AN INVESTIGATION OF THE EFFECTS OF KNOWLEDGE CONVERSION PROCESSES ON MOTIVATION, LEARNING STRATEGIES, METACOGNITION, AND PERFORMANCE IN A BLENDED LEARNING ENVIRONMENT

by

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Abstrak

Tujuan penyelidikan ini ialah mengkaji kesan proses-proses urupan pengetahuan terhadap motivasi, strategi pengetahuan, metakognisi dan prestasi di dalam persekitaran pembelajaran gabungan berbantukan LMS. Banyak kajian telah melaporkan kesan antara faktor-faktor ini menggunakan analisis bivariat tetapi belum ada kajian yang meneliti kesan-kesan ini menggunakan model urupan pengetahuan Nonaka and Takeuchi (1995) yang terdiri daripada faktor-faktor Sosialisasi, Pensuratan, Kombinasi, dan Pensiratan, atau analisis serentak kesan faktor-faktor ini menggunakan kaedah model persamaan berstruktur. Kajian ini menggunakan kaedah soalselidik dan melibatkan sampel 202 prasiswazah yang mengikuti pelajaran secara pembelajaran gabungan berbantukan LMS. Dua soalselidik, iaitu Soalselidik SECI yang telah dibangunkan oleh penyelidik, dan Soalselidik MSLQ yang dibangunkan oleh Pintrich et al (1991) telah digunakan di dalam penyelidikan ini. Data telah dianalisis menggunakan kaedah model persamaan berstruktur (SEM) yang mengizinkan analisis serentak semua faktor kajian secara regresi. Dapatan menunjukkan bahawa semua faktor SECI dan MSLQ telah dapat diekstrak di peringkat model pengukuran tetapi di peringkat model struktur, hanya faktor-faktor Sosialisasi & Pensuratan dan semua faktor MSLQ yang kekal di dalam model yang diperolehi. Sosialisasi melaporkan kesan langsung yang signifikan terhadap metakognisi dan kesan-kesan tidak langsung yang signifikan terhadap Strategi Pembelajaran dan Prestasi melalui faktor-faktor

Metakognisi dan Motivasi. Pensuratan pula melaporkan kesan langsung yang signifikan terhadap Motivasi dan kesan-kesan tidak langsung yang signifikan terhadap Strategi Pembelajaran dan Prestasi melalui faktor Motivasi. Dapatan-dapatan ini menunjukkan bahawa faktor-faktor urupan pengetahuan yang diwakili oleh Sosialisasi dan Pensuratan telah mencetuskan proses-proses pembelajaran kognitif pelajar serta motivasi mereka dan menyumbang kesan saiz yang besar terhadap Strategi Pembelajaran. Walau bagaimana pun kesan proses-proses ini terhadap Prestasi adalah amat kecil. Kajian ini telah menyumbang di dalam menzahirkan hubungan-hubungan tersembunyi di dalam persekitaran pembelajaran gabungan berbantukan LMS, dan untuk persekitaran yang dikaji, mendapati bahawa pemacu pembelajaran ialah interaksi bersemuka antara pensyarah dan pelajar dan bukannya kemudahan teknologi.

An Investigation of The Effects Of Knowledge Conversion Processes On Motivation, Learning Strategies, Metacognition, And Performance in A Blended Learning Environment

Abstract

The purpose of this study was to investigate the effects of knowledge conversion processes on motivation, learning strategy, metacognition and performance in an LMS supported blended learning environment. Many studies have investigated the effects of these variables on each other using bivariate analysis but no study has investigated their effects using Nonaka and Takeuchi's (1995) knowledge conversion model which comprises factors of Socialization, Externalization, Combination, and Internalization, nor employed a simultaneous analysis of the effects of all the factors using tools such as structural equation modeling. This study employed the survey research method and involved a sample of 202 undergraduate students currently enrolled in classes using blended learning and the LMS at one university in the northern part of Peninsular Malaysia. Two sets of questionnaires, namely the SECI questionnaire that was developed by the researcher, and the MSLQ questionnaire developed by Pintrich et al. (1991) were employed for this study. Data were analyzed using Structural Equation Modeling (SEM) that allowed for simultaneous analysis of all the factors using the regression method. The findings showed that all the factors of SECI and MSLQ were extracted in the measurement model but in the final structural model only the factors of Socialization & Externalization were represented together with the MSLQ factors. Socialization reported a significant direct effect on metacognition

and significant indirect effects on Learning Strategy and Performance through Metacognition and Motivation. Externalization, on the other hand, reported a significant direct effect on Motivation and significant indirect effects on Learning Strategy and Performance through Motivation. This study found that the knowledge conversion processes represented by Socialization and Externalization triggered the cognitive learning processes and motivation and contributed a very large effect size on Learning Strategy but these processes produced a very small effect on Performance. This study contributed to the understanding of the hidden mechanics of learning in an LMS supported blended learning environment, and for the environment studied, the driver of blended learning was face-to-face interactions with the lecturers and not the facilities afforded by technology.

CHAPTER 1

INTRODUCTION

1.1 Introduction

In recognition to the evolving field of educational technology, the Association for Educational & Communication Technology (2004) offers the following definition of educational technology:

> *Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (AECT, 2004: p. 1).*

This definition represents a significant departure from the Seels and Richey (1994) conceptualization where technology was seen as a set of tools to aid learning within the objectivist views of learning. The new definition is based on the constructivist view of learning and sees technology a facility that can offer immersive authentic environments as well as virtual environments that facilitate and promote inquiry, problem solving, ownership, and deep and meaningful learning.

The 2004 definition extends the scope of design and development to a larger scale to encompass systems such as online databases for knowledge management, automated help systems, and portfolios for displaying and assessing learning and includes the concepts of appropriateness and sustainability to ensure that the solution uses resources carefully and with minimum damage to the environment. Resources are people, tools, technologies, and materials to help students and include the Internet and ICT systems such as the learning management system (LMS).

A rapid growth in using of information and communications technologies (ICTs) is occurring in all aspects of learning and teaching in higher education (Rich, Robinson, & Bednarz, 2000). ICTs, and more specifically computers, can be used in the educational context in several ways, including sources of information and data; laboratories for interpreting the world; and as lecturers (Healey, Robinson, & Castleford, 1996). Reported benefits of the use of ICT include improved learning processes and enhanced educational outcomes (Rich, Robinson, & Bednarz, 2000). Using ICTs for teaching directly is seen as an inadequate and mechanistic approach to learning (Healey, Robinson, & Castleford, 1996). Instead, the emphasis is increasingly on more imaginative approaches—particularly given the opportunities offered by the use of the Internet.

Universities are now using the learning management system (LMS) to help in the delivery and management of learning and using blended learning as the mode of instruction. LMS is a software supported environment that enables the delivery and management of learning content to the students. It offers an environment to maintain interaction between the lecturer and students and to assess the students' knowledge by providing immediate feedback on the online exams. Most LMS are web-based systems to facilitate anytime and anywhere access to learning content and administration. The LMS can improve learning through effective access to learning materials, by the providing of immediate feedback to the students through online assessment (Breen, Cohen, & Chang, 2003), and by improved communication between the students and their lecturers through email and discussion forums (Beard & Harper, 2002).

E-learning systems, or Virtual Learning Environments (VLEs), are rapidly becoming an integral part of the teaching and learning process (Pituch & Lee, 2006). A VLE is a web-based communications platform, that allows students, without limitation of time and place, to access different learning tools, such as program information, course content, lecturer assistance, discussion boards, document sharing systems, and learning resources (Martins & Kellermanns, 2004; Ngai et al., 2007). It can be an electronic system that can provide online interactions of various kinds that can occur between the students and the lecturers, including online learning (JISC, 2003). By another meaning, VLE is an integrated learning environment where students can apply for admission over the internet, enroll in the classes offered by VLE after admission, access a complete course, take tests, and interact with the professors as well as classmates.

The VLE allows students to view lectures and access the study material for every topic of the course. The students are given tests at specified times, and answers to the questions are transmitted to the professor automatically. The communication hub of the VLE has an e-mail facility, chat facility, and a multimedia teleconferencing system. VLEs are often used by universities and a learning technologist is usually employed to deal with technical issues such as the uploading of materials. Universities commonly use two types of VLEs, Learning zone site / Blackboard and Moodle. VLE is sometimes referred to as an LMS (Learning Management system).

Many of the traditional institutions of higher education, universities and colleges, are now beginning to develop and deliver Web-based courses via Virtual

Learning Environments (VLEs) (McCormick, 2000). Therefore, in this technology-mediated learning area, the research and development of VLEs have been growing quickly. Blackboard is a leading example of a VLE which many Universities have chosen as their e-learning platform (Green et al., 2006). Within VLEs lecturers can set up and maintain areas dedicated to specific modules, and content accessed by students can be prepared within familiar software applications such as MS Word and PowerPoint. Lecturers may also monitor student progress through resource usage and assessment statistics.

A suitable mechanism to deliver such innovative approaches is the VLE, which 'typically combines a range of functions which aim to provide students with round-the-clock access to course materials as well as opportunities for tutor–student and student–student interaction' (Monger & Weaver, 2002). In effect, the temporal and geographic relationship between the lecturer and learner, typified by conventional classroom teaching, is broken down and replaced by a dynamic, open learning environment. According to Belanger and Jordan web-based learning has the potential to fundamentally change the student learning experience through students gaining control of learning, something that is often absent from the classroom (Belanger & Jordan, 2000).

Many research and case studies have shown that using Virtual Learning Environment (VLE) increases student's motivation since the activities are comparable and close to real world and require effective interaction during studying (de Leng, Dolmans, Muijtjens, & van der Vleuten, 2006).

The rapid development in technology has been changing the way lecturers teach and students learn (Wells, de Lange, & Fieger, 2008). Educational trends have been changing rapidly towards blended instruction and web-based instruction, where web-based instruction replaces features of face-to-face instruction. One example of this changing is the development of learning management systems (LMS), course management systems (CMS), and virtual learning environments (VLE) that facilitate teaching and learning of the students outside the physical classroom. Often, these terms are used mutually in designating the same software or tools (Wells, de Lange, & Fieger, 2008).

The Learning Management System (LMS) can be server-based software that control delivery and access of online learning resources through a standard web browser. LMS as a term has many other synonyms like Virtual Learning Environment (VLE) or Content Management System (CMS). An LMS usually comprises a set of web-based tools to manage information online for administrators, lecturers, and students as well.

E-learning can be defined as "using new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (European Commission, 2007). E-learning provides an effective environment for teachers to achieve better learning conditions for students. But it also has some certain disadvantages that affect the education process. For instance, it is always difficult to ensure an effective socialization process in e-learning systems. In contrast to e-learning, traditional face to face education is still front runner model to achieve a good socialization

environment for students. Another disadvantage of e-learning is high student dropout rate. High student dropout rate has been an important problem for all types of education systems. But it is notably present especially in e-learning models (Berge & Yi-Ping, 2004; Kemery, 2000). Disadvantages of e-learning have caused searching for better education approaches that include advantages of both e-learning and face to face education systems. Eventually, a new education model, which is called as "blended learning" has been emerged (Köse, 2010).

The term of 'Blended Learning' comes up to the educational field as a popular trend in need of blending both online and offline activities for effective, efficient and attractive learning (Lee, Choi, & Lee, 2006). Blended learning can be defined as an educational approach that combines different models of face to face and distance education and makes use of all technology types belong to educational studies. Some different definitions can also be found in the literature. Procter (2003) defines blended learning as an effective combination of different education techniques, technologies and delivery modes to supply students' needs (Köse, 2010).

Blended learning should be viewed as an educational approach that joins the effectiveness and socialization opportunities of the physical classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modes. In other words, blended learning should be approached as a fundamental redesign of the instructional model with the following characteristics: a transfer from lecture- to student-centered instruction in which students become interactive and active learners, this transfer should apply to the whole course, including face-to-face sessions; increases in interaction between

student-lecturer, student-student, student-content, and student-outside resources; Finally, integrated formative and summative assessment mechanisms for students and lecturer (Watson, 2008).

LMSs are often viewed as being the starting point (or critical component) of any e-learning or blended learning program in terms of pedagogical impact and institutional resource consumption (Siemens, 2004). Webster and Hackley (1997) also stated that learner's attitudes towards technology and blended learning may have significant effects on the success of the LMS.

Some universities promote blended learning to offer flexibility in the time and place of learning (Sharpe et al., 2006). Studies have overwhelmingly shown that blended learning can be used to improve pedagogy, increase cost-effectiveness, access and flexibility, and simplify revision (Graham et al., 2005; Osguthorpe & Graham, 2003).

In this study, blended learning means that universities can have a common on-line orientation program for any number of students at any time, allowing all students to have the same basic knowledge of concepts, vocabulary and terminology. When students do meet in the classroom with the lecturer, the face-to-face class can now focus on higher- level skills since the basics are known by all students and were tested by the Learning management system (LMS) orientation module. Now, lecturer-led orientation sessions can focus on knowledge transfer and behavioral changes and not simply the memorization of acronyms or instructional jargon.

1.2 Background

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information and originates in the minds of knowers (Davenport & Prusak, 1998). There are many different opinions on the taxonomies of knowledge and the processes in acquiring and constructing personal knowledge. As for knowledge, it is commonly agreed that it can be split into two types: explicit and tacit (Hubert, 1999; Nonaka & Takeuchi, 1995; Tiwana, 2002). Explicit knowledge is a component of knowledge that can be codified and transmitted through systematic and formal language (Nonaka & Takeuchi, 1995). Tacit knowledge is personal, context-specific knowledge that is difficult to formalize, record, or articulate, and is stored in the heads of people (Tiwana, 2002). Hubert (1999) defined explicit knowledge as articulated knowledge – the words spoken, the books read, the reports written, the data compiled and tacit knowledge as unarticulated knowledge - senses, perspectives, beliefs, and values that students form as a result of personal experiences.

According to Nonaka and Takeuchi (1995), the process of learning and acquiring knowledge involves the dynamic and continuous interaction between tacit and explicit knowledge between the individual, group, organizational, and inter-organizational levels. Nonaka and Takeuchi (1995) propose a process that involves translating knowledge from tacit to explicit means in transferring and creating new knowledge between members of an organization or group. Their model, and commonly known, comprises four modes of knowledge sharing or knowledge conversion: Socialization, Externalization, Combination and Internalization.

- Socialization is the tacit to tacit knowledge conversion process and is described by Nonaka (1994) as the "process of creating tacit knowledge through shared experience" (p. 19). Experience is vital to this mode of knowledge creation because it allows tacit knowledge to be transferred from one person to another through such social interactions as apprenticeship or training. Numerous authors, including Davenport and Prusak (1998) have stressed the importance of direct, face to face interaction for the successful transfer of tacit knowledge (p. 100). Nonaka (1994) makes no direct distinction between face to face human interaction and virtual, technology-mediated interaction however, writing only that without some form of shared experience and knowledge, it is very difficult for people to share each others' thinking process.
- Externalization is the tacit to explicit knowledge conversion process and is a process of articulating tacit knowledge into such explicit forms as defined concepts, diagrams, often using metaphors, analogies, and sketches. This mode is triggered by a dialogue intended to create concepts from tacit knowledge.
- Combination is the explicit to explicit knowledge conversion process and involves the process of assembling new and existing explicit knowledge into a tangible systemic knowledge set such as a set of specifications for a prototype of new product or a written proposal. Nonaka has described this process by noting that "the reconfiguring of existing information through sorting, adding, recategorizing, and recontextualizing of explicit knowledge can lead to new knowledge" (Nonaka, 1994, p. 19).

- Internalization is the explicit to tacit knowledge conversion and involves the process of embodying explicit knowledge that has been documented into text, manuals, sound, or video formats facilitates the internalization process into tacit, operational knowledge such as know-how. This mode is triggered by "learning by doing or using".

From the cognitive perspective, the process of learning is also aided by learning and metacognitive strategies which are mental devices that learners use to process and manage information. Weinstein and Mayer (1986) define that learning strategy is a set of attributes consisting of three strategies namely, rehearsal, elaboration, and organizational strategies that are connected to the metacognition and affective learning strategies. They conclude that learning does not come out directly or automatically from teaching but occurs through mediating variables in the form of cognitive or affective strategies. The relationship between teaching and learning was examined by Vermunt and Verloop (1999). They described learning activities according to three categories, cognitive, affective, and metacognitive. Cognitive activities were explained as leading to changes in a student's knowledge base and included relating/structuring, analyzing, memorizing and processing critically. Metacognitive activities incorporated both cognitive and affective components as students' exerted control over how they processed information. Metacognitive or self-regulation activities or metacognition is defined as use to self-monitoring knowledge of user-self knowledge. They are carried out by orienting or preparing a learning process by examining content and processing activities as well as prior knowledge; adjusting the original learning plan through continual monitoring; and evaluating and reflecting by trying to explain course work in one's own words,

answering questions from fellow students, and thinking about learning experiences in general. It has been suggested that cultural factors influence the strategies that a student uses to learn (Hatano & Miyake, 1991; Ninnes, 1996; Pinxten, 1991; Säljö, 1991).

Many studies have been conducted to investigate metacognition and factors surrounding it. Barnard et al. (2008) present the results of a survey conducted with 434 students enrolled in a course having an online format at a large, public university located in the Southwestern United States. These results of the study suggest a significant relationship between the epistemological beliefs and the self-regulated learning skills of online learners. Other researchers such as Al-Skaiti (2007) and Sternberg (1998) found that Metacognition which included self-checking behavioral tendencies, which composed of planning and self-checking improved learning and achievement in traditional and online learning environments.

Researchers at the University of Michigan have elaborated on the effects of Metacognition for presenting the learning strategies that used by individuals to plan, monitor, and regulate their cognition, not their metacognitive knowledge (Pintrich, 1988; 1989; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Pintrich et al., 1993).

Another factor that contributes to learning is motivation. Motivation is a word that can be used to label or identify the relationship between how someone performs and what is expected of him, and the degree to which environmental events affect his behavior as expected (Solane & Jackson, 1974, p.5). Motivation study deals with the

processes that give behavior its energy and direction (Reeve, 1992, p.7). Reeve (1992) explained that motivation can be self-regulated or environmentally regulated. A motivational study needs to control both of these variables in order to be effective (p. 13).

There is a considerable number of studies on the factors that affecting students' success and majority of them focus on students' motivation and use of learning strategies (Pintrich, Smith, Garcia, & McKeachie, 1991, 1993; Garcia & Pintrich, 1995; Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990). According to these studies, students who have high motivation and exploit learning strategies are more likely to perform better and be more successful. Also these students would develop lifelong learning skills more efficiently. When students organize and manage their learning goals efficiently, they use cognitive and metacognitive strategies frequently (Eccles et al., 1983; Pintrich, 1988). They also manage more efficiently their learning effort when learning. Additionally, higher level motivated students' uses of cognitive and metacognitive strategies are higher and they completed their learning tasks better (Pintrich & De Groot, 1990).

1.3 Problem Statement

Students and lecturers are put into the LMS supported blended learning environment as part of the university's exercise to modernize the teaching and learning processes based on the promise of improvements from the aspects of delivery and management of learning. External factors such as scaffolding strategies and logically designed courses and course content have been shown to improve internal processes of learning (Vygotsky, 1978; Gagne, 1985). However, not much

emphasis or attention on the theories of learning or the mechanisms of interaction between and within the factors of the LMS supported blended learning environment are sufficiently attended to Figure 1.1.

Lecturers are aware of the interaction between the factors and all the LMS software do provide multiple avenues for interaction such as email, forum, and face to face. However, these factors are not emphasized because the LMS is employed within the objectivist paradigm where the emphasis is on the delivery of course content and mastery of the learning outcomes. As a further consequence, few research if any were conducted by universities before implementing the LMS and no emphasis is given to investigate the use or intensity of knowledge conversion processes involving the factors of SECI in the LMS supported blended learning environment.

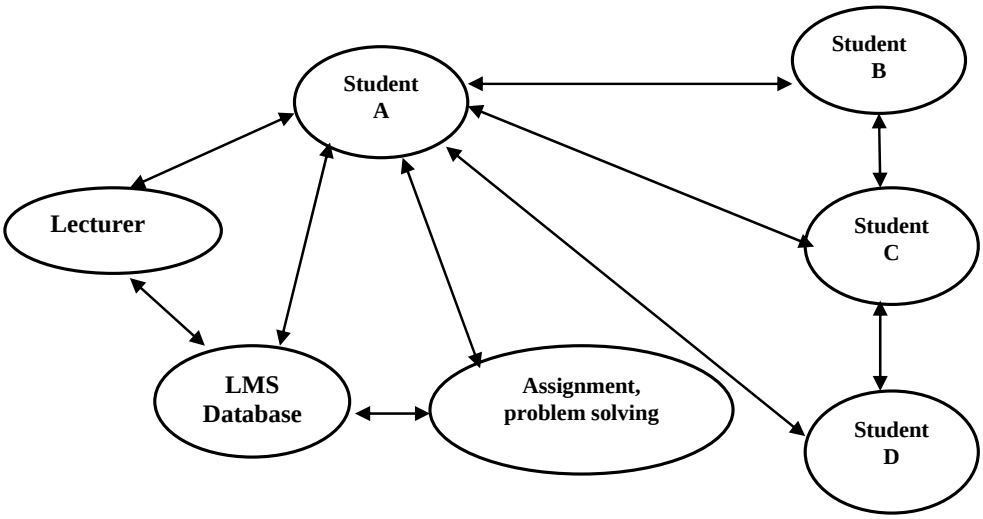

Figure 1.1: Interaction between factors of the LMS
(Modified from Horton & Horton, 2003)

Also, many research have been conducted to investigate the relationships between motivation, learning strategy, and metacognition in the e-learning environment such as using Pintrich's Motivated Strategies for Learning Questionnaire (MSLQ). In the industry the factors of SECI are directly related to performance, but in education the factors of SECI must interact with mediating variables such as the strategies presented by Weinstein & Mayer (1981) before any learning or performance is obtained. Mazida (2009) has established the existence of the SECI factors in educational settings while Kutay & Aurum (2007) has established that Externalization factor was present in mobile learning. But no study was found that addressed the effects of the SECI factors on motivation, learning strategy, metacognition and performance in the e-learning or LMS supported blended learning environment. Thus, this study investigated a) the effectiveness of the intensity of the knowledge conversion processes within the LMS supported blended learning environment based on the SECI model, and b) the effects of the factors of the SECI on motivation, learning strategy, metacognition and performance in a LMS supported blended learning environment.

The effects of the factors of SECI on motivation, learning strategy, metacognition and performance are sketched as in Figure 1.2. It was hypothesized that the LMS supported blended learning environment features and facilities together with blended learning strategies would shape the knowledge conversion processes that would induce different levels of motivation and the use of learning and metacognitive strategies that would in turn produce the learning outcomes. The knowledge conversion processes are exogenous variables while motivation and

learning and metacognition strategies are the mediating variable and performance is the endogenous variable.

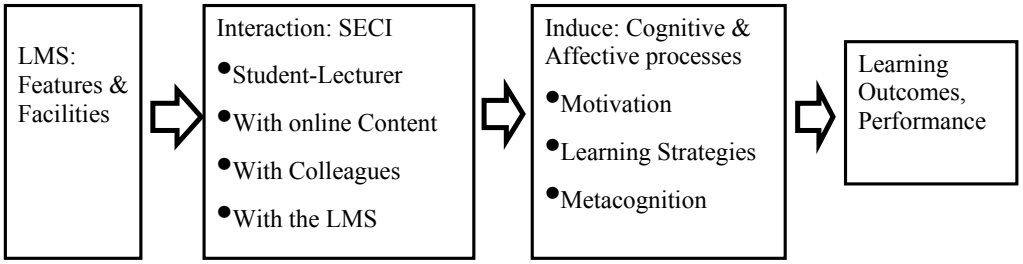

Figure 1.2: The general model for the effects of the SECI factors on motivation, learning strategy, metacognition and performance

1.4 Purpose of the Study

The purpose of this study was to investigate the direct and indirect effects of the knowledge conversion processes, namely Socialization, Externalization, Combination and Internalization (SECI) on motivation, learning strategy, metacognition and performance.

1.5 Research Questions

The following are the research questions for this study:

1. Do the factors of SECI contribute to the knowledge conversion processes in the LMS supported blended learning environment?
2. What are the direct effects of SECI factors on motivation, metacognition and use of learning strategies?
3. What are the direct effects of motivation and metacognition on the use of learning strategies and performance?
4. What are the indirect effects of the factors of SECI on performance?

1.6 Significance of the Study

This study performs a needs assessment activity at the theoretical level and will help educators in their search for an effective and efficient pedagogical strategy or model for improving learning through the knowledge conversion processes in the LMS supported blended learning environment. This study investigates the effectiveness of an organization at the micro or product level (Kaufman, 2000), and seeks answers to questions such as "What do we produce that leads us to the desired outputs and desired outcomes and improves processes and performance?"

The findings of this study will contribute to further understanding of the role of collaborative knowledge construction with learning management system (LMS). The knowledge conversion processes as defined by the SECI factors will help universities to redefine the roles and activities of the lecturers and students and make learning in LMS supported blended learning environment more efficient and productive, and improve student learning and performance. The findings in this study could be used as a basis of further new researches in Learning Management Systems based on SECI model in colleges and schools. And it could be used as reference of instructional institutions related in learning management.

1.7 Operational Definitions

Blended learning is a mixing of online delivery of course content and asynchronous discussions by using email and forum through the LMS (Learning Management System) as well as face-to-face-meetings between the lecturers and the students and between students themselves.

Socialization is the process of creating new tacit knowledge among students out of existing tacit knowledge of the lecturer through shared experiences between lecturer and students and students and students involving the exchange of ideas through discussion and dialogue by e-mail, forum and face to face.

Externalization is the process of creating explicit knowledge out of tacit knowledge, where the lecturer prepares the content, its objectives, multimedia tools, and other internal and external activities into database.

Combination is the process of converting explicit knowledge into more organized and systematic sets of explicit knowledge, called systemic knowledge, where the students exchange and re-elaboration of internal and external their files inside and outside the groups.

Internalization is the process of converting explicit knowledge into tacit knowledge, where students find and read new strategies and employ problem solving activities inside and outside the groups.

Motivation consists of constructs such as value component (beliefs about the importance, interest, and utility of the task) and includes constructs such as intrinsic motivation, expectancy and control component(beliefs about one's ability to perform a task) includes constructs such as self-efficacy, self-concept, and competence beliefs and affective component (feelings about oneself or affective reactions to tasks)includes constructs such as fear of failure, anxiety, and pride, serve as energizers or resources for students in learning- and achievement related contexts (Pintrich et al., 1991).

Learning strategy is a set of mental processes (such as rehearsal, elaboration, organization, and critical thinking) used by a learner that will facilitate the acquisition, storage, manage, retrieval or understand and use of knowledge and

information and solve problems and to make learning easier, faster, more enjoyable (Pintrich et al., 1991).

Metacognition is the processes of considering and regulating student's own learning that, include planning, monitoring, and evaluation of the student's current and previous knowledge (Pintrich et al., 1991).

Performance is the magnitude of acquisition of knowledge which a student gets after studying a course and is measured by lecturer-administered test scores and grades.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the literature in the relationships expressed in the hypothesized model, knowledge conversion processes in relation to the motivation, learning strategy, metacognition and performance in LMS supported blended learning environment. The chapter reviews the fundamental concepts and research carried out with regard to the effects of motivation, learning strategy and metacognition on performance, and the intensity and effects of knowledge conversion processes in companies and in learning management systems (LMS).

2.2 Theoretical Framework

Vygotsky in his theory of cognitive development emphasized the critical importance of interaction among people, including other learners and lecturers, and pointed at the element of "social constructivism" underlying the learning process (Maddux, Johnson, & Willis, 1997). Vygotsky proposed that learning is a socially mediated activity. He also postulated that thinking and problem-solving skills can be classified into three categories (Maddux et al., 1997). First, some learning can be performed independently by the learner. Second, some learning cannot be achieved even with help from others. And third, between these two extremes are the tasks that learners can perform with the help from others such as lecturers or fellow learners. According to Vygotsky's sociocultural theory, the full cognitive development requires social interaction (Tu, 2000: p. 33). Vygotsky suggests that teaching and learning are "social activities that take place between social actors in socially constructed situations" (Moore, 2000: p. 15).

The study adopts Vygotsky's (1978) sociocultural theory which has been regarded as a fundamental theoretical framework for computer-mediated communication (Hauck & Youngs, 2008; Kidate, 2000; Simpson, 2005). Sociocultural theory emphasizes that an individual's mental development can be achieved with meaningful verbal interactions with others in social contexts which involve complex and higher mental functions (Lantolf & Thorne, 2006). Vygotsky suggests that students can be guided by explanation, demonstration, and can attain to higher levels of thinking if they are guided by more capable and competent learners. This conception is known as the Zone of Proximal Development (ZPD). ZPD is the gap between what is known and what is not known, that is, generally higher levels of knowing. The ability to attain higher levels of knowing is often facilitated and, in fact, depends upon, interaction with other more advanced peers, who for Vygotsky are generally adults. Through increased interaction and involvement, students are able to improve themselves to higher levels of cognition and thinking. The ZPD is thus the difference between what students can accomplish independently and what they can achieve in conjunction or in cooperation with another, more competent person.

Vygotsky formulated two levels of development to clarify how students transit from potential development to actual development, which is referred to as the Zone of Proximal Development (ZPD). It is the distance between the real developmental level as determined by independent problem solving and the level of possible development as determined through problem solving under the lecturer or in collaboration with more capable students (Vygotsky, 1978). Society provides students with a variety of tasks and demands that require them to depend upon

experts to solve problems. When they can independently solve problems and achieve their goals without experts' guidance, the ZPD disappears.

In his sociocultural theory, Vygotsky (1978) proposed that humans use language to communicate with other people to share experiences and to construct knowledge from those people in a society. Vygotsky argued that the developing individual needs help with higher mental functioning development that can be gained from other people's experiences through social interaction. That is, the mental development of an individual can be accomplished with assistance from other people in society through interaction. Social interaction is a fundamental concept in the development of cognition proposed in Vygotsky's theoretical framework. Vygotsky (1978) pointed out two levels, social level between people (inter-psychological) and the individual level inside an individual (intra-psychological), to explain how a student's cultural development functions. That is, a student interacts with other students who are with higher mental development in society and construct relationships with them to gain help with the development of his or her own cognition and knowledge.

Vygotsky (1978) proposed the Zone of Proximal Development to argue that the novice cooperates with the expert (such as a lecturer) who can assist the novice (a student) from the intermental plane (social interaction) to the intramental plane (thinking and performance) to form concepts and acquire knowledge. When the novice can direct himself/herself to solve problems and accomplish tasks without assistance from the expert, Vygotsky regards the shift as self-regulation. It is clear that the meaning of negotiation, the shift from potential development to actual

development (ZPD), or self-regulation occurs because an individual interacts and communicates with other people in the process of activities in a society.

According to Vygotsky (1978), learning happens within the area of ZPD. That is, the more knowledgeable students identify the ZPD of the less knowledgeable students engaging in a task, and scaffold the less knowledgeable students until they are able to accomplish the task without assistance. The concept is often applied to interactions between lecturers and students in the classroom and to second language learning within a sociocultural tradition. Aljaafreh and Landtolf (1994) summarized that scaffolding refers to "offer[ing] just enough assistance to encourage and guide the learner to participate in the activity and to assume increased responsibility for arriving at appropriate performance" (p. 469). They also concluded that "…learning is not something an individual does alone, but is a collaborative endeavor necessarily involving other individuals" (p. 480).

Vygotsky (1978) explains the differences between the current abilities of the students and their potential development as the distance between the actual students' independent level and their potential level under support, guidance, or in collaboration with more capable peers. Scaffolding provides an opportunity for students to develop their knowledge and skills beyond their independent current level, and this closes the distance between what is and what is possible. That is, with scaffolding, students are supported to go beyond their current thinking, so that they continually increase their capacities (Schofield, 1992).

Furthermore, Vygotsky (1978) suggests that integration of an active student and an active social learning environment cooperate to produce developmental change. The student actively explores and tries alternatives with the assistance of a more skilled partner, as a lecturer, or a more capable student. The lecturer guide and structure the students' activity, scaffolding their efforts to increase current skills and knowledge to a higher competency level. A greater level of support and guiding is offered if the learning task is new, and less is provided as competency grows (Berk & Winsler, 1995). The student is able to move forward and continues to develop new capabilities.

Vygotsky (1978) believes that students cannot independently narrow their ZPD (Rosenshine & Meister, 1992). So the concept of scaffolding becomes a critical technique to bridge the gap between what the students can accomplish independently and what they can achieve with assistance or guidance of others. When using scaffolding, students are provided with "a great deal of support during the early stage of learning and then diminishing support and having the students take on increasing responsibility as soon as they are able" (Slavin, 1994, p. 49). In this way, students are able to narrow the ZPD initially with support, and retain this level of achievement as support is reduced. So awareness of a student's ZPD helps a lecturer gauge the tasks students are ready for, the kind of performance to expect, and the kinds of tasks that will help the students reaching their potential.

2.2.1 Application of Zone of Proximal Development to the LMS

Figure 2.1 describes the interactions between the factors of the LMS when analyzed using Vygotsky's Zone of Proximal Development. Vygotsky believed that

the role of the lecturer in education is crucial. In developing students' abilities, lecturers can guide students towards performing learning actions or tasks which are just beyond their current capacity. With such guidance from the lecturer, students can perform beyond their own ability within certain limits. Vygotsky defined these limits as the ZPD. When the student get on the higher level of ZPD the most effective teaching occur, the edge of challenge.

A student's ability to acquire information involves a process whereby an *expert* (such as a lecturer) uses language to interact with, guide and direct (in a scaffold-like process) the *novice* (a student) in making personal connections with the subject at hand. This type of exchange between the *expert* and the *novice* is how Vygotsky suggests students learn most effectively. In this process, learners are involved in the active construction of knowledge, and, in the process, validate prior knowledge and experiences (Bodner, 1986: p. 873-878) through the connections they make between previously understood and new information, taking students beyond what they can accomplish independently, to what he/she can accomplish with assistance or under guided discovery (the zone of proximal development). Such a concept requires a student to interact with other students who will extend their understanding. Group interaction in the learning process is an important requirement for this condition and the exploration of Vygotsky's ideas can be used as rationale and explanation for the effectiveness of collaborative learning.

Vygotsky (1978) affirms that student cognitive development cannot be understood without referring to the social environment in which the student is embedded. Students' social interaction with more capable students is essential to

cognitive development. So students' cognitive or learning is developed through interaction with more competent students working in the ZPD. This interaction enables students to discuss and exchange their ideas and thoughts which in turn emulate rational thinking processes such as the verification of ideas, the symbolic representation of intelligent acts, and criticism. Students will then takes on and internalize these procedures thus enhancing the development of their cognitive abilities such as their problem solving capacities. Social interaction with its creation of a zone of proximal development enables learning that develops an internal process of cognitive thought that the student can then construct independently. It also enables Vygotsky's notion of scaffolding, in which students are given a great deal of support initially and then encouraged to become more independent and responsible for their learning as soon as possible. Vygotsky did not see learning as a developmental process but, properly organized; learning can result in mental development and can start other developmental processes that require learning. He refuted the traditional view that learning shows development but said that learning was the beginning of further development (Roberts, 2005).

The concept of scaffolding derived from Vygotsky's (1978) Zone of Proximal Development concept refers to assistance for a student who is unable to accomplish or perform a task independently provided by a more capable student or lecturer. That is, a student engages in learning at his/her current level of knowledge or skill until the student no longer requires assistance from another student or lecturer. This type of learning promotes collaboration between students and other students.