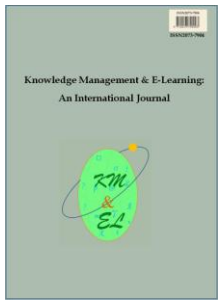
Knowledge Management & E-Learning



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Dana Tessier
Kimiz Dalkir
McGill University, Montreal, QC, Canada

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Implementing Moodle for e-learning for a successful knowledge management strategy

Dana Tessier*

School of Information Studies
McGill University, Montreal, QC, Canada
E-mail: dana.tessier@mail.mcgill.ca

Kimiz Dalkir

School of Information Studies
McGill University, Montreal, QC, Canada
E-mail: kimiz.dalkir@mcgill.ca

*Corresponding author

Abstract: A knowledge management strategy was implemented in a call centre organization. Part of this strategy included an e-learning tool 'Moodle' to support employee training and knowledge management (KM) initiatives. The research looked at the ways in which the e-learning tool could be used to help successfully implement the knowledge management strategy – specifically, to improve knowledge transfer between employees, improve individual and organizational performance and have a better understanding of the critical success factors involved for the KM strategy. The study analyzed three different methods of knowledge transfer to determine which resulted in the highest frequency of use for the knowledge repository. The results showed that by using e-learning, the knowledge repository had a high frequency of use and this shows that e-learning was a successful method of knowledge transfer. To keep employees functioning at an optimal level, employers will need to ensure knowledge management, training, and performance management strategies are aligned, measurable and maximized.

Keywords: knowledge management; e-Learning; Moodle; Knowledge transfer; Change management

Biographical notes: Dana Tessier's research interests include e-learning, knowledge management and change management. She is a recent graduate of the School of Information Studies at McGill University where she specialized in Knowledge Management.

Dr. Kimiz Dalkir specializes in innovation and knowledge management. She is a professor in the School of Information Studies at McGill University.

1. Introduction

Many workers are facing several job changes in their career due to the current trends in employment. While the exact number of careers in a person's lifetime is still in question, in 2008, the majority of Americans had been in their current job for 12 months or less

(Bialik, 2010). These are employees that are still adjusting to the learning curve of joining a new organization and therefore might not be as effective or productive as tenured employees. Furthermore, this commonly cited statistic does not take into account how many new processes or procedures employees might have to learn over the course of their employment. These changes may be due to product innovations or new laws and legislations that may apply to their industry. For example, think of how many different times McDonald's (www.mcdonalds.com) menu has changed over the years. Every change impacts the employees requiring new processes to follow when preparing, storing, packaging, and selling the food. There may also be new equipment for employees to learn as well as health, safety, and sanitary procedures. This is one example, in one industry; however, the same picture could be drawn of the technology sector, public sector, health care and manual labour jobs. These changes need to be communicated and implemented through all areas of the business. To continue with the McDonald's example, the cash register must be programmed for the new item, the signage must be updated and any promotional or marketing material must be placed in each store. However, to ensure a successful product launch, the communication cannot stop at informing clients of the new product – focus must be placed on the front-line employees to ensure they are ready to support the business on this new venture.

As companies continue to innovate and grow, they must ensure their new processes and procedures are properly implemented throughout the organization to achieve success. A knowledge management strategy can allow organizations to utilize their knowledge resources more effectively (Chen & Hsiang, 2007), which is crucial when undergoing an organizational change. By implementing an e-learning tool, organizations can better disseminate new information that will help employees on their journey of change management. This paper looks at some new approaches in knowledge management, e-learning and change management to see how they can work together to improve knowledge transfer. More specifically, we would follow knowledge transfer when undergoing an organizational change such as launching a new product or implementing a knowledge management strategy. By understanding the critical success factors involved in achieving better knowledge transfer, organizations can benefit from an improved knowledge management strategy and ultimately better performance.

2. Key concepts

In order to ensure that change management, knowledge management and e-learning initiatives are properly aligned so that they are working towards the same goal; it is necessary to adopt an interdisciplinary approach. Both e-learning and knowledge management are very important for a learning organization (Ponce, 2003). In the opening chapter in Liebowitz and Frank's (2011) book *Knowledge Management and E-learning*, they describe the similarities of both fields by saying "both disciplines deal with knowledge capture, sharing, application, and potentially knowledge generation" (p. 4). As Ponce (2003) describes in her article "What Can e-Learning Learn from Knowledge Management," both e-learning and knowledge management work together to improve "organizational performance by knowledge dissemination". e-Learning can be described as a "knowledge resource repository" (Ponce, 2003) and this can allow "the users of the e-learning system [to be] consumers of prepared knowledge materials" that will allow them to be involved in their own "knowledge creation" (Ponce, 2003). Both knowledge management and e-learning do indeed deal with capturing knowledge but it is where both systems are involved in sharing or transferring the knowledge that the true intersection lies. e-Learning can transfer explicit knowledge through the creation of training modules,

and through discussion boards, polls and other methods of learner participation. Tacit knowledge can also be transferred through the learning community and this can result in even better knowledge transfer for effectiveness and innovation (Liu & Wang, 2009). The process of transferring tacit knowledge can also create a "feedback loop" which can transfer feedback to the authors or trainers who created the modules who can then ensure they remain relevant and up-to-date (Islam, Kunifuji, Miura, & Hayama, 2011).

A wide number of different definitions are used to describe e-learning. For the purposes of this paper, the following operational definition of e-learning will be used: the process of a training activity being conducted in an online environment. Chen and Hsiang (2007) state that "e-learning goals are to establish a learning organization and nurture a corporate culture based on knowledge sharing". A number of different studies describe many of the similarities of e-learning and knowledge management, such as enabling access to information for learners and easy acquisition of knowledge. The main components of these similarities are the ability to share knowledge (Lau & Tsui, 2009). Another area where knowledge management and e-learning intersect is the idea of the knowledge or learning object. These objects can be "infused into e-learning to put appropriate information or knowledge to the user as needed" (Liebowitz & Frank, 2011). The idea behind learning objects is that these modules can be easily re-used to instruct different users. Furthermore, "knowledge acquisition is therefore an interactive process … [and] e-learning environments are often called 'interactive learning environments" (Barker, 2005).

A simplified definition of knowledge management would be "a generic process through which organizations generate value from knowledge" (Chen & Hsiang, 2007). This value is linked to competitive advantage and excellent business performance (Nevo & Chan, 2007; Chen & Hsiang, 2007; Islam, Kunifuji, Miura, & Hayama, 2011; and O'Dell & Grayson, 1998). Knowledge management practices aim to leverage and improve the organization's knowledge assets to enable "better business practices, improved organizational behaviours, better decisions and improved organizational performance" (King, 2009). Knowledge management activities are ones that create knowledge, identify knowledge, codify it, share it, reuse it and apply it (Nevo & Chan, 2007). To improve organizational performance, knowledge is needed at the right time and place to maximize its usefulness (King, 2009). "It is generally believed that if an organization can increase its effective knowledge utilization by only a small percentage, great benefits will result" (King, 2009).

3. Research objectives

The major objective of this study was to study the effectiveness of e-learning initiatives to contribute to change management and knowledge management strategy objectives within a given organization. More specifically, different knowledge transfer mechanisms made possible through the implementation of a Moodle-based e-learning tool were investigated to identify which contributed to more frequent and more effective use of the knowledge management system. Finally, the potential contribution of e-learning to increased individual and organizational productivity and performance was analyzed.

A case study was used to analyze the different methods of knowledge transfer within an organization. It is expected that an e-learning tool such as Moodle will improve knowledge transfer. This in turn is expected to help implement and see the benefits of a knowledge management strategy. The first research objective is to identify any improvements in knowledge transfer. A related objective is to identify the critical success

factors for using the e-learning tool for knowledge transfer and compare these with performance improvement and change management factors identified in the extant literature. The results will then be discussed to provide recommendations to management on how best to integrate e-learning tools in change and knowledge management strategies aimed at improving performance.

Three different methods of knowledge transfer will be analyzed to determine which method generated the most frequency of use on the organization's wiki:

1. e-Learning module,
2. Teleconference knowledge transfer,
3. E-mail knowledge transfer.

4. Theoretical model and literature review

When examining the use of e-learning within a knowledge management strategy, it can be seen that e-learning can be used to achieve the four different methods of knowledge transfer, as described in the most widely used model in KM, the Nonaka and Takeuchi's (1995) knowledge spiral. In creating the e-learning module, the organization is able to make tacit information explicit which is the process in the 'Externalization' quadrant. This activity also allows the author of the e-learning module to package explicit information and include it in the learning module and that is part of the 'Combination' quadrant. Furthermore, by using the discussion forums or survey tools present in e-learning tools, the organization could use the tool for tacit-to-tacit knowledge transfer (socialization quadrant) and the quiz feature of the e-learning tool can enable the user to experience explicit to tacit knowledge transfer, resulting in 'Internalization.' By placing the e-learning methods on Nonaka and Takeuchi's knowledge spiral, it can be seen how e-learning can be used as a very effective method of knowledge transfer.

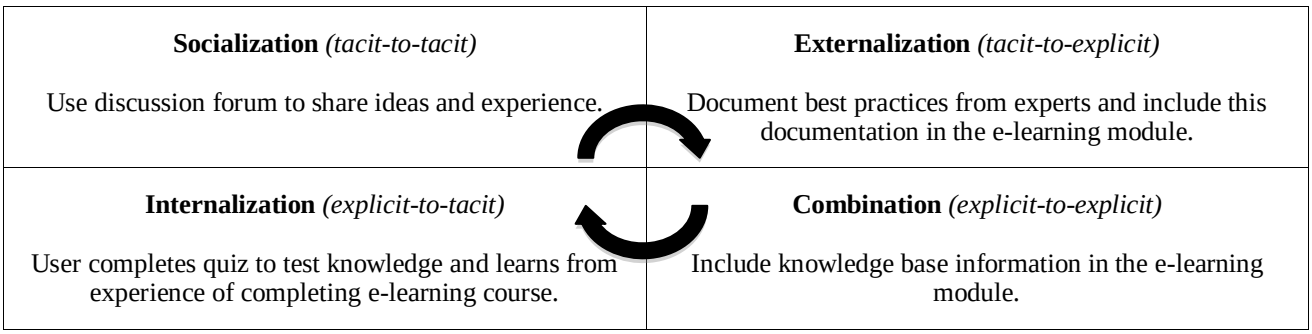

Fig. 1. The Nonaka and Takeuchi knowledge spiral. Adapted from Nonaka and Takeuchi (1995)

As demonstrated in Fig. 1 above, it can be seen that "if properly applied and exploited, [e-learning] can be a huge benefit to firms and their partners by providing access to both explicit corporate knowledge as well as valuable tacit knowledge that has been captured and made available as a firm's resource" (Wild, Griggs, & Downing, 2002). The strong link between e-learning and KM is noted to be the inclusion of both explicit and tacit knowledge forms as both are needed for effective e-learning to take place.

Knowledge management is needed because businesses are not benefiting from the information that they currently have and by ignoring this challenge, they risk becoming

less effective and less profitable (O'Dell & Grayson, 1998). One of the reasons that organizations must share knowledge is due to the constant flux and change that most businesses are experiencing on a regular basis. In their article on communicating change, Richardson and Keith (1996) explain, "if the organization is not successful at communicating the change, it is unlikely that the organization will be successful at implementing it". In the event that there is change in the organization, employees will quickly "try to make sense of the new environment and draw conclusions about its possible outcomes by being actively involved in information seeking" (Choi, 2011). It is at this moment that the organization must have adequate information and direction to provide to the employees or they may lose the employees' acceptance or readiness for this new change. Furthermore, if the change strategy is not effective and the "company fails to adapt, [the company]… will eventually experience declining, or perhaps even negative, profits." (Phillips, 1983). Here the strong alignment of e-learning, change management and knowledge management is highlighted. All three must be successfully implemented in order to ensure that employees can fully benefit from the new ways of learning and performing their work.

To protect the company from failed change management, Phillips (1983) suggests that "the company might want to launch a substantial staff training program - including on-the-job assignments as well as off-the-job courses – to develop the orientations and skills required for the new era". By having training programs ready to usher in the new change within the organization, this will ensure that as employees seek out information, they are met with a consistent and informative message. However, even an effective change management plan can fail if the necessary skills to adapt are not internalized by employees (Edmondson, 2008). Knowledge management departments can generate and store knowledge relating to operational change and training initiatives. In fact, some organizations did create knowledge management systems and assumed that by simply building them, employees would use them, however, this is not the case (Yoo & Huang, 2013). A knowledge transfer strategy is needed to ensure employees benefit from the knowledge management system, however, as O'Dell and Grayson (1998) discuss, even successful knowledge transfer strategies can fail due to knowledge not being effectively transferred.

O'Dell and Grayson (1998) outline three possible reasons why knowledge transfer fails. In the context of O'Dell and Grayson's (1998) paper, knowledge transfer implies not only to the capture and storage of knowledge but also its use by its intended audience. The first reason that knowledge transfer fails is that no one knew the information existed and therefore did not go looking for the knowledge in the knowledge repository. The knowledge repository is where the organization has chosen to store the relevant knowledge; this could be a wiki or an online database. The second reason is the "absorptive capacity" of the person seeking knowledge, which means that this person may find the information but lack the ability to use it. The term absorptive capacity refers to the fact that while the individual is looking at the information, they do not possess the skills to adopt it or retain it and are therefore unable to use the information. And thirdly, there is no relationship to support the knowledge transfer. It is not enough to store and capture knowledge by writing it down and making it available for the employees within the organization. Boisot, Child, and Redding (2011) discuss how "agents, individual or collective, make sense of their world by coherently integrating their embodied, narrative, and abstract symbolic knowledge". Sense-making is a necessary part of learning and it is the process whereby individuals build understanding around the new information they have been provided and an e-learning module allows the ability to take information and add context, a narrative and other attributes to not only enhance sense-making but to improve the ability to adapt knowledge through understanding. Boisot, Child, and

Redding (2011), emphasize this by explaining how "knowledge flows … are shaped by interactions – transactions – between agents". This leads the authors to explain knowledge diffusion – the effect that "puts more of the agents within a population within reach per unit of time than hitherto, thus lowering average communication costs". e-Learning can be seen as this type of diffusion process. It allows the relevant information to be capsulated into a module that can allow for context to be created that can be easily disseminated to the target audience. A successful knowledge management strategy must include an iterative process by which knowledge is shared throughout the organization. e-Learning can be used for the iterative process of knowledge transfer.

5. Objectives of e-learning

There are many different reasons why an organization would implement the use of an e-learning tool but the main benefits to doing so are the decreased costs of personnel training, the "anytime" availability of e-learning, and helping learners become fully trained at a quicker rate (Forman, 2002). Chen and Hsiang (2007) list the benefits of a knowledge management and e-learning program to an organization as "learning curve improvement, quick response and efficient customer satisfaction". Wang, Ran, Liao, and Yang (2010) discuss e-learning's "flexibility and just-in-time delivery" as some of the key benefits to implementing an e-learning program in the workplace. This allows the employees the opportunity to learn regardless of when they work or where they are located (Yoo, Han, & Huang, 2012). By providing a well-scripted and consistent message through an e-learning module, an organization could instill confidence in their employees and increase their overall readiness to adapt to the new changes within the organization (Choi, 2011). Choi (2011) emphasizes that "employees' attitudes toward organizational change can be shaped by appropriate efforts at the organizational level". In Kawalek's (2006) case study on his organizational change project, he concludes "with the benefits of hindsight, it now seems obvious to the research team that change in organization will only occur if brought about by genuine purposeful action".

By taking action and creating an e-learning module that is targeted for the employees, this can easily influence the employees to adapt to the new information and then modify their behaviour within the environment in a productive way (Yoo, Han, & Huang, 2012). When creating an e-learning module, "the applications should consider the alignment of individual and organizational learning needs, the connection between learning and work performance, and the interaction between individual learners" (Wang, Ran, Liao, & Yang, 2010). By aligning the goals of the learning module with the correct organizational needs, this will enable the e-learning module to be an effective form of education for the employee and to improve organizational performance. When writing the modules, the author must consider that this needs to "facilitate self-study learning for a novice" and "the wording should be carefully reviewed and enhanced so that it clearly presents the message to a reader, as opposed to a listener" (Colbrunn & Van Tiem, 2002). To enable understanding, "exercises and checkpoints need to be interspersed appropriately to allow for reflection and interaction" (Colbrunn & Van Tiem, 2002). As expressed above, to enhance knowledge transfer, the modules should be interactive both during the module as well as after it. The e-learning modules can also be repeated as needed by the user and this can have many benefits for the organization, for example, an employee returning from a leave of absence could complete the e-learning modules to refresh their knowledge and assist with their reintegration into the organization.

To return to O'Dell and Grayson's (1998) reasons as to why knowledge transfer fails, the reasons circle around the lack of communication about available knowledge as well as a lack of interactivity between the users and the information stored in the knowledge repository. When knowledge transfer fails, it is due to a gap between the users and the knowledge resource. The user must be informed of what knowledge is available so that they can retrieve it quickly and efficiently. As Belkin (2000) explains in his article "Helping People Find What They Don't Know," it is very difficult for someone to find something if they do not know to look for it in the first place. This indicates that if the user is not aware of the knowledge available to them, it is possible that they will not go looking for it and therefore the organization is negatively impacted since its knowledge resources were not put to good use. If users "within the organizations do not utilize the … [knowledge management systems], it will compromise all knowledge management activities and goals intended by the organizations" (Yoo & Huang, 2013). e-Learning becomes a method of teaching the user where to find what they might be looking for and what knowledge is available to them and therefore helps improve knowledge transfer.

Employee training is a very important task for management to complete and employees will need guidance on how to effectively adopt the methods learned in training. For management, the demands are to constantly deliver more for less, and e-learning is a tool that management can utilize to have an effective knowledge transfer system that will do just that. This system can allow for the "just-in-time" training that will allow employees to stay abreast of change that can help with their overall performance. While e-learning allows for learning to occur at any time or place, it is still important for the organization to determine when the employees will conduct the modules (Colbrunn & Van Tiem, 2002). It depends on the needs of the organization and the urgency by which the knowledge must be transferred but regardless of the context, the organization must take into account when this learning will occur and inform the employees of this requirement. Furthermore, e-learning tools often allow for easy to deliver training assessments, polls and surveys that can help audit and ensure that employees understand and will adopt the new procedures they have learned. An e-learning program will not only benefit the employees in understanding the new procedures they must adopt but it will also help management ensure that training is working and that training goals are being met.

Taking into account the best practices of e-learning, a case study was conducted at an organization to investigate the specific problems of how to effectively transfer knowledge within an ever-changing environment, while respecting the timeliness and costs associated with such a transfer, for this specific context.

6. Method

To demonstrate the effectiveness of e-learning for transferring knowledge within an organization, the implementation of the e-learning tool Moodle was analyzed by performing a case study at an organization. This case study was conducted by analyzing different methods of knowledge transfer throughout the organization. The three different methods of knowledge transfer were an e-learning module, a teleconference call with a follow-up quiz, and e-mail. It was determined that by studying the different methods of knowledge transfer, it could be ascertained which method generated the highest frequency of use of the knowledge management system. It was determined that a high frequency of use would mean that the documentation created was helpful in resolving customer inquiries and the fact that these documents are being used would result in better productivity and performance.

The organization, which provided the site for this research, has undergone tremendous growth and change in the last several years. The size of the call centre team grew by 45% to support an increase in clients due to an increase in sales and the acquisition of several portfolios. In addition to the growth of the client base, the company launched several new products; with two of the most high impact ones being within the last year. There is a great demand on the call centre staff. Agents receive an initial 75 hours of new hire training and as the agents mature within the organization, they must complete an additional 150 hours of training to become fully trained. If the agents are completing the additional training hours, it is not possible to use them in the call centre and therefore there is lost productivity in having such lengthy training time.

The call centre was struggling with change management when new processes or products were released and this was affecting the call centre's performance as well as client satisfaction. Once the employee leaves the training room, if the processes that they learned change, or a new product is released, the method by which they are informed of the change is through e-mail. The large majority of processes and procedures have been documented and placed on an internal wiki site for consultation. Currently, the Drupal tool is being used for this wiki. It is a part of the organization's current knowledge management strategy to regularly add new processes to the wiki or to further clarify these processes if they are not being followed accurately. However, the new wiki additions or new processes were not being adapted due to lack of understanding of the process and limited training of the new process. Many employees had said "I don't know which process I should be following" or "I receive too many e-mails and it takes too long to review the e-mail and then go to the wiki to understand the new process."

A method had to be found to continue implementing new processes while reducing the adaption time of the new procedures. It was not possible for the organization to re-train all call centre agents, as this would be lengthy and costly to complete. Furthermore, due to the confusion that the call centre agents expressed about changing processes, management has found a need to be able to audit employees' understanding of the new processes. The organization understood that employees will still require time to learn about the new processes and procedures, however, a method must be found to reduce the impact of this time on the call centre's overall performance.

The e-learning tool 'Moodle' (www.moodle.org) was selected as a means of addressing these issues. Moodle is an open source, course management system that provides the ability to create self-directed learning courses that include the option for assessments, polls, discussion forums, feedback, surveys and many other options. This tool was chosen because it was open source and therefore had a very low cost for implementation. Furthermore, the tool can be downloaded and hosted within the organization's network so the data that is stored in the tool is safe and has not left the organization. The organization possessed the essential technical knowledge to perform these tasks and therefore no outside help or consultation was required, further lowering the cost of implementing a tool of this kind. Moodle allows for a 'Lesson Module' which can create a series of HTML pages that can be viewed in the sequence determined by the instructor / creator of the learning module. This can be followed by a quiz, a feedback module to conduct surveys of participants, a discussion forum, and a glossary where participants can add definitions for various terms. Moodle includes many other out-of-the-box features and since it is open source, it can be easily customizable by those who possess the right technical skill.

With the implementation of Moodle, a case study could now be conducted on different methods of knowledge transfer within the organization and it could then be

determined which method generated a greater frequency of use for the knowledge repository. Each method of knowledge transfer was directed at a different audience so that a clear representation of the users' habits could be studied; however, the difficulty of the distributed information was equal across all three methods of knowledge transfer. In each case, procedures that were necessary for the users to complete their job were released. For the first method of knowledge transfer, an e-learning module was created to support the organization through the launch of a new product. The e-learning module was designed to instruct the call centre agents on how to support this new product during inquiries from clients. For this research, a transaction log analysis of both the e-learning tool and the knowledge management wiki was conducted to verify the frequency of use of the knowledge management repository upon completion of the e-learning tool. A transaction log analysis was selected since "transaction logs are an unobtrusive method of collecting significant amounts of … data on a sizable number of system users" (Jansen, 2006). It is expected that the frequency of the knowledge management repository will increase due to participation in the e-learning tool and that this frequency of use will increase performance.

The second method of knowledge transfer that was analyzed was training that was conducted via conference call and not through e-learning; and the third method of knowledge transfer was distributing updates via e-mail to a specific department but this department never received training on the knowledge management wiki or e-learning. This will allow the transaction log analysis results of the knowledge management wiki to be compared in different training scenarios to effectively analyze the different methods of knowledge transfer.

7. Results and discussion

7.1. Knowledge transfer type A: e-Learning

The first method of knowledge transfer that was analyzed was distributing information throughout the organization by creating an e-learning module. The module was originally intended for 51 users. However, over 90 users logged into the e-learning module. Different departments requested access for the module regardless of the fact that they were not the intended audience. This demonstrates that individuals in the organization were eager for the occasion to understand new knowledge and products that were present in the organization. By distributing an e-learning module, individuals were more interested to use it and therefore this method of knowledge transfer reached a wider audience than was intended. By having a wider audience, the organization benefitted because historically, these individuals would have not had access to this type of information on a product. They may have received a brief overview or a Power Point presentation, but in the e-learning module they received an overview of the product and its value, how the product works, screenshots of the product and different scenarios within the product's use. Also, the organization was able to track the extra participation, whereas with a Power Point, it cannot be determined who opened it and whether or not they viewed all or just some of the slides. The extra participants and the demand for the e-learning module was an unexpected result when completing this case study analysis.

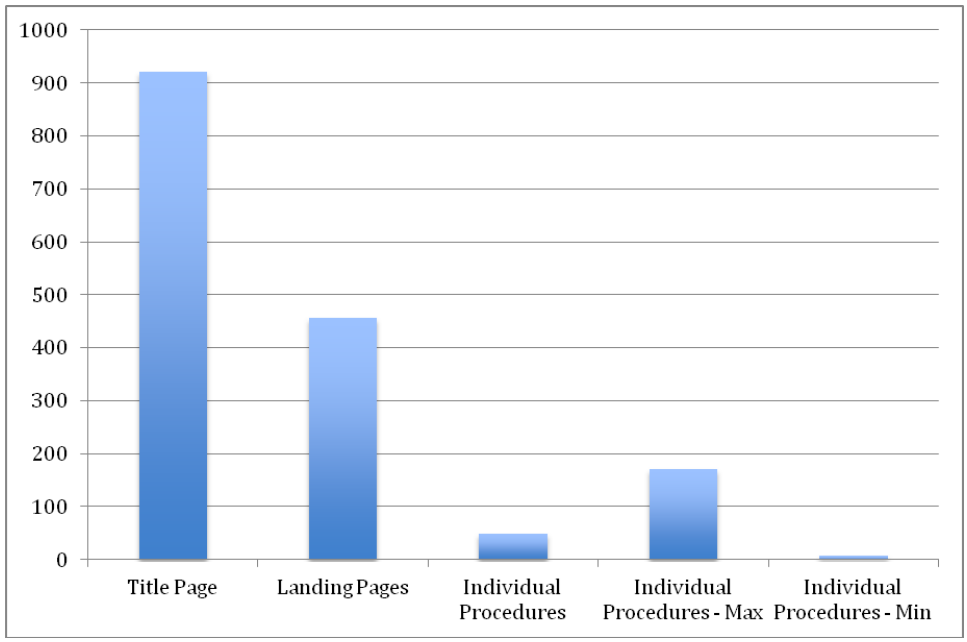

Fig. 2. Frequency of Wiki use: e-Learning distribution

The title page on the wiki for this new product became one of the top 100 posts viewed on the wiki (out of 3094 posts) within three months of being published. To provide context, the home page of the wiki has over 39 000 views and is viewed on average 180 times each day. This demonstrates that procedures found within the section that related to the e-learning module were being frequently accessed, as shown in Fig. 2. Not all procedures are ones that should be accessed every day. Some are troubleshooting steps for different errors that do not occur frequently. The minimum amount any post in this section has been viewed is 8 and the maximum is 170 times. This is a large spectrum of use but it is logical based on the aforementioned fact that not all of these procedures will need to be accessed frequently. Overall, the frequency of use for these procedures is very high. This demonstrates that users who completed the e-learning module were also then going to the wiki to read further or to access documents to support clients who were inquiring about this procedure. It should be noted that the e-learning tool Moodle and the wiki tool Drupal, are two separate tools. Therefore, completing the e-learning module and accessing the wiki are two different actions.

At the end of the e-learning module, the user had to complete a quiz about what they learned in the module. The quiz covered the most important parts of the e-learning module such as, the value of the new product, the cost of the product for the client, how to assist clients in using the product, and other key items related to supporting the product. Ninety users completed the quiz and two users completed the quiz twice. Out of 92 attempts at the quiz found in the e-learning module, the average grade was 78.37% out of 100%. If only the quiz results of the anticipated audience are reviewed, this grade raises to 84.03% out of 100%. Two different users from the intended audience re-attempted the quiz to ensure they received a score of 100%. This is another positive result of releasing an e-learning module as all individuals who reviewed the module, continued with the quiz. The quiz raises the interactivity of the individual with the knowledge they are acquiring and this is a very important aspect to achieve for e-learning, as mentioned in

the above literature review. Furthermore, the quiz was based on procedures that the intended audience was familiar with and so it was not unexpected that users who were not familiar with this context would do poorly on the quiz. Since it was not expected that the audience would expand to other areas of the company, no adjustments were made to the quiz to accommodate the context of the other participants.

These results show that the distribution of an e-learning module generated a high frequency of use for the procedure documents within the wiki. This means that employees understood the new product and where to find the relevant information on how to support it. The frequency of use demonstrates that employees retained information that they learned in the e-learning module as they were able to find the relevant information again when they needed it. These results answer the first research question and show that e-learning can improve knowledge transfer, as shown by the high frequency of use of the wiki, by helping employees to benefit from a knowledge management strategy.

7.2. Knowledge transfer type B: Teleconference

The second method of knowledge transfer that was analyzed was that a new product was released and the procedures were documented and placed on the wiki by the Knowledge Management team. The target audience was 17 users and they were informed by e-mail but they also attended a 30-minute webinar where a trainer walked them through the wiki documents by showing them the sections on the wiki and discussing the relevant procedures. One month later, the users were asked to complete a quiz to assess their understanding of the procedures. The quiz was designed the same way as the quiz in the e-learning module for Knowledge Transfer Type A; it covered topics such as the value of the new product, the cost of the product for the client, how to assist clients in using the product, and other key items related to supporting the product. The users were reminded that all the relevant information was on the wiki. The score for the quiz was 66% out of 100%. Based on the data in Fig. 3, it is apparent that the wiki was not consulted for the quiz and that the users did not either understand the procedures or take the time to research the questions they did not know. Furthermore, none of the users re-attempted the quiz to improve their score.

The average wiki reads shown in Fig. 3 were based on analyzing the data for each individual procedure page. For this specific training activity, the wiki posts were housed under landing pages that included other procedures not related to this training initiative. The statistics for the landing page were therefore excluded from analysis since the data for those pages was not specific to this training initiative.

The results for this method of knowledge transfer demonstrate a very low level of engagement from the participants of this training webinar. Neither the webinar nor the quiz generated any interest from other departments and the audience stayed the same size as what was intended. It appears that based on the quiz results and the number of wiki reads, the participants were not stimulated by this information and did not retain it which will result in lower productivity and errors in future situations. Furthermore, while it may appear that each user read each post one time, this is most likely not the case based on the quiz results. The poor results indicate there are individuals who did not read the wiki at all or retain any information from the quiz. These results show that the webinar and the quiz were not an effective method of knowledge transfer. Due to the poor results of this method of knowledge transfer, it is possible that employees will feel like they do not have this knowledge and this will affect their performance in dealing with this topic in the future.

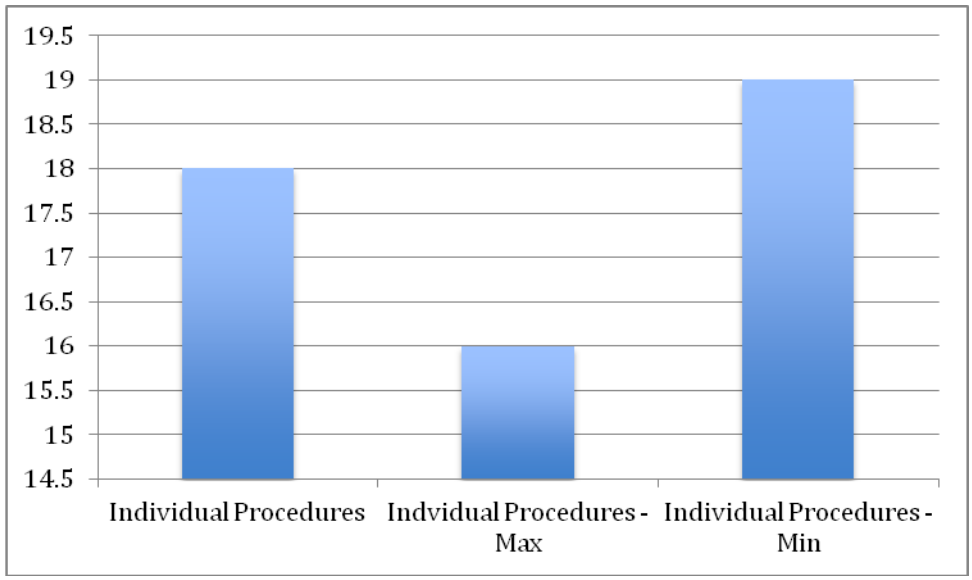

Fig. 3. Frequency of Wiki use: Teleconference

When this method of knowledge transfer is compared with e-learning, there is a distinct difference between the frequency of use generated by these different methods of knowledge transfer. It can be seen that e-learning did generate a frequency of use on the wiki which allows employees to benefit from a knowledge management strategy; whereas the webinar and quiz did not generate much frequency of use. This comparison further demonstrates that e-learning is effective for knowledge transfer in a knowledge management strategy and successfully answers the first research question.

7.3. Knowledge transfer type C: E-mail

The third method of knowledge transfer that was analyzed was that procedures were documented and placed on the wiki by the Knowledge Management team, and the target audience was informed through e-mail distribution. These procedures were created to ensure that this department was adhering to all standards and rules that Management has deemed important for case investigations. The e-mail indicated that a new procedure had been uploaded to the wiki and indicated the name of the procedure as well as a hyperlink to the wiki. The e-mail did not include the specifics of the procedure; therefore it is expected that the users would still need to access the wiki to fully understand the procedure. Fig. 3 demonstrates the frequency of wiki use for these procedures. The title pages are the main pages for this section of the wiki, the landing pages are the pages that organize the individual procedures based on type, and the individual procedures are steps to complete these various tasks. A quiz was not released for this type of knowledge transfer because it was expected that the use of a quiz might increase the frequency of use of the knowledge management system, as users would need to research the answer to the questions. This research is attempting to determine the true frequency of use of the knowledge management system when only e-mails are distributed to the user group.

The bulk of these procedures were added to the wiki in October 2011. Updates and additions were made throughout 2012 and these were all announced through e-mail distribution as they were individually added to the wiki. The data represented in Fig. 4

was gathered on January 27, 2013 and represents the average number of times the different pages were read. Based on the data in Fig. 4, it can be seen that while many users accessed the relevant section of the wiki, the users are not accessing the individual procedures to complete their daily functions. On average, this department investigated 18 specialized cases a month in 2012 and each case would have resulted in the use of multiple different procedures that are documented on the wiki. However, since the procedures were posted in October 2011, on average, they have only been read 8 times in total, which indicates that this knowledge is not being used with the intended or desired frequency. Furthermore, in December 2012 alone, 42 cases were investigated, which is barely the amount of use that occurred for the wiki landing pages.

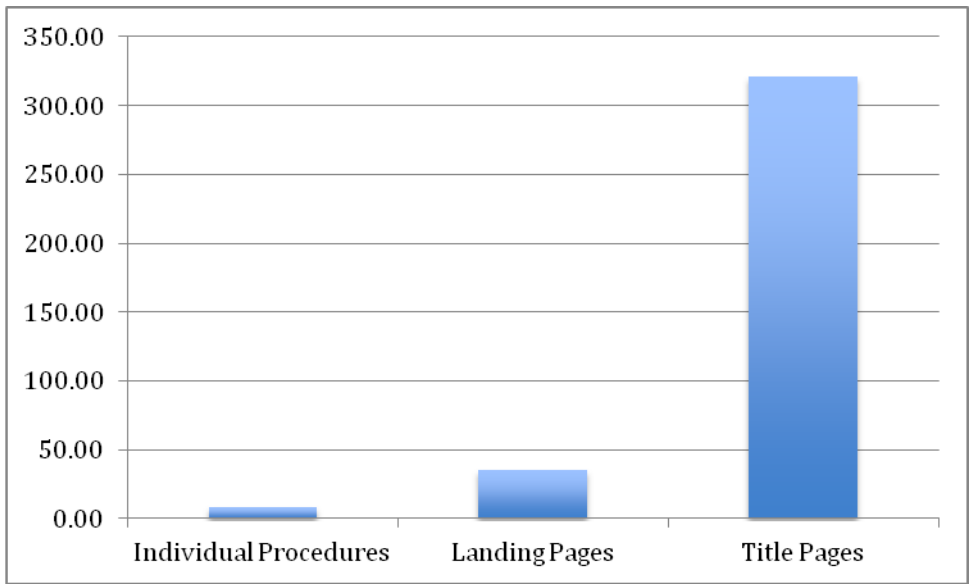

Fig. 4. Frequency of Wiki use: E-mail distribution only

These results demonstrate that distributing information through e-mail does not generate a high frequency of use of the wiki. This shows that the users were not engaged by the e-mails and the wiki did not entice them to go and use it. By not accessing the wiki, the individuals are not benefitting from this knowledge and there is very little benefit to the organization for documenting these procedures and placing them on the wiki if they are not being used. Furthermore, these documents are likely to become out-of-date since the audience is not using them and then the documents will become completely useless. E-mail was not an effective method of knowledge transfer which resulted in there being no benefit to the employees in having this knowledge management strategy which is tied to the first research question. The lack of use of this knowledge can result in this team making poor decisions, which could negatively impact their performance.

Based on the above results, e-learning was the most effective method of knowledge transfer. It resulted in high quiz scores and a high frequency of use of the wiki. This means that employees were accessing the documents, they were aware of the information within the organization and they were aware of how to find it and use it should they need to. This demonstrates how e-learning can be an effective component of a knowledge management strategy to promote knowledge transfer of the key knowledge within an organization. By demonstrating that this is an effective method of knowledge transfer, managers could use e-learning for performance improvement and change

management within the management process. This could be done by finding process improvements within the organization and using e-learning to communicate these changes effectively to the organization which should result in better change management based on the findings in the above literature review. By targeting e-learning towards change management and performance improvement initiatives, managers can be successful in these initiatives and this effectively answers the second research question.

In reviewing the analysis of e-learning as the first method of knowledge transfer, the third research question is partly answered and managers can understand that the critical success factors in using e-learning, change management and knowledge management to bring about performance improvement and this is to first communicate the change effectively. Whatever these changes may be, expectations for performance and the specifics regarding this change must be clearly communicated to those affected in the organization. e-Learning has been demonstrated as an effective method of communication. Managers can then enact their knowledge management strategy by storing the documents in a centralized place so that employees can access them later and as they are needed. By using the practices of e-learning and knowledge management together in a change management scenario, managers can effectively guide their employees towards improved performance. Therefore, the critical success factor to bring about an organizational change is effective communication which e-learning, knowledge management and change management practices support; however, a further tie must be made to link the effectiveness of e-learning resulting in an actual increase in performance.

8. Conclusion

By using e-learning in the knowledge management strategy, the knowledge management team was able to reach a wider audience than what was intended which is a very positive result for this study. This helped to share information in a wider context within the company than had ever been done before and not only at the executive or manager level, but with employees at the front-line. Due to the nature of e-learning being more of an experience than just reading a document, it created intrigue and this added value to the learning experience. e-Learning helped employees understand where to retrieve the relevant documentation for this new initiative and this generated a lot of use for the documents. Frequency of use in this context is the most valuable metric for this knowledge management team as it shows that the organization needs the information the team created and that it is being used to complete required tasks. This frequency of use also indicates that employees are using and reusing the knowledge held within the organization because if it were not useful, the frequency of use would not be as high. An additional benefit to the organization was that they could audit which employees completed the e-learning modules and their quiz results, whereas with e-mail distribution, the organization could not audit which employees had read the new information. By ensuring that the knowledge obtained through e-learning is used, understood, and a relationship is created with it, knowledge transfer is successful and the organization benefits. The results presented in this study partly answered all research questions and the objectives of the research goals were met. Further investigation is required to ensure that the frequency of use of the wiki did in fact result in higher performance. For the field of knowledge management, this posits e-learning as a very effective method of knowledge transfer and therefore should make e-learning a key component of a successful knowledge management strategy.

9. Further research

As an area of further research, it would be interesting to take the results found in this study and tie knowledge management frequency of use metrics directly to performance metrics. In the above context, the most important metric would be to determine if by having an e-learning module and better knowledge use if this could reduce the length of time it takes to solve a customer inquiry and therefore reduce the cost per call into the call centre. Reducing the length of calls increased customer satisfaction and by reducing the cost of the call, overall operations efficiency was improved. This would allow a more concrete and positive correlation between e-learning, knowledge management and performance improvement. Further research could explore employees' use of the knowledge management resources and dig in deeper to determine how it affects the quality of their work, their productivity and perhaps even employee engagement and satisfaction. This could create a very powerful and persuasive argument in favour of knowledge management programs within organizations in all industries.

Another opportunity for this research would be to re-create this study in different industries or contexts to determine if the same results occur. e-Learning has already been applied in many different industries and sectors and so it would be interesting to see if an e-learning program could also generate frequency of use for a knowledge management system in these different contexts as well.

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