Title	Development of a structured on-the-job training model
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Publication Date	2007
Publication Information	Masterson, F. and Cormican, K. (2007) Development of a structured on-the-job training model 8th European Conference for Knowledge Management Barcelona, Spain, 2007-09-06-2007-09-08
Item record	http://hdl.handle.net/10379/4054

Masterson, F. and Cormican, K. (2007) Development of a structured on-the-job training model. Proceedings of the 8th European Conference for Knowledge Management, 6th -7th September, Barcelona, Spain.

Development of Structured On-the-Job Training Model Utilizing Knowledge Management

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Abstract: This paper examines the potential of using knowledge management in developing a structured on-the-job training programme. Using a qualitative multiple case study approach, multiple sources of evidence were collected from two Irish based multinationals, including written and interview-based information from training managers, specialists, trainers and trainees. The multinationals are Ballina beverages (Coca Cola) and Intel.

A structured on-the-job training model in the form of a two-tiered closed loop circle was developed. The inner circle consists of knowledge management processes. The outer circle consists of the on-the-job training implementation steps. The structured on-the-job training model, when applied to organisations, has the potential to significantly improve their knowledge exchange activities through training, and consequently the strategic competitive advantage of the firm. The model is meant to help to turn their knowledge-sharing initiatives from theory to practice. Applying this model in a company that wishes to implement on-the- job training programmes gives structure to the implementation of the project.

The contribution of this study may help organisations when they are seeking to launch a structured on-the-job training programme and to maximize their chance of success as it provides structure to the implementation of the project This study has the potential to assist other researchers in refining and modifying on-the-job training programmes to maximize knowledge and insight in this field that is still deficient in theory, tools, models and framework. The findings demonstrate the possibility of issuing knowledge management in delivering a structured on-the-job training model.

Keywords: Knowledge Management; Knowledge Processes; On-the-job Training; Case Study.

The continuous changes in today's economy, focused on a process of globalization, demands competitive organizations with skilled workforces, where employees must have adequate knowledge and skills to perform their jobs successfully. On-the-job training (OJT) is a critical component of work place training where employees receive training while they work. Training is instrumental in increasing the knowledge and competence of individuals. Knowledge management is the structured and intentional collection and distribution of information to support learning (Ives et al 1998). Many argue that knowledge has become the main competitive tool for many businesses. The potential importance of managing knowledge for competitive advantage has received phenomenal amount of attention in recent years (Alavi and Ingam 2000; Gupta and Govindarajan 2000; Bowman 2002). It is only, however, comparatively recently that attention has specifically been directed towards the opportunities and limitations of managing knowledge through training (Johannessen and Olsen, 2003). This is somewhat surprising, as training is one of the main methods used to transfer knowledge between individuals within any organisation. The researchers see the linking of Knowledge management and training as a natural progression and warrants study. It is thus the focus of this paper. The aim of the case studies undertaken was to study was to determine if knowledge management processes can be leveraged in developing a structured OJT model.

Case Study
The problem of this study is to design a model for implementing a structured OJT programme utilizing the knowledge management concept. The aim was to use knowledge management processes to ensure the retention of knowledge within an organisation and to use the OJT programme as a vehicle

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to deliver this. Properly structured and executed training can be an effective method to increase productivity, shorten learning curves, and lower scrap rates in manufacturing operations. Using a qualitative multiple site case study approach, many sources of evidence were collected from two Irish based multinationals, including written and interview-based information from training managers, specialists, trainers and trainees. Site selection was based on their different on-the-job training methods. Intel is a manufacturing facility, which is located in the East of Ireland. It is too part of a larger group. Intel's plant produces microprocessors and communication silicon chips. These two companies come from two contrasting industries. They are world leaders in their product fields. The objective of the case studies is to use the information obtained from them to help in developing an OJT model. Coca Cola is a manufacturing facility located in the West of Ireland. It is part of a large global organisation. The company produces concentrate beverage. The company is considered market leaders in most product lines. The researchers tried to determine of knowledge management processes were being used to facilitate OJT.

On-the-Job Training

Jain (1999) describes OJT as "*the informal/practical training that can be acquired at the job site or through workshops/seminars in order to equip personnel with enhanced skill to provide more efficient services to the customer, which may be especially necessary for new recruits to familiarize them with their work place and work and for existing employees to update their skills*". According to Jacobs (1987) "[OJT] *is the planned process of developing task-level expertise by having an experienced employee train novice employee at or near the actual work setting*". There are two forms of OJT; structured and unstructured. Jacobs (2003) and Levine (1995) outline how structured training is differentiated from unstructured training. They see the principle difference is in the structure, manifested by standardized training materials, OJT processes, selected and trained trainers, and performances. Jacobs (2003) describes how unstructured OJT occurs when trainees acquire job knowledge and skills from impromptu explanations or demonstrations by others, trial and error efforts, self-motivated reading, or simply by imitating the behaviour of others. In unplanned OJT, the learners are expected to learn by watching experienced workers perform or by actually doing the work themselves.

Knowledge Management

Davenport and Prusak (1998) describe knowledge management as a process of capturing, distributing and effectively using knowledge. Organisations often implement knowledge management systems to prevent expertise knowledge leaving when the employer leaves (Malone, 2002, Rubenstein-Montano, and Buchwalter 2001). Rubenstein-Montano and Buchwalter (2001) cite how knowledge management can mitigate the impending shortage by capturing the expertise of employees before they leave so their expertise can be reused in the future. Zarraga and Garcia-Falcon (2003) describe how ones knowledge is retrieved from the minds of individuals, it can be transferred to work teams within an organization, and this becomes individual knowledge then becomes a source of organizational knowledge.

Knowledge Management Processes

The key processes within Knowledge Management as identified from the literature are;
Knowledge Generation (Bowman 2002; Grover and Davenport 2001; Von Krogh et al. 2001; Davenport and Prusak 1998;), *Knowledge Codification* (Davenport et al. 2003; Grover, 2001; Hansen et al. 1999), *Knowledge Storage* (Brown and Duguid 1991), *Knowledge Access* (Pan and Leidner, 2003 Bowman, 2002) and *Knowledge Transfer* (Pan and Leidner 2003, Von Krogh et al. 2001, Grover and Davenport 2001; McDermott 1999; Davenport and Prusak 1998).

Knowledge Generation: There are a number of ways knowledge can be generated. Knowledge fundamentally can only exist in the individual as the creator, recipient, or user of knowledge. As both individual and organizational well-being grow more dependent upon knowledge-rich resources. Understanding how new knowledge is created and managing that process becomes key to individual and organizational success. Hence, it is most important for individuals to develop their personal mastery, build knowledge competency and fervently pursue life long learning.
Knowledge codification: Is the process of the conversion of knowledge into various forms that can be accessed, leveraged and transferred independently of the presence or absence of the individuals that

might posses that knowledge (Grover and Davenport 2001). Grover and Davenport (2001) describe knowledge codification as the process of the conversion of knowledge into various forms that can be accessed, leveraged and transferred independently of the presence or absence of the individuals that might posses that knowledge.

Knowledge Storage: It is important to have mechanisms, which can store and retrieve all kinds of data, information and knowledge. Brown and Duguid (1991) have argued that ideas generated by employees in the course of their work rarely get shared beyond a small group of colleagues or team members with whom they collaborate. They believed that organizational learning can be considerably improved if these experiences and narratives are stored electronically for future reference.

Knowledge Access: In traditional types of organizations knowledge and information are fragmented in that they are located in many different places in the organization (Bowman 2002). Knowledge access is the inability to find knowledge in a timely fashion and apply it to a problem.

Knowledge Transfer: Once captured and stored, knowledge must be shared and made available to anyone who needs it. Knowledge transfer involves the movement of knowledge from its point of generation to the point of use (Grover and Davenport 2001).

Case Study A
Workplace training in Intel:

In Intel a variety of methods are used in the delivery of workplace training, such as in-class instructor-led courses, self-paced tutorials (videos or personal computer-based), vendor-led classes or web-based instruction. When a new employee commences employment at Intel they enter an Orientation Programme. This programme has duration of one week. There is a strong emphasis placed on basic Personal Computer training during this programme. The reason for this being that the majority of work that is done in Intel has a Personal Computer aspect to it. One of the reasons Intel has such a comprehensive Computer Based Training system, is because Intel has in-house expertise in software. They say that they leverage this competency to develop computerized training packages.

The OJT that is done at Intel is structured. A certification process is used to ensure that OJT is structured. Due to the nature of the production process, operators are certified against a piece of equipment or tool. There is tight control in ensuring that an uncertified operator cannot use a tool. To use a tool you have to log on to it with your personal ID. There are designated trainers at Intel, whose role is to deliver OJT. These trainers plan, deliver and manage all of the OJT training. Trainers are given comprehensive training prior to becoming a trainer. These trainers are designated trainers and do not work on the factory floor. When a new process or tool is being developed they spend time at the test facility where the process is being developed and help develop the training manuals for this new piece of equipment/tool.

The majority of Intel's training materials are online. This includes online documents that describe how tools are operated. They also have response flows online. A response flow checklist is a trouble shooting flow chart. If some thing goes wrong during the operation of the tool the operator can go online and follow the response flow in order to resolve it. If the online training material requires change an online request is sent to the owner of the packs. They make the changes to the pack and then issue a new revision to the document.

Structured OJT in Intel
Structured OJT is done in Intel. Intel's has detailed OJT training materials and they have specially selected trainers who exclusively conduct OJT. The training materials are online and they have an exam at the end that the trainee must complete. This results in giving structure to their OJT program. Their OJT trainers receive train the trainer training and are taught different training techniques. OJT training materials at Intel consists on online training documentation; this often includes a test at the end.

Knowledge Management processes utilized in OJT in Intel
In analysing the OJT practices in Intel the researchers attempted to identify the knowledge management processes utilized at the site in the OJT process. There is no knowledge management system in Intel. Knowledge management processes are present however, but not under the formal

title of knowledge management. Bowman (2002) says that in some organizations knowledge and information are fragmented in that they are located in many different places in the organization. Davenport et al. (2001) also holds the view that a large number of companies gathers data, but do not utilize this data. When discussing the development of training materials for their formal OJT training programme with training specialist in Intel he stated that they have one location for all of their training materials and that is on their Personal Computer.

Knowledge Generation: Knowledge generation occurs in Intel when new tools/processes are developed and the method of using them is initially in the form of tacit knowledge.

Knowledge Codification: Knowledge management processes are present in Intel but not under the formal title of Knowledge Management. In Intel the training materials content is an example of the company's explicit knowledge. When issues arise and are resolved by engineers the process of resolving the issue is documented in a response flow. These solutions found the engineers hold an example of the tacit knowledge by the engineers. They however convert it to explicit knowledge in the form of the response flows. Knowledge codification can be seen in the way Intel obtains the information about new processes and categorizes it, deciding where it should reside within the OJT training manual. It is the organization and representation of knowledge before authorized personnel access it.

Knowledge Storage: Intel store they process information on line, it can be assessed anytime, anywhere. If the online training material requires change, and new knowledge needs to be added to the material, an online request is sent to the owner of the training packs and the changes are made accordingly.

Knowledge Access: Intel ensures all operators have access to a Personal Computer and as part of OJT, operators view the training materials on the Personal Computer and frequently do quizzes to ensure they have understood fully the material before they are deemed as "certified".

Knowledge Transfer: The OJT trainers at Intel are used to transferring knowledge about processes to new employees. This is done during the structured OJT process.

Case Study B:

Workplace training in Ballina Beverages:

Each employee receives orientation-training beginning on the day of commencement of employment. This is called mandatory training. Each orientation programme covers topics such as an introduction to the company, good manufacturing practices, environmental training and general safety. Permanent employees attend an academy. The academy is a three-week comprehensive induction programme. When new employees finish the academy they commence work in production. They are given an area induction pack when they enter an area. This is an informal document that gives an overview of the tasks that are to done in an area. Operators are assessed at how well they do a task by using a competency assessment method. Very little Computer Based training occurs in Ballina Beverages. Employees access Standard Operating Procedures on the Intranet when required at work stations. The academy which an employee does when he or she joins the company is class room based. Treven (2003) and Garavan, et al., (2003) discuss how both on the job and off the job training occurs normally in companies. These two forms of training take place in Ballina Beverages.

Unstructured OJT at Ballina Beverages

Jacobs (1987) described OJT as *"[OJT] is the planned process of developing task-level expertise by having an experienced employee train novice employee at or near the actual work setting."* This could define the OJT that occurs in Ballina Beverages. When asked if structured or unstructured OJT is done, the training specialists say that unstructured OJT is done. Both on the job and off the job training takes place in Ballina Beverages. There is no formal process of doing on-the-job training at Ballina Beverages. Ballina Beverages does not have specific personal that are OJT trainers. Individuals, whose full time job is to work in production, conduct OJT. These people are not chosen because of their training expertise, but rather the knowledge they possess. They are usually the people who are longest doing the operation. They are the most knowledgeable and experienced employees. An experienced operator demonstrating to a new operator how a task is done or how a piece of equipment operates delivers OJT. There are no specific training materials used in delivering OJT at Ballina Beverages. One of the most frequently used materials that are used include is Standard Operating Procedures (SOPs), which detail process steps. The SOPs can be accessed on the plant's internal Intranet.

Knowledge Management processes in Ballina Beverages

In analysing the OJT practices in Ballina Beverages the researchers attempted to identify the knowledge management processes utilized at the site in the OJT process. Ballina Beverages does not have a Knowledge Management System. *Knowledge Generation:* The basis of organizational knowledge creation is the conversion of tacit knowledge into explicit knowledge and back again (Nonaka (1994)). Ballina Beverages has identified a knowledge gap that they have in their plant. A lot of their processes are not fully documented. A number of experienced operators know how to operate these processes. They acknowledge that operators who have been working there for the longest time and are experienced hold important knowledge about processes. This type of knowledge can be identified as Nonaka's tacit knowledge.

Knowledge Codification: Codification puts the knowledge in a form that makes it possible to easily find and use (Grover and Davenport 2001). Knowledge is unavailable in Ballina Beverages until it has been codified in a manner that will allow those who need it to find it. Davenport and Prusak (1998) believe that the determination of the appropriate medium for codification and distribution is important.

Knowledge Storage: The training materials that are used in Ballina Beverages can range from Standard Operating Procedures to vendor manuals. They have a lot of different types of information in different locations, for example, training videos stored in the training department; vendor manuals stored in the documentation library and training materials in soft copies stored on individuals Personal Computers. They describe how this information is not utilized to its full potential. Knowledge storage requires a structured storage capability, which reflects in a quick search for information, access to information for all employees, and the effective sharing of knowledge as it is easily stored for everyone's use (Brown and Duguid (1991). Ballina Beverages does not have its knowledge stored in one location, which is a common problem in organisations.

Knowledge Access: Ballina Beverages acknowledges that they have a lot of different types of training materials in different locations e.g. training manuals, CD ROMs, PowerPoint presentations. These are not however utilised to their full potential. If a person is being trained and the trainer is aware that a training manual exists for a piece of equipment, they might show this to the new person. This, however, is not always the case. Making knowledge easily accessible, for example over an intranet (Bowman 2002) is an example of a knowledge access process. Ballina Beverages does have an Intranet, where employees can access Standard Operating Procedures. Each workstation has a personal computer which ensures employees have access to the Intranet at all time. There are no OJT materials on this Intranet. It is therefore not being used to its full potential as a possible knowledge access medium.

Knowledge Transfer: There is no formal checklist used in the OJT that is done in Ballina Beverages. The absence of checklists and training materials was one of the factors identified by the trainers in Ballina Beverages as a problem. They have seen how different individuals do processes slightly different and therefore inconsistent training can be delivered. This view is collaborated by those held by Van Zolingen (2000). One trainer in Ballina Beverages stated that there is a slight difference in the way training is done across shifts. Davenport and Prusak (1998) believe that is important to an organisation that functions and department, and business units should have the possibility to leverage knowledge through transfer processes. Ballina Beverages agrees with this as it wishes to use a structured OJT programme to transfer knowledge to employees.

Structure on-the-job model:

The principle gaps in Ballina Beverages OJT training programme are the lack of training materials. An additional question is how to capture all of this knowledge centrally in one location? To close this gap, I propose the development of Process Knowledge modules. These modules will be a form of training manual. They will contain all of the pertinent knowledge relating to the process. The Process Knowledge Manuals can be developed using the proposed model (Figure 1) below that utilizes Knowledge Management processes in developing a structured OJT programme. The structured on-the-job training model, when applied to organisations, has the potential to significantly improve knowledge exchange activities within an organisation through training, and consequently the strategic competitive advantage of the organisation.
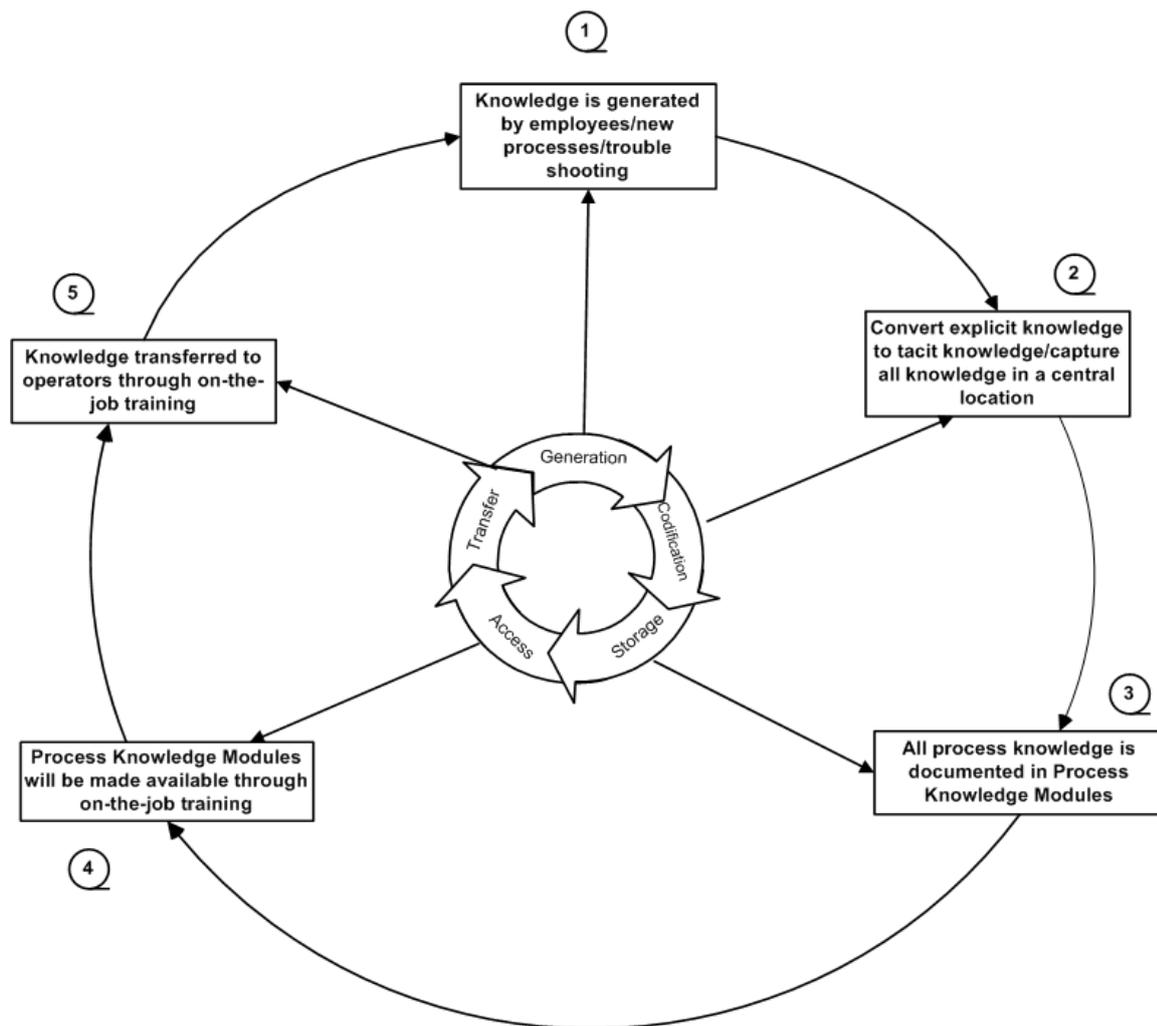
Figure 1: Closed Loop Model for Developing Structured OJT, utilizing Knowledge Management Processes

The following is a breakdown of each step in the model (Figure 1)

Step 1. Knowledge Generation; knowledge created by experienced employees.

This step depicts the knowledge that is held by experienced employees and continually generated by all employees. There are three forms of knowledge that are generated here; firstly, the knowledge held by the experts, secondly the knowledge that already resides in different locations and thirdly the knowledge that is generated through troubleshooting situations.

Step 2. Knowledge Codification; conversion of explicit knowledge into tacit knowledge.

All of the pertinent knowledge that exists must be codified or organized. This means determining the knowledge that is important for the process and the location of this knowledge must be determined. For example, the CDs, vendor's manuals must be located. This is the easiest knowledge to collect; the harder knowledge to collect is that knowledge that resides in the heads of the experts. This knowledge that resides with the "experts" is the tacit knowledge. It must be converted to explicit knowledge. One method of doing this could be to get the experienced operators to write down what they know about the process.

Step 3. Knowledge Storage; the explicit knowledge is documented in training manuals.

Once the knowledge is codified it must be stored in order for it to be accessible to everyone. This can be done by the creation of training manuals or Process Knowledge Modules (PKMs). The PKMS are designed to aid in the training of new operators, in cross training of existing operators and to ensure that the training is administered in a consistent manner. The contents (consisting of text/images/clipart) are based on the current procedures with specific emphasis on the best demonstrated practices required to perform each task. All of this knowledge will be developed into training materials, or Process Knowledge Modules (PKM).

Step 4. Knowledge Access.

Because this knowledge has being developed into training manuals it will be made available through the OJT training programme.

Step 5. Knowledge Transfer; operators will obtain this knowledge through the plant's OJT programme.

Knowledge will be transferred to employees through the structured OJT training programme.

The model is a closed loop circle as when new knowledge is created, the PKM, must be updated. Then the operators must be retrained against the new knowledge. The review of the literature and analysis of the case study data has resulted in the development of the model for structured OJT training, utilizing knowledge management processes, in an organization. The structure gives us a comprehensive view of the knowledge transfer from the start to finish and provides a suitable starting point for isolating and defining potential implementation problem areas. To structure the initiative in this way is of great help prior to the implementation.

Conclusion

The intent of this research is to advance the knowledge management field by providing quantitative data that will facilitate the understanding of the field's relationship to workplace training. Developing an OJT method will improve training delivery and to increase the numbers of employees who can receive training, therefore, reducing time and cost of training for the organization. Professionals in the training and development field still have to learn a lot about how delivering successful OJT tools effectively and efficiently with traditional instructional methods. The purpose in doing so is to design, develop, and deliver adequate structured OJT training programme that respond to the requirements of today's organizations to reduce cost and time in training. The research saw it possible that knowledge management processes could be used in developing a structured OJT program.

The structured OJT model, when applied to organisations, has the potential to significantly improve their knowledge exchange activities, and consequently the strategic competitive advantage of the firm. The model is meant to help an organisation to turn their knowledge –sharing initiative from theory to practice. The main purpose of the model is to give the structured OJT initiator a clear picture of what he/she is about to implement. The model presents the structure of the knowledge initiative and the context in which it is to be implemented. The application of knowledge management in the field of workplace training, namely OJT is appropriate both in theory and in practice. The scope of applying the OJT model, and combining knowledge management and OJT appears to be broad, in that knowledge management has the potential to be applied to improving OJT in a variety of companies, regardless of size, industry sector, and type of product. The application model for OJT is useful in describing and explaining the application of Knowledge management in the context of OJT.

The 5–step structured OJT model developed is presented as a significant enhancement to the workplace training field. The proposed model, illustrated in figure 1, is anticipated to advance the current conception of Knowledge management and related OJT applications. The use of the structured OJT model will ensure that employees receive adequate training. The use of the model

also highlights how companies can effectively capitalize on the knowledge maintained by their workers. Through a conscious focus on these implications for practice, managers can determine how knowledge is defined and leveraged as a strategic resource of the organization, directly affecting its competitiveness.

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