


An empirical study on integration of experiential learning and mobile learning

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ABSTRACT

This paper discusses how experiential learning and mobile learning can be integrated to facilitate knowledge acquisition and knowledge sharing among students, and equip students with the abilities to solve real-world problems in a ubiquitous manner. Running in a cyclic manner, experiential learning guides students to interpret why something happened, plan what should be done in the future, collect and manipulate facts and data, and experience and reveal what they learnt. With the capabilities of current mobile devices (like virtual personal assistants), experiential learning can be implemented with a higher level of effectiveness. The results reveal that experiential learning is beneficial for learners who believe it can help them to solve practical problems and the usage of mobile devices can offer flexibility to study and address the diversity of learners' needs.

Contribution/ Originality

This paper reports a study result that confirms the usefulness of experiential learning in the educational environment with the application of mobile devices. The students find it beneficial to use this learning approach that applies theories into practice to solve real-world problems with the support of the powerful functions of mobile devices.

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1. INTRODUCTION

While the markets are becoming global and increasingly competitive and the practical skills and technical knowledge are becoming outdated at a faster rate than ever before in the era of information, knowledge management has received considerable attention from the academic and business communities where practitioners benefit from sustainable competitive advantages by leveraging knowledge. Traditionally, managing knowledge is the process of acquiring, capturing, organizing, disseminating, and efficiently utilizing knowledge (Bhatt, 2001; Davenport, 1994; Yau *et al.*, 2005). This process enables organizations to learn new knowledge, reflect on what has been acquired, correct mistakes, and make improvements, which are important to build, maintain, and secure the core-competencies of an organization.

Managing knowledge is relevant in the educational environment as learning and teaching activities aim to facilitate knowledge creation and sharing amongst teachers and students. Knowledge in classrooms is usually distributed in the form of interaction between teachers and students (Yau *et al.*, 2005). When teaching and learning experiences are well documented with the support of information technology (e.g., an e-learning system), they become knowledge (Bhatt, 2001). In learning, students go through various cognitive processes to develop knowledge starting from lower level skills and gradually progressing to more complex skills. As constructivists suggested, new ideas can be built from current and past knowledge learnt by the students or personal experiences (Bruner, 1986). Constructivists also suggested that learning can be enhanced by repeating and sharing the experiences of peers (Vygotsky, 1978). To make sharing of information possible, an educational institution is required to develop a sharing culture and change the operations procedures.

A review of the literature indicates that manipulating knowledge is commonly found in the business organization context (Gold *et al.*, 2001; Wang *et al.*, 2014) and government agencies (Yates and Paguette, 2011). Educational studies also examined knowledge management and argued for its importance in education. There is a likelihood that the planned learning activities may not help to achieve the desired learning outcomes. For example, social media, which is widely used for sharing information among peers, may not be suitable for factual knowledge acquisition. If a teacher uses social media simply because of its popularity and without careful consideration, students may show little interest in learning with such an inappropriate tool. It is, rather, the interaction among different knowledge management elements such as information technology and people that facilitate an organization to process its knowledge efficiently (Bhatt, 2001). Educators have to appreciate how the different elements are connected and work together as a whole system. Understanding this is important; as it can help educators make correct decisions about, for example, curriculum design and lesson planning.

Education aims to create and apply knowledge. After all, knowledge is the product and business of educational institutions. In this paper, we studied how experiential learning could be applied to facilitate knowledge creation and sharing among learners. Theory (i.e., how to think) and practice (i.e., how to do) are usually taught and learnt separately in classrooms (Bontchev *et al.*, 2018; Grace *et al.*, 2019; Richards, 2018). Experiential learning is the way in which learners develop a connection between thinking and doing in order to enable them to apply theories in practice. This learning method can deepen the understanding of concepts and provide teachers with a better understanding of how to transfer knowledge to students in different stages of their learning. At the educational institution level, to understand how knowledge is constructed, transferred, and managed is as important for as it is for other types of organizations. The potential knowledge construction and the competence in knowledge sharing can be realized to enhance the learning of students in the educational context (Ashby *et al.*, 2017).

In particular, mobile learning was emphasized in this study because the characteristics of mobile phones are quite suitable for experiential learning. Nowadays, people access smartphones unceasingly every day and it is logical to extend learning to them. Educational institutions are attempting to use

innovative methods to motivate and engage the students (Hockly, 2013). There is now a lot of supporting content on the internet. Mobile learning is flexible for students to learn with their own devices. With the advances of technologies, there is acceleration in the adoption of Bring Your Own Device (BYOD) policies in many educational institutions. This continues to be the case that motivates students to learn on their devices (Lim and Churchill, 2016). This usage of mobile learning supports conventional online learning and offers a multitude options to design learning formats optimized for mobile devices.

The rest of the paper will introduce experiential learning and how it can be integrated with mobile learning. Then, an exemplar will be presented to illustrate how they can be implemented in a course at the university. The results of the survey on students’ attitudes to this learning approach will be presented and followed by the conclusion.

2. LITERATURE REVIEW

2.1. Experiential learning

There are several critical components of experiential learning (see Figure 1). This is a learning cycle with four distinct stages: (1) abstract conceptualization, (2) active experimentation, (3) concrete experience, and (4) reflective observation (Kolb, 1984).

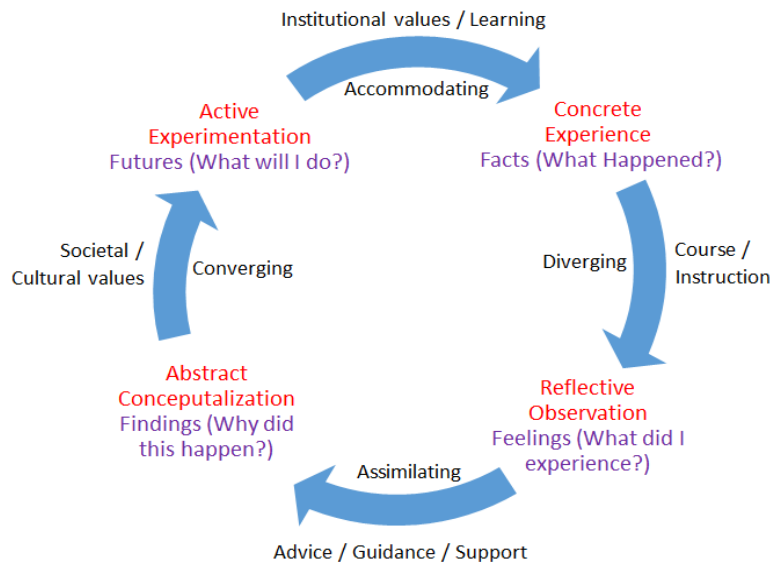


Figure 1: Four stages in the experiential learning cycle

Abstract conceptualization is the analysis of the received data and the internal development of theories and concepts from the experience. Students conceptualize through inductive learning and assimilate theories from gathered information. This stage considers logical preciseness and is more concerned with abstract concepts. Active experimentation is combining knowledge and modifying behaviours when considering future actions and applying new concepts in new situations. Students solve problems, make decisions, and deal with technical problems and tasks. Concrete experience is grasping knowledge and the tangible qualities of the immediate experience. Students carry out plans or tasks to obtain hands-on experience in new and challenging situations. They rely on action, opportunity seeking, and risk taking. Reflective observation is collecting data through observation and critical thinking about these experiences. Students consider concrete experience from various points of views and organize their relationships. They should be imaginative and emotional, and request information to brainstorm ideas.

Active participation is involved in experiential learning (Vinagre, 2017). Learners vigorously engage in learning experiences. Experiential learning puts emphasis on interaction amongst students and teachers and those between learners and the environment. Experiential learning depends seriously on feedback from teachers about their viewpoints of the process and from students about their experiences. Students learn beyond the classroom and venture out into the real world. Learning involves two-way communication in which students engage with their peers and teachers aggressively (Gross and Rutland, 2017). Activities may include the instructor's demonstration of the steps in solving a specific problem (e.g., calculating the financial ratios of a retailer) and asking the students to use the same approach with another retailer. Students face real problems and utilize theories in practical application. Feedback from teachers and peers is important to successful learning because the interactions and correspondence can take students beyond the traditional classroom.

There are uncertainties and variabilities in the learning environment. Students learn to deal with unfamiliar situations under the guidance of the teacher. In experiential learning, students are engaged in focused reflection and experiences in a real world context (Chakravorty and Hales, 2017). There are several types of experiential learning utilized in higher education, like service learning, exchange programmes, internships, and clinical experiences. The courses integrate experiential learning activities so that learners understand why they participate in learning activities and reflect on what happens and the students are allowed to empower their learning with relevant experience. To focus on problem solving and critical thinking skills is significant for students to learn beyond rote learning and memorization in traditional lecture-based courses (Abe, 2011).

Since rote learning is discouraged by experiential learning, it is suggested that students use their analytical skills and existing knowledge to solve problems and create and learn new knowledge (Goodnight *et al.*, 2008). In experiential learning, students are encouraged to explore and discover new knowledge and tackle unfamiliar situations in real life. Students analyse problems, use their knowledge and find out ways to learn relevant and new information and create new knowledge to acquire a solution. Experiential learning inspires students to control their own learning process and study in a comfortable way. Self-directed learning assists students in cultivating curiosity and motivates them to learn (Naufalin *et al.*, 2016). Experiential learning brings about behavioural changes. Knowledge is acquired from grasping and applying experiences. The real word is ever-changing and learners have to be trained to adapt to these changes rapidly. Experiential learning results in a deeper understanding of acquired skills like critical thinking, communication, and problem-solving. Experiential learning has elements of uncertainty to make sure that students are equipped to manage unfamiliar situations instead of relying on rote-learning only (Wilson *et al.*, 2018).

2.2. Mobile learning

There are several reasons why e-learning (including mobile learning) is relevant to experiential learning. For example, when students learn the various parts that make up a machine, traditionally, a teacher may ask students to memorize a list of part names. But students may operate the machine in a computer simulation. With interactions, students engage with the interface and understand how a machine works. Information technology, such as an e-learning system, provides the life-long learners with a self-paced, flexible, and cooperative learning context with minimum constraints to remain competitive in the information age (Yau *et al.*, 2005). The power of information technology has been emphasized, as it can provide an edge in harvesting knowledge. Some other studies (e.g., Bhatt, 2001), however, contend that knowledge resides in people's minds and, therefore, content sharing culture through motivation and training is the important feature to manage knowledge.

Mobile learning is a subset of e-learning and it is an education establishment where the main technologies are wireless and personal devices (Cho, 2007). Mobile technologies provide new opportunities for teaching and learning because they support multimedia and the learning content becomes dynamic. This can keep students' attention and presents course materials effectively. For instance, the use of gamification is significant for serious learning. With the extension over mobile devices, there are the alternatives of gamified quizzes and learning paths. They can increase the

engagement of students and mobile phones are progressively being utilized in educational institutions (Meurant, 2010; Quinn, 2000) to deliver significant learning. Mobile learning includes resources accessible anytime and anywhere, rich interaction, and strong search capabilities (Sheppard, 2011; Stevens and Kitchenham, 2011).

Consistent with experiential learning, there are various interactions between students and teachers in e-learning. Blended learning usually starts off in classrooms and learners are able to conduct research and access resources online to gather information for preparing presentations and reports (Mouza and Barrett-Greenly, 2015). Students may collaborate online through evaluation and critique of others' work. Learners can see the fulfilment of the learning outcomes and are encouraged to learn continuously (Chen and Huang, 2012). E-learning takes place on the internet and mobile learning offers learning opportunities provided by mobile networks. Online experiential learning offers collaborative and reflective experiences that can be structured with exploration, sharing, reflection, analysis, generalization, and application (Cavus and Ibrahim, 2009).

One important feature of mobile learning is self-actuated personalization that is related to the self-directed learning feature of experiential learning. The smartphones, tablet PCs, and mobile apps lubricate the shift to mobile learning. With access to cloud services, all learning materials and relevant data are available continuously. This allows for revision and collaboration that was not easily performed previously. Because of connectivity and collaboration, planning, thinking, and reflection are now transparent and gain an instant audience in both local and global online communities like Facebook and Twitter. Asynchronous access is an important feature of mobile learning. This allows educational environments to move anytime and anywhere and enables a personalized learning experience. In addition, asynchronous access to these learning materials leads to the potential for self-actuation and students plan how to learn via facilitation from teachers.

Mobile learning has other useful features, including social networking, mobile search, geospatial technologies like GPS and NFC communication, and the usage of cameras for capturing images. These context-aware technologies help students to integrate learning resources from both online and offline environments (Chen and Huang, 2012). The increased ubiquity of mobile devices creates potential options for students to explore mobility as an instructional strategy. These features of mobile learning enable students to face unfamiliar situations, which is the aim of experiential learning. Mobile devices offer ways for learners to retrieve learning materials and interact with others students and instructors, no matter where they are (Cavus and Ibrahim, 2009). Mobile learning focuses on the mobility of devices that can access knowledge and information and students are used to carrying and regarding mobile devices as personal and friendly tools (Traxler, 2007). Mobile learning is both informal and formal (Colley *et al.*, 2003; Pachler *et al.*, 2010). Formal learning is usually highly structured and students are engaging with learning content prepared by their teachers in educational institutions. Informal learning is usually purposeful but contextualized and unstructured and it includes using the internet, accessing resources in online communities, and various online learning activities (Marsick and Watkins, 2001).

3. EXEMPLAR OF COURSE DESIGN WITH EXPERIENTIAL LEARNING

This example shows the design of learning activities and assessment methods for a 13-week undergraduate retail management course based on experiential learning integrated with mobile learning. The objective of this course is to familiarize students with retailing and merchandising concepts and practices. The course focuses on key strategic and tactical issues in merchandising and store management. The intended learning outcomes of this course are to develop the creative, critical thinking, and communication skills of students. The performance of students is assessed through a quiz, a case study, and a group project that requires students to work collaboratively and apply their creativity and critical thinking in formulating retailing and merchandising strategies. The course instruction is arranged in four stages according to experiential learning.

In the first stage, the students are provided with the basic grounding on management practices in the retailing and merchandising context. The factual knowledge (e.g., types of retailing activities, roles of retailers, functions of merchandising in retail operations) is delivered in the class and the lecture materials and fact sheets are made available on the learning management system (e.g., Blackboard). Teachers may prepare business articles for reading after the class. In addition, students are also encouraged to gather factual information themselves and consider various perspectives. This is reflective observation in which students listen before responding to the stimuli. Teachers are responsible for providing support, guidance, and advice. Students may immediately access the latest information on the internet and this increases the engagement and motivation level of learners in their studies. They acquire instant access to information and share this information with others through smartphones. Although the lecture is a way of conveying information to learners, this new way of sharing information assists learners in widening their knowledge. Digital media will be adopted in the physical and virtual classroom. For example, students may use social media to write about what they learnt on social media like blogs. They are useful tools for enhancing teamwork and improving interactions among students. Knowledge can be increased if students get updated information promptly. Most textbooks cannot update the relevant information requested by students. Library books may not be able to offer updated information like smartphones do. When students answer questions, they may use their smartphones to search for a solution. Virtual personal assistants (like Siri) may be helpful in this situation.

In the second stage, the objective is to develop students' conceptual knowledge (e.g., of retailing mix models, retail metrics). This is abstract conceptualization in which students are asked to think of real life examples of retail store concepts and take photos of these to show others (externalization of knowledge). With the smartphones, students are able to carry and go through notes when they are free. Virtual personal assistants are becoming both human-like and beyond in that they can access unlimited information and have virtually unlimited memories. In addition, they can learn through the use of innovative artificial intelligence and intelligence algorithms to make the user's experience personal. When learners are excited and engaged, they continue learning outside of the classroom. Both the instructor and students also share their retail experiences in the online discussion forum in Blackboard. Students can also share materials and relevant information easily with instant messaging mobile apps (like WhatsApp) and learn collaboratively using smartphones.

In the third stage, the objective is to develop students' procedural knowledge (e.g., merchandising planning, store management skills) and investigation capabilities. A case study may be used to examine students' ability to analyze and solve a problem. This is active experimentation in which students should be able to use analytical techniques to identify critical components and examine each part. Students examine the financial reports of Firm A in the case to determine which financial ratio best reflects the improvement in performance of the firm, calculate its inventory shrinkage level, and forecast its sales. They then examine the financial reports of Firm B and compare its performance with Firm A. Students are required to explain the reasons for the performance differences between these two firms and find supporting statements and evidence for each conclusion or finding. Students test things and learn practical application that provides immediate benefits to them. Getting assistance in investigation is the typical way of using a virtual personal assistant in classrooms. Students need to maintain a lot of documentation on their works and they may use a virtual personal assistant to streamline the process of note-taking. Students may put it to work transcribing and taking notes. It can transform spoken words into text.

In the fourth stage, the objective is to develop students' metacognitive knowledge by requiring them to work on a group project to create a model of a new store layout and develop a merchandising plan to improve the performance of a given retailer. This is concrete experience in which students will present in class and the instructor will evaluate their work as well as their communication skills. There will be a shift from focusing on discovering answers as the endpoint to focusing more on analytical skills. Educators have to design questions that force students into drawing conclusions. Lessons need to be designed with the assumption that students will use readily available technology, and will build

on prior knowledge. Students' presentations are also uploaded to Blackboard for other teams to evaluate and comment on. Thus, the students learn to use their knowledge to judge the work and ideas of others. To further develop their cognitive skills, they work in teams on a knowledge building worksheet that requires them to organize previously acquired information in a new or different way. Virtual personal assistants can make it incredibly easy to keep and access such information. Greater use of these applications in the classroom will result in profound changes to teaching. In this stage, students are trained to be open-minded and they perform collaborative activities and experiment.

4. RESULTS

In the academic year 2018 – 2019, a total of 213 business students in a university were invited to participate in the survey on their attitudes to experiential learning integrated with mobile learning after finishing the course using this learning approach. The survey questions and their results in Likert scale are presented in Table 1.

Table 1: The results of the survey on students' attitudes to experiential learning and mobile learning

Survey questions (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	Average score (n = 213)
Section 1. Attitudes on experiential learning	
1. Course objectives for experiential learning are explained clearly to me.	3.4
2. Experiential learning is integral to the course.	3.6
3. The setting of experiential learning helps me to understand the subject content better.	3.8
4. The experiential learning experience helps me to deal with real-world problems.	4.5
5. Experiential learning reinforces how to apply the course content to everyday life.	4.7
6. Interaction with people enhances the learning experience.	3.5
7. Experiential learning develops my leadership skills.	2.8
8. I feel comfortable working with others in the setting of experiential learning.	3.7
9. Experiential learning stimulates me.	4.4
10. The experiential learning experience is sensible to me.	3.3
11. The experiential learning experience enables me to do more than just listening passively.	3.9
12. The experiential learning experience presents me a challenging way of learning.	4.6
13. I find the experiential learning experience exciting.	3.7
14. I like being active in experiential learning.	3.9
15. Experiential learning assists me in thinking about the information.	3.6
16. I am concerned about the information processed by me in the learning process.	2.7
17. I enjoy the experiential learning experience.	4.1
18. The experiential learning experience is pertinent to me.	3.8
19. I am encouraged to share my experiences and ideas.	3.7
20. I appreciate value in experiential learning.	3.8
21. I can put the experiential learning experience into the future usage.	4.6
22. I will continue to apply what I learnt from experiential learning.	3.3
23. The experiential learning experience helps me to finish my jobs better.	4.4
24. The experiential learning experience helps me to define and reinforce my career direction.	4.4
25. The experiential learning experience will be useful for me in the long run.	4.3
Section 2. Attitudes on mobile learning	
26. Mobile learning is helpful for traditional learning in classroom.	3.7

27. I learn effectively with mobile devices.	3.8
28. Mobile learning increases flexibility of learning.	4.6
29. Mobile learning helps me to learn on my own way.	4.5
30. Mobile learning helps me to organize my own study.	3.7
31. Using mobile devices motivate students to learn.	4.1
32. Using mobile devices encourage students to collaborate more often.	3.8
33. Using mobile devices improve communications among students.	3.8
34. I prefer learning with mobile devices in classrooms.	3.7
35. I believe the usage of mobile devices plays a critical role in the future.	4.2

Based on the survey results (Q1 to Q25) in Table 1, experiential learning is beneficial for learners. Most average scores of the survey questions are greater than the neutral state (i.e., 3). Specifically, students found experiential learning helpful because they were equipped to solve problems in the real world (e.g., Q4 and Q5). In addition, students believed this learning approach was beneficial for them in the long run (e.g. Q21, Q24 and Q25). These are actually the critical characteristics of experiential learning (Skilton *et al.*, 2008). Through observed experience, students acquire concrete experience and form abstract concepts and conclude by testing them in new situations (Dewey, 1938; Kolb, 1984). Processes in experiential learning are as important as content. Content can vary across different students, while learning processing requires activities supporting critical analysis and reflection. Learning is relevant and personal for learners and they take the initiative to direct their own ways of learning. They learn from successes and failures. Teachers should set contexts for learners, pose problems, and facilitate and support their activities (Banach *et al.*, 2019). The experiential learning cycle certainly has active learning opportunities for the learners. Vital thinking is involved as students plan out the action and reflects upon the practice. In particular, the two steps of active experimentation and reflective observation are essential because learners make action plans according to the key issues of the principles and internalize the knowledge after reflection over their experience. Learners learn to utilize principles and put theories into practices. They can understand the concepts upon reflection and experience them more deeply. In addition, this learning approach is able to enhance learners' critical thinking ability effectively (Kuk and Holst, 2018).

The survey results (Q26 to Q35) also reflect that the usage of mobile phones for education helps students to get the flexibility to study on the devices of their choice. Learners have diverse abilities and requirements and the inherent flexibility of mobile learning can address such diversity. The learners are able to select the preferable devices at the pace they can assimilate and consume. One obvious advantage of mobile learning is the capability of learning in any place and at any time. Learners are no longer confined to classrooms or preset schedules. Students can log into the online learning platforms at their convenience to study course materials (Crompton and Burke, 2018). This results in learners engaging willingly at their own paces and the learning process empowers students to access information and knowledge conveniently. Personalized learning is important for students. Personalized or custom learning paths make learning more relevant for students. Students feel comfortable with engaging electronic devices and online platforms and this makes learning better and easier. This also equips students with abilities for working in the real world (Kim *et al.*, 2017).

5. CONCLUSION

This paper discussed a study on the implementation of experiential learning in a university course. There are several stages in this learning approach. Firstly, in the stage of reflective observation, the instructor helps to find out what learners think about the topic and makes connections between previous experiences and knowledge with what they are going to do. Then, students perform activities, accumulate experiences, and move beyond previous performance levels. Secondly, in the stage of abstract conceptualization, students share results, reactions, and observations, and discuss acquired feelings and experiences. They connect experiences with the real-life examples and find trends and truths in experiences. Thirdly, in the stage of active experimentation, students apply what is learnt to other similar situations, learn from experiences and practices, and discuss how the issues raised are

helpful in the future. Finally, in the stage of concrete experience, students analyze, reflect upon and look at the experience, discuss how experiences brought out themes and problems, and look for recurring themes.

The usage of smartphones is relevant to experiential learning and this study also attempted the application of mobile devices to experiential learning. With the advance of technologies and the emerging increase in the number of smartphone users, people now rely on smartphones for numerous activities. The concepts of mobility and ubiquity are usually associated and they emphasize that people can do anything in any place at any time. Smartphones are pervasive and they are used for various aspects by teachers and students (Christensen and Knezek, 2017). By using smartphones in the classroom, knowledge can be upgraded in any subject conveniently. Students are responsible for their own learning progress and they bring their own personal devices like smartphones and notebook computers to their educational institutions and these devices are considered user-friendly for seeking assistance. In particular, most teachers and students have some types of virtual personal assistant (like Siri) on their smartphones. They should be aware of the capabilities that these applications can offer them. Advantages of virtual personal assistants include easy access to software applications, automation of repetitive tasks, and effective and efficient hands-free operations. These features can be applied for experiential learning effectively (Hwang *et al.*, 2011).

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