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Author(s)	Mac Mahon, Brendan; Ó Grádaigh, Seán; Ní Ghuidhir, Sinéad
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From iTE to NQT:

Evaluating Newly Qualified Teachers' Use of Mobile Technology in Their First Two Years of Teaching

Brendan Mac Mahon, National University of Ireland, Galway, Ireland

Seán Ó Grádaigh, National University of Ireland, Galway, Ireland

Sinéad Ní Ghuidhir, National University of Ireland, Galway, Ireland

ABSTRACT

This article outlines a study to examine if newly qualified teachers (NQTs) who had incorporated iPad within pedagogical practice during initial teacher education, continued to do so in their first two years of teaching, and also to identify the challenges to integration that emerged. Findings show that use of iPad in teaching, learning and assessment by NQTs during induction year was followed by a significant fall in Year 2. Deeply embedded external barriers at both system and individual school context level are shown to exert significant influence on the use of iPad within pedagogical practice. It is concluded that NQTs require ongoing support to maintain and develop their practice with technology, and also that significant reform is required at senior cycle in Irish secondary schools to enable technology integration.

KEYWORDS

INTRODUCTION

The first years of teaching can be challenging for newly qualified teachers (NQTs) as they attune to school contexts that may support or contradict pedagogical approaches advocated within their initial teacher education (ITE) programmes (Clausen, 2007). Campus-based preparation may be "washed-out" (Tabachnick & Zeichner, 1984, p. 29) and NQTs become susceptible to a form of "strategic compliance" (Flores 2005, p.396) or adjustment to the values and practices prevailing within the "particular ecology" of the school (Slaouti & Barton, 2007, p.418). In her investigation of new teachers' development over the first two years of teaching, Flores (2005) highlights "…a shift from a more progressive and constructivist view of teaching towards a more traditional and teacher-centred way of organising classroom activities…" (p. 393). This was accompanied by a greater focus on output rather than process, driven in the main by concerns over classroom management, "long syllabi, time pressure to complete them and national requirements in terms of curriculum delivery and assessment" (p. 394).

A strong contextual influence on practice is evident at pre-service level also. Investigating the impact of school placement on student teachers' beliefs in relation to curriculum, pedagogy and assessment, Gleeson, O'Flaherty, Galvin, and Hennessy (2013) found a dissonance between university-based teacher education programmes and the socialisation experiences of student teachers during practicum. "When the professional values of the school placement setting are not consistent

with those of the on-campus ITE programme", they conclude, "…the values and beliefs experienced during placement are likely to prevail…" (p. 452).

This paper details findings from a research study that followed NQTs in their first two years of teaching. All had previously incorporated iPad within teaching, learning and assessment while student teachers on an ITE programme. The aim of the study was to investigate if they continued to integrate mobile technology within pedagogical practice and to examine also the challenges they might face in doing so.

Newly Qualified Teachers and Technology

Viewed as a period of "survival, discovery, adaptation, and learning" (Clausen, 2007, p.246), the first years of teaching may prove difficult for new teachers to explore ways of integrating technology into teaching, learning and assessment. This challenge is not confined to NQTs, however. While all teachers, regardless of experience, now have unprecedented access to technology, there still persists "a surprising shortfall in its far-reaching impact envisaged by some on classroom practice" (Haßler et al., 2016, p.9). Explanations highlighting external factors such as school practices and resource access, have more recently focused on factors internal to the teacher. Ertmer (2005) distinguishes between external or first-order barriers and internal second-order barriers that embrace teachers' fundamental beliefs about teaching and learning and the perceived value of integrating technology into the process. Close alignment is evident between teachers' use of technology and their beliefs about the nature of knowledge, learning and effective ways of teaching (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012; Kim, Kim, Lee, Spector & DeMeester, 2013). Haßler et al. (2016, p. 9) maintain therefore that "it is critical that pedagogy is carefully considered from the outset" in order to realize the full potential of technology in improving student learning.

With specific reference to the use of mobile technology by classroom teachers, Christensen and Knezek (2017) identify many of the same internal and external challenges that exist for technology integration in general. Likewise, it is argued that successful integration of mobile learning into pedagogical practices "requires an instructional paradigm shift that promises to fundamentally change the way students learn" (UNESCO, 2012, p. 7) and ITE is increasingly viewed as a central means for promoting this (Mishra & Koehler, 2006; Hammond et al., 2009; Haßler et al., 2016; Admiraal et al., 2017). Research on mobile technology within the context of ITE is limited however, and as Røkenes and Krumsvik (2016, p.2) point out, "there seems to be a situation in teacher education internationally…where it is challenging to promote ways of teaching with ICT that move beyond basic digital skills".

Irish Context

In Ireland, the current Digital Strategy for Schools 2015-2020 (Department of Education and Skills, 2015) provides an "action plan for integrating ICT into teaching, learning and assessment practices in schools" (p. 5) and across "the continuum of teacher education from initial education through induction and continuing professional development" (p. 4). ICT is to be embedded in the planning, design and delivery of all teacher education programmes to ensure that "pre-service teachers acquire the skills, knowledge and confidence to use digital technologies to support learning and teaching" (p.33). Likewise, it is to be an element in the induction programme for NQTs to ensure they "… receive appropriate guidance and support to integrate ICT…" (p. 33). Currently, all NQTs in Ireland are inducted into the profession by way of systematic support in their first year of teaching.

Underpinning all aspects of the strategy is a "constructivist pedagogical orientation" requiring teachers to use technology in ways that enable learners to become "actively involved in a process of determining meaning and knowledge for themselves" (p.16). However, a survey by Cosgrove et al. (2014) on the use of ICT in Irish schools prior to the Strategy notes that while the majority of teachers claimed to hold constructivist views, traditional teacher-directed practices were nevertheless the dominant pedagogical orientation in most schools. When asked, for example, how often they used

ICT for different purposes during class time, 80% of teachers in primary and post-primary schools indicated that it was employed "often or always" to present information or give class instruction to pupils (p. 122). Frequently cited barriers to the effective use of ICT were lack of time, pressure to cover prescribed curricula and, ranking highest for post-primary teachers, pressures relating to State examinations. The report concludes that if teachers "are traditional in their pedagogical practices, then technology will be used in traditional ways" (Cosgrove et al., 2014, p. 196).

RESEARCH CONTEXT AND QUESTIONS

This investigation represents the second phase of an earlier research study undertaken with 38 student teachers on a one-year, postgraduate, initial teacher education (ITE) programme provided through the medium of the Irish language in the National University of Ireland, Galway. iPad is deployed 1:1 with student teachers on the programme and embedded in all aspects of practice. A stand-alone, skills-based approach to technology instruction is eschewed in favour of engaging student teachers in collaborative pedagogical design activities with technology within subject areas (Koehler and Mishra, 2005; Koehler et al., 2011). The first phase of the study investigated if, and in what way, iPad deployment on the programme supported student teachers' professional learning and development of pedagogical knowledge. Findings showed that using iPad within design-based approaches can enable student teachers to develop and integrate technological, pedagogical and content knowledge (TPACK), and also promote the integration of mobile technology within pedagogical approaches to teaching, learning and assessment (Mac Mahon, Ó Grádaigh & Ní Ghuidhir, 2016).

The aim of this phase of the study was to track the same sample across their first two years of teaching as NQTs and to investigate their use of mobile technology within professional and pedagogical practice. There were two research questions in this second phase:

1. Are NQTs continuing to make use of iPad in their professional practice as teachers?
2. What challenges do NQTs face in using iPad?

METHODOLOGY

The study adopted a mixed methods approach, comprising qualitative data from semi-structured interviews, together with both quantitative and qualitative data from online questionnaires. The sample of NQTs was drawn from those who had participated in the earlier phase of the study and subsequently taken up a first teaching post in September 2015 on completion of the ITE programme. All were known to the three researchers who are also lecturers on the programme.

A multiple case-study design (Yin, 2009) was used to focus on the experiences of 12 NQTs within this cohort. This group was purposively selected on the basis of gender (6 female & 6 male); range of subjects taught (Irish, French, Science, Biology, Chemistry, History, Geography, OSSP, Agricultural Science, Business Studies, Mathematics, Drama and Music); and school type (a mixture of single/mixed sex; urban/rural; Irish/English medium ranging in size from 140 to 800 pupils). Two semi-structured interviews were conducted with each participant in this group, the first at the mid-point of teaching in Year 1 and the second at the mid-point of Year 2 (December/January). Interviews aimed to gather information on school context, explore the use of iPad in teaching, learning and assessment, and to examine change, development or challenges regarding its use across the two years. Interviews lasted 30-40 minutes and were conducted by telephone, recorded and transcribed verbatim. Transcripts were then translated into English and checked for accuracy against the original Irish medium recordings.

Interview findings were supplemented by two online questionnaires which used both quantitative and qualitative open-ended questions to elicit factual and descriptive data from respondents. The first questionnaire was completed by NQTs (n=32) at the mid-point of teaching Year 1 (induction year

2015-16) and the second questionnaire (n=17) at the mid-point of Year 2 (2016-17). Questionnaires aimed to gather detail on infrastructure and attitudes towards technology in schools, as well as NQTs' use of iPad in teaching, learning and assessment.

An inductive approach was used to reduce, code and surface emerging themes from all qualitative data (Strauss & Corbin, 1990). Respondents' interviews were each analysed separately, before a comparative, horizontal analysis was conducted to look for common patterns and differences (Miles & Huberman, 1994). Quantitative data from questionnaires were first coded and analysed before correlation and cross tabulation tests were carried out between associated variables.

FINDINGS

Year 1

Questionnaires indicate that the majority of NQTs were working in well-equipped schools, with desktop computers, wifi, projectors and speakers available in almost 90% of classrooms. Apple TV (which facilitates teachers to use iPad remotely in the classroom) was available on site to 6 of the 12 case study NQTs although interviews reveal ongoing connection difficulties in 2 schools and access restricted to particular classrooms in a further 3 schools.

While just 4 of the case study NQTs and 22% of the overall sample were working in schools where "some" or "all of the students" had iPads, all 12 NQTs and 75% of the questionnaire respondents maintained use of iPad in their teaching and wider professional practice beyond the ITE programme. iPad retained its appeal as an organisational tool or "mobile diary" (Tom: Year 1) and was used in association with a range of apps by all 12 NQTs to monitor attendance and assessment. It was also used widely in lesson planning and preparation, with 66% of questionnaire respondents continuing to create teaching resources on iPad, and 36% doing so "every" or "nearly every day."

Teaching, Learning, and Assessment

Deployed with a range of presentation software applications, iPad was used as a medium to "present information" (Joe: Year 1) or "my own notes" (Tom: Year1) within a teacher-centered approach. Keynote (Apple Inc., 2013) for example, was used regularly by 7 of the 12 NQTs and "often" or "very often" by 66% of questionnaire respondents. However, interviews indicate also that the pedagogical function of iPad extended beyond the traditional presentation of subject content. For example, when used in conjunction with collaborative brainstorming applications, it could be "sent around" the classroom (Alice: Year 1), facilitating pupil-centered approaches when often the only available iPad was that belonging to the teacher. All 12 NQTs and 72% of questionnaire respondents acknowledged that it enabled interactivity:

You can send it around unlike a computer… they add to it and I send it to them as an email (Seán: Year 1).
It adds to interactivity…they can do research in class, connect apps to the board and all can participate (Tony: Year 1)

All 12 NQTs agreed also that it "added to learning" (Anna: Year 1) by motivating and promoting engagement among pupils who "are proud of their work and put effort in if they have to show it" (Tony: Year 1):

Certainly…they are more cooperative when they are using iPad and trying to teach you things…that inspires me to do more work on the iPad…you can do projects, group work (Brian: Year 1).
When I am teaching I am talking and focusing on the ear but with an iPad they see things…it's much easier for them to understand and that helps greatly. With Popplet[1] they see what other pupils have

created and have to think of something extra to add. That's not something you can do with paper. When they see something that others have done and that they did not think of, they will not forget it. That's different from me doing it for them (Seán: Year 1).

There was evidence also that iPad was being utilised to assess learning and that this in turn facilitated more innovative and wider uses of technology:

The First Year French class had to prepare a presentation on the iPad and this was the exam rather than written test, this was it! There are many more ways to assess learning if you use iPad…recordings that you can send…its great for languages (Tony: Year 1)
I recorded an oral French assessment on my iPad and emailed the recordings with my feedback to the pupils (Colin: Year 1).
They outline what they have learned in today's class and then upload it from their iPads on to the interactive whiteboard for all to see. That's a great assessment. Only takes 5 minutes to do (Seán: Year 1).

Content sharing platforms were used in assessment also:

For homework, each pupil uploaded a completed task onto EdModo[2]. We worked on this material the following day in class and they created a video based on this and added a voiceover (Lauren: Year 1).
I record experiments in Science and upload them with a voiceover into their electronic folders to aid revision for assessment. As there is no textbook available in Irish for Agricultural Science, I make videos of topics, add a voiceover and share through Google Drive[3] (Seán: Year 1).
I record pupils in language class to assess pronunciation. I uploaded the link with feedback notes onto Google Drive and they found this very helpful before their Oral Examinations (Veronica: Year 1).

While benefits were outlined, the view was also expressed that iPad was "just another resource to be used with other approaches" (Lauren: Year 1):

I could go in without the iPad and have the same impact on their learning…it's a great resource but without the relationship with students you are going nowhere (Ruth: Year 1).

NQT Impact on School Context

Although NQTs were reluctant to view themselves as 'agents of change' it was clear nevertheless that they were having an impact on teachers' knowledge and use of technology in their schools. All 12 NQTs reported being considered as a "source of information" (Colin: Year 1) or "kind of an expert on iPad" (Joe: Year 1) by colleagues:

When they come into my classes they are shocked…I can help them, things we did [on the ITE programme]... I'm like an expert… a go to person (Seán: Year 1).

This was similarly the case for NQTs in schools where neither teachers nor pupils had iPad:

Two years ago I was clueless but teachers are now asking me questions (Lauren: Year 1).

Questionnaires likewise show that 72% of respondents had given in-service on the use of technology to fellow-teachers in their schools. In addition, the practice of sharing resources, common among student teachers while on the ITE programme, was not alone maintained but extended to

colleagues also. Questionnaires indicate that 75% of respondents were now creating and sharing resources with other teachers in their new schools.

There was strong evidence that experiences with mobile technology during initial teacher education had positively influenced attitudes and pedagogical practice in schools. In interviews NQTs reported feeling "more confident" with technology (Brian: Year 1) and considered it "very natural… not a big thing" (Alice: Year 1):

I was a technophobe last year but am more open, more comfortable with this now (Lauren: Year 1). Prior to the [ITE] course I would not have an interest but I now see the importance, that pupils are interested…its another way, a different way to teach things to pupils…a resource for learning but there is still a place for the book and copybook (Anna: Year 1).

Impact of School Context on NQTs

Interviews indicate that the use of iPad within teaching, learning and assessment did not give rise to classroom management concerns. While there was acknowledgement of a 'distractability factor' such as pupils accessing games in class, iPad use was "viewed as a natural thing by pupils" (Joe: Year 1), and in schools where both teachers and pupils had access to iPads "it can be like a pencil case on the desk…they don't misuse it" (Seán: Year 1).

Although 78% of questionnaire respondents stated that their schools were "favourable" or "very favourable" towards technology, there was evidence in interviews of NQTs encountering a tension between their use of iPad within interactive teaching approaches and the examination culture of schools. This was most evident in senior examination classes where the culture was "very directed towards points[4] and notes" (Veronica: Year 1) and "in conflict with what I learned on the course about technology" (Colin: Year 1). As a result, it was "impossible to use interactive approaches with iPad when senior classes were looking for As and Bs" (Alice: Year 1):

Classes are looking at me and saying 'Why are you not giving us notes? Why are you trying to do fun things with us?' (Veronica: Year 1).

Lack of access to continuing professional development (CPD) on the use of technology emerged as an issue in interviews also. None of the 12 case studies NQTs had received CPD training in their schools although 31% of questionnaire respondents had. Similarly, of the 9 NQTs participating in the National Induction Programme for Teachers which promotes professional development in the first year of teaching, none had received guidance on the use of technology. This was also the case for over 90% of questionnaire respondents. NQTs displayed a clear appetite for further professional development however, as "new things were coming up all the time" (Brian: Year 1).

Year 2

At the time of interview in their second year of teaching, 4 of the 12 case studies NQTs had changed school. One teacher in this group had moved from a setting where iPad was deployed 1:1 with pupils, while another 2 teachers were now in schools where pupils and staff used Microsoft devices that functioned as both a laptop and tablet. Overall, just 3 of the 12 case studies NQTs and 35% of questionnaire respondents were teaching in schools where "some" or "all of the students" had iPads.

Teaching, Learning, and Assessment

Findings reveal that iPad was no longer used in teaching by 6 of the 12 case studies NQTs and the number of questionnaire respondents using it "every day" or "nearly every day" had likewise fallen to 35%. Within the group no longer using iPad, 3 teachers were working in schools that had recently

adopted Microsoft tablet devices and these were deployed primarily to present information or share resources with pupils as part of the content management role assigned to technology within the schools:

I use this tablet mainly with OneDrive[5]. This is an organised system for teachers. I can put all plans on it. Notes, videos also. You can share resources very easily (Alice: Year 2).

Because of difficulties connecting iPad to projectors in her new school one other NQT in this group was relying exclusively on "classroom computers" to "present notes" (Louise: Year 2). The remaining 2 teachers were now using smart phones rather than iPad in their teaching. However, a difference in approach was evident here with one teacher using it exclusively to make "traditional presentations" of subject content (Colin: Year 2), while the other teacher allowed pupils to submit homework from their smart phones as a recorded voicemail before returning "recorded feedback to them also" (Lauren: Year 2).

Of the 6 NQTs who continued to use iPad in their teaching, 3 were employed in schools were iPad was also deployed 1:1 with pupils. Similar to findings in Year 1, evidence shows that iPad, used in association with a variety of applications, was again integrated into teaching, learning and assessment as part of both traditional, teacher-centered and innovative, pupil-centered approaches.

NQT Impact on School Context

As was the case in Year 1, NQTs maintained contact with one another and continued to share resources. However, there was a noticable increase in the number using technology to create and share resources with other teachers in their schools. A total of 9 of the case study NQTs were now doing so as were 76% of questionnaire respondents.

All 6 NQTs using iPad in their second year of teaching continued to be considered a technology "expert" (Veronica: Year 2) by other teachers in their schools and this was reported by 76% of questionnaire respondents also. Rather than in-service however, advice and support was given to colleagues on an informal rather than formal basis:

Yes I am seen as an expert. I'm not proactive but others come to me and I give advice (Tony: Year 2).

Recognition of expertise was not always forthcoming for those no longer using iPad in their teaching however, as is evident in the contrasting experiences of the 2 NQTs who had changed to schools using Microsoft devices. While the first teacher was given the post of Technology Coordinator in her new school and had become "the reference person" giving help "informally…when teachers have problems" (Alice: Year 2), a degree of disillusionment with the school's use of technology was apparent in the case of the second teacher who "was seen as an expert last year but not now" (Ruth: Year 2).

Impact of School Context on NQTs

In questionnaires, the school's attitude towards technology was described by 89% of respondents as "favourable" or "very favourable". Levels of technology equipment remained high and Apple TV was now available in 47% of schools. Nevertheless, connectivity problems were still evident and these impacted on practice:

Technical issues are the cause…I'm not using iPad at all now (Lauren: Year 2).

In addition, new responsibilities such as that of "Year Head" (Lauren: Year 2), as well as teaching load and time pressures to cover course content, had all impacted on the use of iPad. The role assigned to technology by school management was also a factor:

This school is very traditional. I gave a presentation on iPad to the staff last year. Some teachers were interested but there is neither support nor direction from management. The emphasis is on the use of the Virtual Learning Environment rather than technology for teaching and learning (Questionnaire Respondent: Year 2).

Management expectations were often communicated directly to NQTs:

The school were not very happy that I was using iPad and preferred if I used the system they have (Ruth: Year 2).
We are asked to use it, mainly for administration. Everything in relation to attendance and behaviour is going online but not much training on how to use it in class (Colin: Year 1).

NQTs in the three schools using Microsoft devices felt restricted by a requirement to use technology primarily for content management:

I was using technology to interact with students last year… but the school this year wants to use OneDrive. There is no way for the students to interact. Its just a place to share resources with them more than anything else. Its like a Cloud where we upload our notes, questions, homework, whatever and students can download them (Anna: Year 2).

The strongest single challenge to the continuing use of iPad in teaching however, was the examination and 'points' culture encountered in schools and the resulting influence this had on the pedagogical approaches used by NQTs:

The points system definitely restricts what I can do. They are all trying to get 600 points in the Leaving Certificate exam. I prefer when I am using iPad because it is interactive and all are involved but they would prefer if you gave them the notes. There is pressure from parents, from the Principal, from the students to get good grades… They want points and you cannot argue with this (Tony: Year 2).
They want notes and that is the attitude in the school…they want to get the marks. Not alone does the points system put that restriction on me but parents and the pupils themselves do so also (Veronica: Year 2).

This pressure was not confined to examination classes alone:

…even in second year students are talking about the Leaving Certificate exam. Many of them are just looking for the traditional thing from the teacher (Anna: Year 2).

Although the majority of case study NQTs expressed the view that the points culture was "in conflict with my view of education" (Tony: Year 2), "in conflict with active and collaborative approaches promoted on the [ITE] programme" (Anna: Year 2) and "in contrast to my approach" in the classroom (Brian: Year 2), there was evidence also that it facilitated the pedagogical approaches of others:

I like technology… but when it gets closer to exams they want notes. I prefer that they write it on paper… because this is how they will do it in exams (Colin: Year 2).
Principals want good results and you have to go through the notes. In my subject there are loads of notes, theory…and to get the results you have to do exams. To a point, this is how I view education. Good points are important (Louise: Year 2).

DISCUSSION

This study aimed to investigate if NQTs, who had integrated iPad within pedagogical practice during initial teacher education, continued to do so in their first two years of teaching, and to identify the challenges to integration that emerged. Findings show that traditional and innovative use of iPad in teaching, learning and assessment by NQTs in their induction year was followed by a significant fall in usage in Year 2. Why then did this change in practice occur?

The "quality of technology experiences" included in pre-service teacher education programmes is recognised as an important factor influencing the adoption of technology by teachers in later practice (Haßler et al., 2016, p. 29). Likewise, in this study, there is widespread acknowledgement among NQTs that the infusion of technology within ITE had given them the knowledge and confidence to integrate iPad in a natural way within pedagogical approaches. Furthermore, NQTs made a notable impact on schools in their first year of teaching by raising awareness of the pedagogical affordances of mobile technology among colleagues in the form of in-service, advice and resources.

Ertmer (2005) nevertheless, reminds us of the need to address both internal and external barriers in any effort to facilitate teachers' uses of technology in the classroom. Findings from this research however, demonstrate that external barriers embedded in the institutional or school context, exerted a more significant and ongoing influence on NQTs wishing to maintain use of iPad within pedagogical practice. Such barriers were visible throughout the study in the form of on-going infrastructural issues, unreliable or non-compatible technical equipment and, particularly evident from interviews with NQTs in the second year, the limited role assigned to technology in schools by school management. In the majority of cases the function of technology was conceptualised largely in "techno-centric" terms (Butler, Shiel, Leahy, & Cosgrove, 2013, p.4) with a focus on infrastructure and systems to deliver and manage subject content.

While this had inevitable implications for the integration of technology within pedagogical practice, a more significant and powerful external pressure impacting on NQTs' use of iPad emanated from an examination culture, deeply embedded in schools, that placed an inherent focus on measurable output in the form of results. Tensions are perhaps inevitable when potentially transformative technologies meet institutionalised practices (Gray, Dunn, Moffett, & Mitchell, 2017) and in the context of Irish education, high stakes testing has been shown to have an impact on pedagogical approaches that can become more didactic and place a greater emphasis on the transmission of factual knowledge as pupils approach the exam year (Smyth & Banks, 2012). Likewise, in this study a strong and continuous pressure was experienced by all case study NQTs to embrace traditional teacher-centered approaches. This resulted in technology being cast in a supporting role for "giving instruction and presenting information during lessons (Cosgrove et al., 2013, p. 6), rather than aligning with constructivist approaches to facilitate pupils become actively involved in determining meaning and knowledge for themselves (Department of Education and Skills, 2015). However, a limited pedagogical focus on product rather than process is analogous to pupils receiving information by "sat-nav" (Bassett, Cawston, Thraves, & Truss, 2009, p. 12) rather than teachers having the expectation that they think for themselves.

School context can however, consist of forces that work in harmony as well as opposition (Slaouti & Barton, 2007) and it is notable that the 3 NQTs teaching in schools where iPad was deployed 1:1 with pupils all continued to use iPad innovatively in teaching, learning and assessment across both years. Yet even in these supportive contexts it was evident that high stakes testing can determine not alone the knowledge that is taught but also the manner in which it is taught, as the NQTs in question struggled to maintain and employ interactive and pupil-centered approaches afforded by iPad.

While internal barriers such as teachers' beliefs about teaching, learning and assessment were more difficult to determine in this study, it was evident nevertheless that teacher-centered approaches corresponded with the way in which some NQTs "view education" (Louise: Year 2) and consequently used technology. It is significant therefore, that all 12 NQTs lacked systematic support to interrogate or

develop their practice within the National Induction Programme for Teachers which, it was reported, had "no emphasis at all of technology" (Alice: Year 2). Clausen (2007) argues that support provided to new teachers within the institutional context is an important factor in facilitating their development as teaching professionals and greatly influences how they use technology with their own pupils.

CONCLUSION

Pre-service education is now rightly recognised as an important means of achieving a wider integration of technology within pedagogical practice in schools. However, this study illustrates the need to address the context in which NQTs begin their professional lives as teachers as this can present significant challenges and barriers to integration. NQTs require support during induction to maintain and develop the strengths they can bring to teaching with technology. School management and experienced teachers need support also if technology is to be viewed in pedagogical rather than infrastructural terms alone. Cosgrove et al. (2014, p.45) argue that as new technologies imply "new teacher roles, new pedagogies and new approaches to teacher education, a reappraisal of the design of teacher professional learning as currently conceptualized in Ireland is needed". However, these will have little purchase in a teaching environment that is dictated to and determined by the culture of examinations and high stakes testing. While reform is currently underway in junior cycle at second level in Ireland (Department of Education and Skills, 2015a), there will be a limit on what can be achieved with technology unless there is significant reform in senior cycle also.

REFERENCES

Admiraal, W., van Vugt, F., Kranenburg, F., Koster, B., Smit, B., Weijers, S., & Lockhorst, D. (2017). Preparing pre-service teachers to integrate technology into K-12 instruction: Evaluation of technology-infused approach. *Technology, Pedagogy and Education*, *26*(1), 105–120. doi:10.1080/1475939X.2016.1163283

Apple Inc. (2013). Keynote (Version 6.0) [Mobile application software]. Retrieved from https://itunes.apple.com

Butler, D., Shiel, G., Leahy, M., & Cosgrove, J. (2013). *Building towards a learning society: A national digital strategy for schools*. Dublin: Educational Research Centre.

Christensen, R., & Knezek, G. (2017). Readiness for integrating mobile learning in the classroom: Challenges, preferences and possibilities. *Computers in Human Behavior*, *76*, 112–121. doi:10.1016/j.chb.2017.07.014

Clausen, J. M. (2007). Beginning teachers' technology use: First-year teacher development and the institutional context's affect on new teachers' instructional technology use with students. *Journal of Research on Technology in Education*, *39*(3), 245–261. doi:10.1080/15391523.2007.10782482

Cosgrove, J., Butler, D., Leahy, M., Shiel, G., Kavanagh, L., & Creaven, A. (2014). *The 2013 ICT census in schools – main report*. Dublin: Educational Research Centre.

Department of Education and Skills. (2015). *Digital strategy for schools 2015-2020: Enhancing, teaching, learning and assessment*. Retrieved from https://www.education.ie/en/Publications/Policy-Reports/Digital-Strategy-for-Schools-2015-2020.pdf

Department of Education and Skills. (2015a). A framework for junior cycle. Retrieved from https://www.education.ie/en/Publications/Policy-Reports/Framework-for-Junior-Cycle-2015.pdf

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educational Technology Research and Development*, *53*(4), 25–39. doi:10.1007/BF02504683

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, *59*(2), 423–435. doi:10.1016/j.compedu.2012.02.001

Flores, M. A. (2005). Mapping new teacher change: Findings from a two-year study. *Teacher Development*, *9*(3), 389–412. doi:10.1080/13664530500200274

Gleeson, J., O'Flaherty, J., Galvin, T., & Hennessy, J. (2015). Student teachers, socialisation, school placement and schizophrenia: The case of curriculum change. *Teachers and Teaching*, *21*(4), 437–458. doi:10.1080/13540602.2014.968895

Gray, C., Dunn, J., Moffett, P., & Mitchell, D. (2017). *Mobile devices in early learning: Evaluating the use of portable devices to support young children's learning*. Retrieved from http://www.stran.ac.uk/media/media,756133,en.pdf

Hammond, M., Fragkouli, E., Suandi, I., Crosson, S., Ingram, J., Johnston-Wilder, P., & Wray, D. (2009). What happens as student teachers who made very good use of ICT during pre-service training enter their first year of teaching? *Teacher Development: An International Journal of Teachers' Professional Development*, *13*(2), 93–106.

Haßler, B., Major, L., Warwick, P., Watson, S., Hennessy, S., & Nichol, B. (2016). *Perspectives on technology, resources and learning: Productive classroom practices, effective teacher professional development*. Faculty of Education: University of Cambridge.

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76–85. doi:10.1016/j.tate.2012.08.005

Koehler, M. J., & Mishra, P. (2005). Teachers learning technology by design. *Journal of Computing in Teacher Education*, *21*(3), 94–102.

Koehler, M. J., Mishra, P., Bouck, E. C., DeSchryver, M., Kereluik, K., Shin, T. S., & Wolf, L. G. (2011). Deep-play: Developing TPACK for 21st century teachers. *International Journal of Learning Technology*, *6*(2), 146–163. doi:10.1504/IJLT.2011.042646

Mac Mahon, B., Ó Grádaigh, S., & Ní Ghuidhir, S. (2016). iTE: Student teachers using iPad on a second level teacher education programme. *International Journal of Mobile and Blended Learning, 8*(2), 21-34.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). London: Sage.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Røkenes, F. M., & Krumsvik, R. J. (2016). Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education. *Computers & Education*, *97*, 1–20. doi:10.1016/j.compedu.2016.02.014

Slaouti, D., & Barton, A. (2007). Opportunities for practice and development: Newly qualified teachers and the use of information and communications technologies in teaching foreign languages in English secondary school contexts. *Journal of In-service Education*, *33*(4), 405–424. doi:10.1080/13674580701687807

Smyth, E., & Banks, J. (2012). High stakes testing and student perspectives on teaching and learning in the Republic of Ireland. *Educational Assessment, Evaluation and Accountability*, *24*(4), 283–306. doi:10.1007/s11092-012-9154-6

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. London: Sage.

Tabachnick, B. R., & Zeichner, K. M. (1984). The impact of the student teaching experience on the development of teacher perspectives. *Journal of Teacher Education*, *35*(6), 28–36. doi:10.1177/002248718403500608

UNESCO. (2012). *Working paper series on mobile learning: Turning on mobile learning in North America.*

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

ENDNOTES

[1]   Popplet is a collaborative mind-mapping application for capturing and organising ideas.
[2]   Edmodo is a social learning network where teachers and pupils can communicate, collaborate and share resources.
[3]   Google Drive is a file sharing and storage service developed by Google.
[4]   Examination grades are converted into points for entry to third level education.
[5]   OneDrive is a file hosting service from Microsoft.