results - analysis by question, 2018-19

Question type	No. of student attempts	Mean score (%)	SD
Semester 1 exam		(N=24)	
Q1 Sole trader final accounts	24	84.58%	26.94%
Q2 Accruals and prepayments; Users of financial statements	23	59.50%	29.37%
Q3 Suspense account	4	41.00%	34.47%
Q4 Bank reconciliation statements	20	86.10%	19.71%
Semester 1 exam - mean score		73.06%	26.14%
Semester 2 exam		(N=23)	
Q1 Company final accounts	23	76.58%	20.14%
Q2 Ratio analysis	23	74.66%	23.98%
Q3 IAS 10 and IAS 37 – theory and application	5	44.80%	44.04%
Q4 Accounting theory	17	47.41%	17.73%
Semester 2 exam – mean score		67.43%	20.20%

Student scores on ratio analysis assignment, 2018-19

	M (N=23)	SD
Final assignment mark	66.26%	14.12%
Higher level cognitive score	63.91%	13.56%

Appendices

Examination results, 2019-20 – design cycle three:

Exam paper results - analysis by question, 2019-20

Question type	No. of student attempts	Mean score (%)	SD
Semester 1 exam		(N=16)	
Q1 Sole trader final accounts	16	77.34%	16.84%
Q2 Bank reconciliation statements	15	77.33%	17.59%
Q3 Control accounts	11	57.82%	34.57%
Q4 Suspense accounts	5	28.40%	16.64%
Semester 1 exam - mean score		68.47%	18.52%
Semester 2 exam		(N=15)	
Q1 Company final accounts	15	86.08%	10.44%
Q2 Ratio analysis	15	77.90%	11.65%
Q3 Irrecoverable debts; allowance for receivables; accounting theory	5	39.60%	22.65%
Q4 Depreciation of non-current assets; accounting theory	10	67.20%	19.23%
Semester 2 exam – mean score		76.20%	10.26%

Student scores on ratio analysis assignment, 2019-20

	M (N=14)	SD
Final assignment mark	66.50%	11.41%
Higher level cognitive score	62.86%	9.24%

Appendices

Appendix 16: F2f class resource – bank rec authentic question



SUN BANK

MARDYKE ST. ATHLONE Tel (090) 6472050
 Fax (090) 6472051
 Branch code 30-11-10
 Branch identifier Code YESBIE2C

BARLOW PRODUCTION LTD
 MONKSLAND
 ATHLONE
 CO WESTMEATH

Your account name BARLOW CURRENT ACCOUNT
 Account number 22113400
 IBAN IE19 SUNB 3011 1022 1134 00
 State ment date 30 September 2018 Number 145

Your Current Account statement

Date	Transaction details	Payments - out	Payment - in	Balance
01-Sep	BALANCE FORWARD			-2,214
02-Sep	LODGEMENT		1,750	-464
03-Sep	CHEQUE 1543	1,200		-1,664
04-Sep	LODGEMENT		2,360	696
05-Sep	CHEQUE 1538	140		556
	DISHONOURED CHEQUE RETURNED	240		316
06-Sep	CURRENT ACCOUNT FEES	130		186
08-Sep	CHEQUE 1544	320		-134
10-Sep	ELECTRICITY - SEPA DIRECT DEBIT	186		-320
11-Sep	TELEPHONE - SEPA DIRECT DEBIT	149		-469
	LODGEMENT		500	31
13-Sep	LOAN - STANDING ORDER	1,450		-1,419
14-Sep	CHEQUE 1545	55		-1,474
16-Sep	CHEQUE 1549	110		-1,584
	LODGEMENT		1,310	-274
20-Sep	CHEQUE 1547	459		-733
23-Sep	LODGEMENT		2,300	1,567
25-Sep	CREDIT TRANSFER - J OWENS A/C		230	1,797
30-Sep	CHEQUE 1550	1,875		-78
	CHEQUE 1552	250		-328

This is an eligible deposit under the Deposit Guarantee Scheme. For more information see the 'Deposit Guarantee Scheme—Depositor Information Leaflet' which is available from your branch or on our website.

Current lending rate applied to this account: 7.950%

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dr		Cash Book - Barlow Production Ltd		cr	
		€			€
01-Aug	Balance b/d	8,157	10-Aug	Electricity DD	106
09-Aug	Lodgement	1,000	11-Aug	Cheque 1536	505
15-Aug	Lodgement	546		Telephone DD	120
28-Aug	Credit transfer	700	13-Aug	Cheque 1537	7,356
29-Aug	Credit transfer	310		Loan SO	1,450
30-Aug	Lodgement	1,750	15-Aug	Cheque 1538	140
			20-Aug	Cheque 1539	135
31-Aug	Balance c/d	604	22-Aug	Cheque 1540	1,960
			24-Aug	Cheque 1541	1,040
			26-Aug	Cheque 1542	255
		<u>13,067</u>			<u>13,067</u>
04-Sep	Lodgement	1,360	01-Sep	Balance b/d	604
04-Sep	Lodgement	1,000	03-Sep	Cheque 1543	1,200
11-Sep	Lodgement	450	06-Sep	Cheque 1544	320
16-Sep	Lodgement	1,310	10-Sep	Cheque 1545	45
23-Sep	Lodgement	2,300	13-Sep	Cheque 1546	327
30-Sep	Lodgement	1,980		Cheque 1547	459
			15-Sep	Cheque 1548	360
			16-Sep	Cheque 1549	130
			22-Sep	Cheque 1550	1,875
			24-Sep	Cheque 1551	1,254
			26-Sep	Cheque 1552	250
				Cheque 1553	98
				Cheque 1554	132
			30-Sep	Balance c/d	1,346
		<u>8,400</u>			<u>8,400</u>

You have been provided with the cash book of Barlow Production Ltd along with a copy of their bank statement for the month of September. You have been informed that the entries on the bank statement are correct.

Required:

1. Reconcile the opening balance on the bank statement with the opening balance on the cash book on 1 September 2018.
2. Complete the adjusted cash book.
3. Prepare a bank reconciliation statement on the 30 September 2018.

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Appendix 17: F2f class resource – ratio analysis question

Your company is considering acquiring one of two companies in the same industry as its own. The board will be considering the acquisition at a forthcoming meeting and the financial director has asked you to put together a preliminary analysis for them on the relative profitability, liquidity and gearing of the two target companies. You have been given the following information on the two companies, A Ltd and B Ltd, for the financial year ended 31 December 2017.

Statement of profit or loss for the years ended 31 December

	A Ltd €000's	B Ltd €000's	
Sales Revenue	3,225	1,871	
Cost of Sales	2,145	1,421	
Gross Profit	1,080	450	
Expenses	375	234	
Net Profit before interest and tax	705	216	
Interest	32	58	
Profit before Taxation	673	158	
Taxation	150	37	
Profit for the year	523	121	

Statement of financial position as at 31 December

	€000's	A Ltd €000's	€000's	B Ltd €000's
Non-current assets		2,655		1,076
Current assets				
Inventory	630		408	
Receivables	1,350		816	
Cash	60	2,040	0	1,224
<i>Total assets:</i>		4,695		2,300
Capital and reserves				
Share Capital		1,800		240
Retained profits		1,445		92
		3,245		332
Non-current liabilities				
Debentures (A Ltd 10 %, B Ltd 8 %)		315		720
Current Liabilities				
Creditors	540		480	
Dividend due	300		95	
Overdraft	295	1,135	673	1,248
<i>Total equity and liabilities:</i>		4,695		2,300

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You are informed that the inventory, receivables and payables figures represent typical average levels for both companies.

Required: Prepare a summary analysis for the board with commentary on the profitability, liquidity and gearing. Your commentary analysis should be supported by relevant ratios where appropriate.

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Name: _____

Ratio Question - Pg 78: A Ltd and B Ltd

Profitability ratios

A Ltd

Return on Capital Employed

Profit before int and tax x 100

Capital employed

%

Net Profit %

Net Profit before int and tax x 100

Sales

%

Gross Profit %

Gross Profit x 100

Sales

%

Expenses %

Expenses x 100

Sales

%

Gearing ratios

Gearing ratio (Debt / Total Capital)

Debt (long - term loans)

Debt + Equity (sh capital & reserves)

%

Interest Cover

Profit before int and tax

Interest

times

Name: _____

Ratio Question - Pg 78: A Ltd and B Ltd

Liquidity Ratios

A Ltd

Current Ratio

CA		: 1
CL		

Acid Test Ratio

CA - inventory		
CL		: 1

Efficiency Ratios

(also known as Working Capital Management)

Receivables days

Receivables x 365		
Credit sales		days

Payables days

Payables x 365		
Credit purchases (COS)		days

Inventory days

Inventory x 365		
COS		days

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Comparison of the performance of A Ltd and B Ltd

PLUS

A	B

MINUS

A	B

INTERESTING

A	B

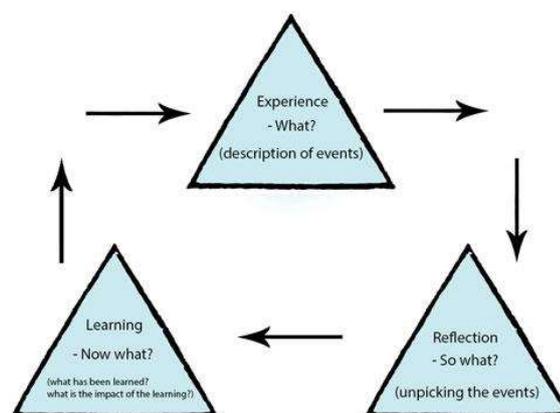
Appendix 18: Metacognition (reflective learning) handout

Reflection / Metacognition

Metacognition refers to awareness and understanding of one's own thought processes: *Purposefully thinking about one's own thinking strategies – when students are able to “learn to think” and “think to learn”*

As part of the Ratio Analysis CA report you are required to reflect on your learning (approx. 200 words). Reflect on **one critical element (moment) of learning** you experienced during the Ratio Analysis topic. (eg taken from the face-to-face class group activities, use of clickers, preparation of the CA report, use of the discussion forum).

1. What? Describe what happened at that time. How you were feeling?
2. So what? Reflect on why that was a key contribution (moment) in your learning. How did you approach the task? What strategies did you use? How did your understanding change? What was good/bad about the experience?
3. Now what? What have you learned from the experience? What other ways could you have approached the task? What would you do differently next time? What changes have taken place in your knowledge, skills and attitudes? How has your thinking changed (or not changed)? What key skill(s) have you developed that may contribute to your success as an accountant?



Source:

Figure 3: What does reflection consist of?, Learning to teach: becoming a reflective practitioner, <https://www.open.edu/openlearn/> © 2021 The Open University

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Appendices

Other useful information to assist you with the task:

Key skills for accountants

Accountants go through a rigorous recruitment and qualification process, and this is reflected in their high professional status. Employers look for graduates with the following skills:

- self-motivation
- integrity
- ability to reflect on one's own work as well as the wider consequences of financial decisions
- business acumen and interest
- organisational skills and ability to manage deadlines
- team-working ability
- communication and interpersonal skills
- proficiency in IT
- analytical ability
- a methodical approach and problem-solving skills
- high level of numeracy

Source: <https://targetjobs.co.uk/careers-advice/job-descriptions/276909-accountant-job-description>

Extract from the Marking Rubric (already provided to you):

Metacognition and Self awareness: (Analysis and expression of individual processes of thinking and learning)	Reflections reveal a strong awareness of the learning and thinking process, as well as an ability to plan, address problems, evaluate progress, and consider ways to improve.	Reflections reveal an awareness of learning and some awareness of thinking process (HOW the student learned or addressed a problem).	Reflections reveal some awareness of learning, but little or no awareness of the thinking process (HOW the student learned or addressed a problem).	Reflections reveal little about the learning or thinking process.	/10
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Appendix 19: Microsoft Excel tutorial handout

MICROSOFT EXCEL HANDOUT

Excel menu buttons

The image shows a screenshot of the Microsoft Excel Home ribbon. The ribbon is divided into several groups: Clipboard, Font, Alignment, Number, Conditional Formatting, Styles, Cell Styles, Insert, Delete Format, and Cells. The Number group is highlighted, showing buttons for General, Comma, Percentage, Increase Decimal, and Decrease Decimal. The spreadsheet below shows a grid with columns A-J and rows 1-7. Cell D3 contains '€ 50.00' and cell F3 contains '10,000'. A green box highlights cell C5. Blue arrows point from callout boxes to specific buttons and the selected cell.

This button is used to place a **border** on a cell

This button is used to place a **euro symbol**

This button is used to place a **comma** on a

These buttons are used to add or remove **decimal**

The box around this cell indicates that this is the cell which has just been clicked on. Each cell has an

Excel formulae

Addition – to add 2 numbers (or more)	=B6+B7
Subtraction – to subtract 2 numbers	=B6-B7
Multiplication – to multiply 2 numbers	=B6*B7
Division – to divide 2 numbers	=B6/B7
SUM function – to add 2 or more numbers	=SUM(B6:B10)

Please note the following:

Before you type your formula, you must click onto the cell where you wish to have your answer. Then you may begin to type!

Do not type any spaces into your formula.

Instead of typing the cell address (for example, B6) you may click on the cell. So to add the numbers in B6 and B7:

you type **=** then **click on B6** then type **+** and **click on B7**

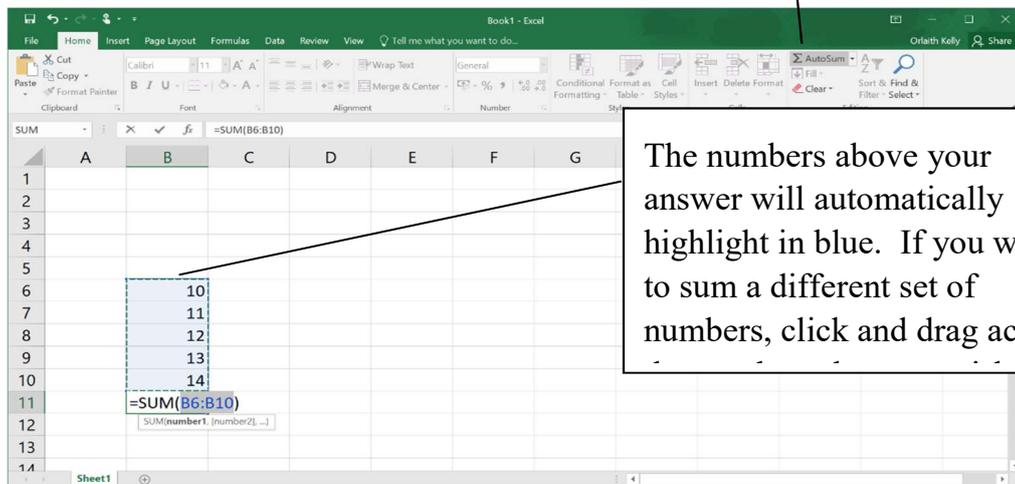
Finally, you must hit the **ENTER** key to complete the calculation



You may also use the **SUM FUNCTION** to add two or more numbers:

For example, =SUM(B6:B10) will add all numbers in the cells between B6 and B10, that is B6, B7, B8, B9 and B10

Click into the cell where you want your answer and then Click on the



The numbers above your answer will automatically highlight in blue. If you want to sum a different set of numbers, click and drag across

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**Appendix 20: Ratio analysis blended topic timetable
semester 2, 2019-20 (design cycle three)**

Blended topic contact timetabled hours in semester 2, 2019-20 – Jan/Feb 2020

Week 1	Tues 14 January 2 - 4 pm	Company final accounts
	Thurs 16 January 11 - 1 pm	Company final accounts
Week 2	Tues 21 January 2 - 4 pm	Company final accounts / Ratio analysis introduction
	Thurs 23 January 11 – 1 pm	NO CLASS
Week 3	Tues 28 January 2 - 4 pm	Ratio Analysis – f2f class 1
	Thurs 30 January 11 – 1 pm	NO CLASS
Week 4	Tues 4 February 2 - 4 pm	Ratio Analysis – f2f class 2
	Thurs 6 February 11 – 1 pm	Depreciation

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Appendix 21: Design changes linked to themes

Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Pedagogy	Conversational Framework (Laurillard, 2002, 2007, 2008a, 2008b, 2009)	students apply theory by working on practical tasks in class; use of ratio analysis assignment task and students provided with marking guidelines; opportunities to discuss in pair work with peers during f2f class and online using discussion forum		
	Constructivism	build on students' prior experiences; digital tools from workplace - real-world setting; pair work collaboration in class; discussion forum for collaboration in online setting		adaptation bank rec topic questions to allow students transition easily from partaking in authentic class activities to completing traditional formal exam questions
	Cognitive load theory: <ul style="list-style-type: none"> Cognitive theory of multimedia learning (Mayer, 2002) 	use of multimedia resources designed in line with CLT principles; presenting solutions as a series of steps, interactive, ability to work at own pace	use of introductory class to reduce cognitive load (opportunity for students to ask questions)	
	<ul style="list-style-type: none"> Worked example effect (Sweller and Cooper, 1985; Sweller, 2006) 		additional online worked examples provided before students advance to independent problem solving using question manual	

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Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Autonomy	Andragogy (Knowles, 1984)	Focus on context of tasks rather than memorisation, building on learners' prior experiences; use of diversity of resources (online and hardcopy questions, online quizzes, discussion forum)		
	Heutagogy (Hase and Kenyon, 2000; Blaschke, 2012; Blaschke and Hase, 2016)		Use of reflective element in ratio analysis assessment task to promote metacognitive ability, encouraging autonomy; Providing opportunities for students to work collaboratively and scaffolding collaboration in the online environment	Scaffolding independent learning by changing the timing between f2f classes to ensure gap between f2f classes is not too long

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Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Collaboration	Scaffolding within zone of proximal development (Vygotsky, 1978)	Delivery of content in step-like fashion; pair work in f2f classes to allow peer scaffolding to take place; provision of clear instructions on BL environment/timetable/tasks; Provision of hardcopy notes manual with solutions available on moodle: use of orientation activities to introduce online resources	introduction of f2f collaborative group work activities to increase scaffolding opportunities; initial posting to ratio discussion forum took place in comp lab to scaffold students; use of bank reconciliation authentic f2f collaborative assessment task and collaborative f2f activities for ratio analysis topic, including 'clickers' to increase participation/collaboration; use of introductory f2f class on each BL topic will provide scaffolding and ensuring the reduction in f2f hours does not all occur in 1 week.	
	Knowledge-building communities (Scardamalia and Bereiter, 1994)	Asynchronous discussion forum activity to facilitate knowledge building outside of f2f contact hours and extend the discourse outside of the classroom		focus on knowledge-building during f2f classes on ratio analysis
	Scaffolding online learning through e-moderating (Salmon, 2011)		use of smaller group sizes; posting 'sparks' and summarising and weaving messages by lecturer to stimulate discussion; use of non-task discussion forum and forums on theory topics to help form learning community and accustom learners to discussion forum use	

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Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Engagement	Flow theory (Csikszentmihalyi, 1990)		The provision of online multimedia resource, worked examples and problems with solutions will provide a set of graded challenges for learners to maintain 'flow' as their skill increases	
	Student engagement in the educational interface (Kahu, 2013; Kahu and Nelson, 2018)	reduction in f2f contact hours to allow learners manage 'lifeload'; use of orientation activities to introduce students to online resources; ensure availability and ease of access to lecturer outside of f2f contact hours	introduction of learning activities to help build learning community relationships within the class group - using group work and clicker technology	Ensure clicker technology works as planned by testing before class
	Engagement theory (Kearsley and Shneiderman, 1998)	incorporating use of MS Excel - digital workplace tool	Use of collaborative problem-based tasks within the f2f learning environment, which have an authentic focus	
	Authentic learning activities (Herrington and Oliver, 2000; Reeves, Herrington and Oliver, 2002; Herrington, Oliver and Reeves, 2003)		Tasks designed as authentic learning activities - with real-world relevance, offering opportunities to collaborate and reflect on learning and integrated with assessment; increasing the challenge associated with the ratio analysis assessment task to include an assessment of the comparative performance of 2 companies in order to test higher level cognitive skills and grading rubric adapted accordingly; use of collaborative authentic bank rec task incorporating use of MS Excel workplace digital tool; Assessment weightings adapted to reflect task complexity	

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Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Interaction	Learner-content, learner-instructor and learner-learner interactions (Moore, 1989)	provision of high-quality online learning and assessment activities; lecturer acting as facilitator of learning with appropriate communication channels in place (announcements forum/email); online interaction with peers facilitated through use of asynchronous discussion forum for ratio analysis topic; use of grading rubric based on Bloom's taxonomy to mark ratio analysis assignments	Participation on discussion forum stimulated through use of grading rubric which was given to students in advance and awards marks for quality and quantity of postings; introduction of initial course activities to foster trust among participants; Ratio Analysis multimedia resource updated based on think aloud protocol from cycle one. Use of Whats App messaging to contact class rep	Bank Rec multimedia resource updated based on think aloud protocol from cycle two. Multimedia resources adapted to become mobile-compliant; Focus on interactions with international students.
	Learner-interface interactions (Hillman, Willis and Gunawardena, 1994)		updated moodle page along with updated discussion forum thread layout to increase user-friendliness and promote ease of access and clear navigation	
	Vicarious interaction (Sutton, 2000)		Discussion forum offers opportunities for shy learners to learn from others, interacting vicariously	

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Theme	Theories / Authors	Cycle 1	Changes made in Cycle 2	Changes made in Cycle 3
Technology	Learner-centred design (Soloway, Guzdial and Hay, 1994; Soloway <i>et al.</i> , 1996)	Students are oriented towards use of the online resources in a computer lab setting and provided with a resource to trial at home in advance of the BL topic. Provision of support to students regarding technical and connectivity issues.	The addition of worked examples provides various levels of task complexity, so that students can tackle more challenging problems as their skill levels evolve - fadeable layers of scaffolding	Provision of a tutorial on MS Excel at start of module to facilitate students who may have little knowledge in becoming familiar with formulae use
	Integrated learning (Harel and Papert, 1990)	Integrating the teaching of MS Excel and financial accounting through the use of the computer lab setting for a number of f2f classes		
	TPACK framework (Mishra and Koehler, 2006; Koehler and Mishra, 2009)	Adapting pedagogy in computer lab setting - use of templates in Excel to facilitate ease of data entry	Return to f2f class setting for topics unsuited to computer lab delivery; use of LanSchool classroom management software for convenient display of resources and problem solutions	

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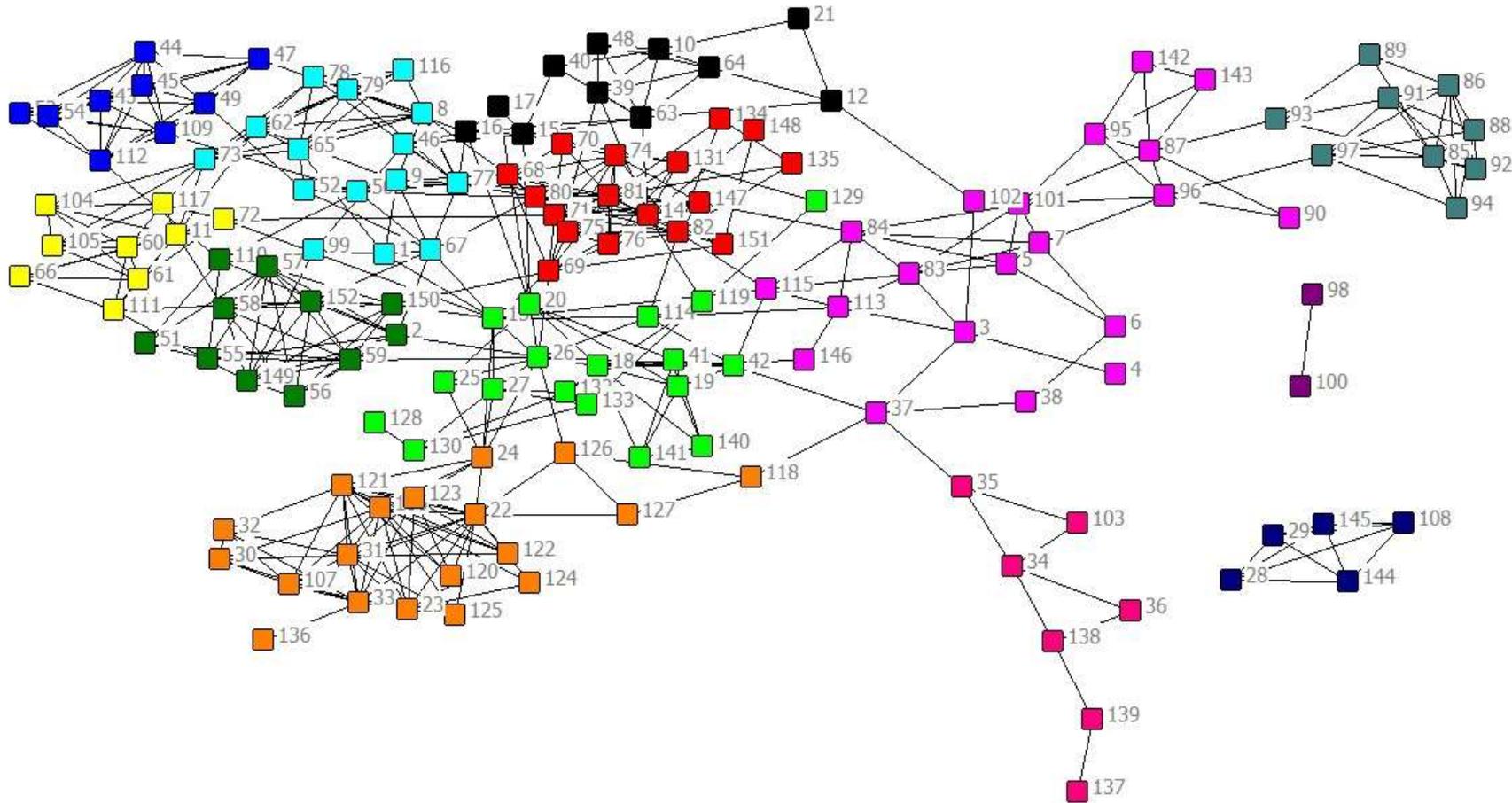
Appendix 22: Data analysis – group interview – concept mapping

Group interview data clusters linked to PACE-IT model themes – design cycle one:

Cluster	Concept	Count	Colour	Theme
1	scaffolding	20	lilac	Interaction
2	Work at own pace	15	cyan	Autonomy
3	Motivation - engagement	11	black	Engagement
4	Interaction with peers	18	bright green	Interaction
5	Self-directed learning	11	dark green	Autonomy
6	Communication / collaboration	19	orange	Collaboration
7	Discussion forum layout	5	navy	Technology
8	Interaction with lecturer	7	deep pink	Interaction
9	Learning - understanding	17	red	Pedagogy
10	Work in own time	9	royal blue	Autonomy
11	Learning - revision	9	yellow	Pedagogy
12	Computer lab class	9	petrol blue	Technology
13	Other IT issues	2	maroon	Technology
	Total no. of statements	152		

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Group interview concept map – design cycle one – 13 data clusters:



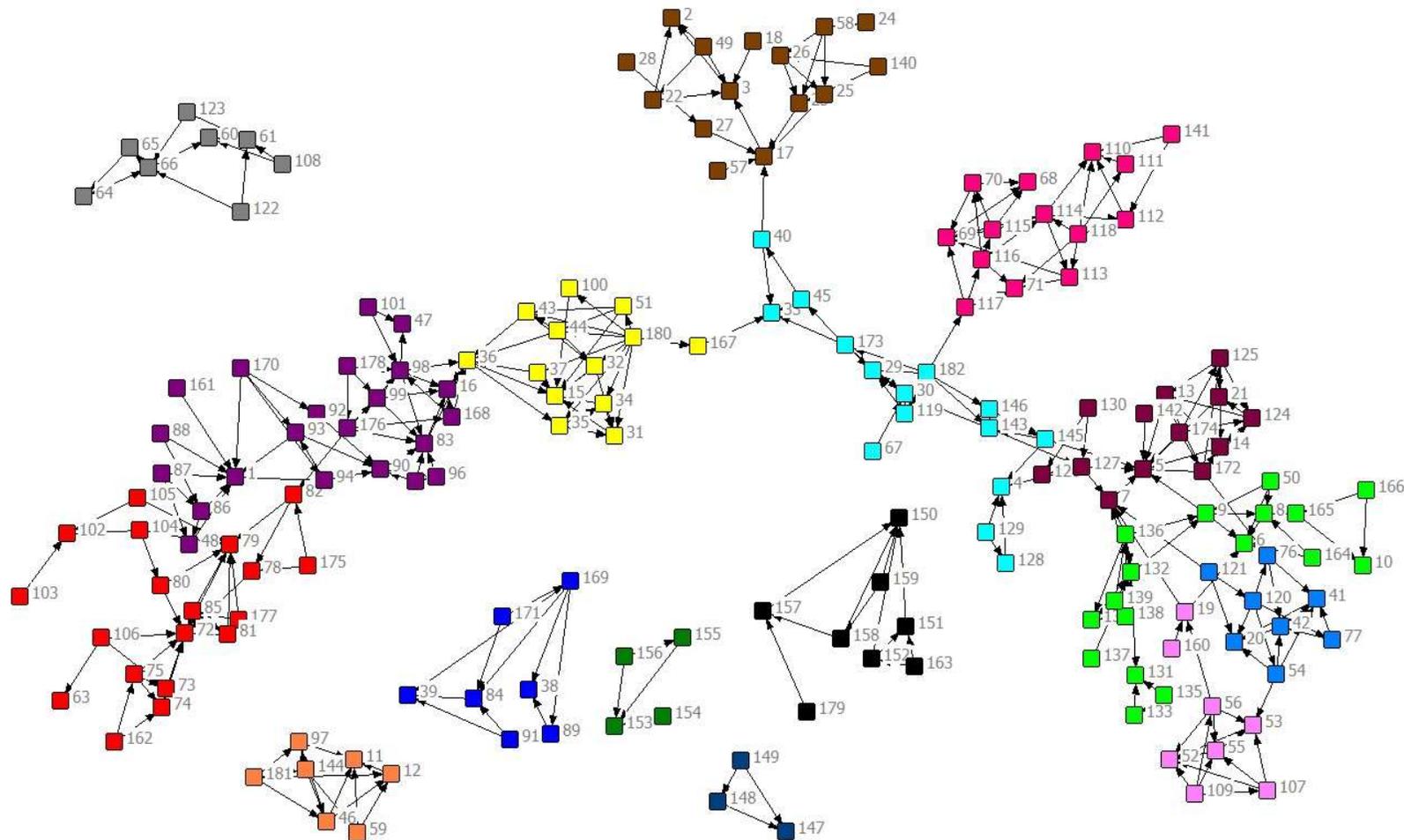
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Group interview data clusters linked to PACE-IT model themes – design cycle two:

Cluster	Concept	Count	Colour	Theme
1	F2F teaching	15	brown	Pedagogy
2	Self-directed learning	13	maroon	Autonomy
3	own pace/time	17	bright green	Autonomy
4	Revision	7	orange	Pedagogy
5	Confidence	8	lilac	Pedagogy
6	Motivation / engagement	15	cyan	Engagement
7	Understanding	13	yellow	Pedagogy
8	Scaffolding (learn from others)	22	purple	Collaboration
9	Different ways of learning	8	blue	Engagement
10	Interaction with lecturer	9	grey	Interaction
11	Scaffolding (solutions)	14	cerise pink	Interaction
12	Interaction with classmates (group work)	19	red	Interaction
13	Discussion forum - comments	7	royal blue	Collaboration
14	Technical - resource issues	3	petrol blue	Technology
15	Comp lab - excel positives	8	black	Technology
16	Comp lab - excel negatives	4	bottle green	Technology
	Total no. of statements:	182		

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Group interview concept map – design cycle two – 16 data clusters:



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Group interview data clusters linked to PACE-IT model themes – design cycle three:

Cluster	Concept	Count	Colour	Theme
1	Flexibility of online content	7	pink	Autonomy
2	Learning through understanding	18	orange	Pedagogy
3	Interaction with content/learner interface	21	cyan	Interaction
4	Flexibility of working in own time	12	light blue	Autonomy
5	Responsibility of learning on own	3	bottle green	Autonomy
6	Interaction with lecturer / classmates	13	maroon	Interaction
7	Engagement / participation	20	yellow	Engagement
8	Group work and collaboration	27	purple	Collaboration
9	Confidence	10	bright green	Pedagogy
10	Apprehensions regarding interactions	11	red	Collaboration
11	Community forming	4	cerise pink	Collaboration
12	Authentic activities	10	royal blue	Engagement
13	Critical and reflective thinking	9	navy	Autonomy
14	Scaffolding	9	black	Interaction
15	Technical support	5	petrol blue	Technology
	Total no. of statements	179		

