# An Investigation of Knowledge Creation Process in the LearningZone Learning Management System amongst Postgraduate Students

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*Abstract-* **Knowledge management (KM) has been discussed in various domain but less emphasis is given in the educational field particularly in understanding the interaction between tacit and explicit knowledge. The knowledge is formed through connection of online learning environment elements. Therefore, the outcome of KM in educational field is unknown due to insignificant attention towards knowledge created from the process itself. This paper discusses the process of knowledge creation based on the Socialization, Externalization, Combination and Internalization (SECI) model amongst postgraduate students in an online learning environment. Research sample covers 160 postgraduate students who were actively involved in Learning Management System (LMS) support environment. A research instrument has been developed based on the SECI constructs. Factors examined are the intensity of knowledge creation processes for transforming tacit knowledge in the learning, thinking and decision making skills. The findings show that the model fit the data for thinking and decision making skills only. The findings indicate that the model is not applicable for developing learning skill for postgraduate students.**

*Keywords- knowledge creation; SECI model; postgraduate students*

## I. INTRODUCTION

KM in education is vital since it provides a framework for understanding the way to improve educational outcomes, organize their efforts, and shares their resources [1]. Unfortunately at the moment, the outcome of KM in educational field is unknown due to insignificant attention towards knowledge created from the process itself.

Knowledge-creation process is based on two types of knowledge, explicit and tacit knowledge [2]. Both types of knowledge are crucial and complement each other. Therefore, understanding both the explicit and tacit knowledge is the key to understanding the knowledge-creation process. They further proposed the SECI model – the four modes of knowledge conversion which include (a) Socialization (from tacit to tacit knowledge); (b) Externalization (from tacit knowledge to explicit knowledge); (c) Combination (from explicit knowledge to explicit knowledge); and (d) Internalization (from explicit knowledge to tacit knowledge). The SECI model enables an expert to transfer his/her tacit knowledge to a novice [2].

Universiti Utara Malaysia (UUM) has implemented a Learning Management System (LMS) known as UUM Learning Zone under the supervision of University Teaching and Learning Centre (UTLC). The UUM Learning Zone offers e-learning facilities which provide knowledge sharing between lecturers and students. In addition, it enables accessibility of the learning materials anywhere and at anytime. This platform applies Socialization, Externalization, Combination, and Internalization to be conducted iteratively over the length of the course. As this has become the growing concern in the practice of KM among educational practitioners, an investigation on the knowledge creation process among the UUM postgraduate students is relevant.

## II. KM IN EDUCATION

Information practices and learning strategies known as KM are gaining acceptance in the field of education. At the most basic level, KM can be described as a set of practices that helps to improve the use and sharing of data and information in decision making. KM technology can be used to rapidly capture, organize and deliver large amounts of knowledge to its users. "KM is the process of transforming information and intellectual assets into enduring value. It connects people with the knowledge that they need to take action, when they need it. In the corporate sector, managing knowledge is considered key to achieving breakthrough competitive advantage" [3].

Knowledge differs from data and information. Data signifies facts which are usually in the form of measurements. Information converts data into a meaningful context. Knowledge, on the other hand is an understanding of information acquired through study, investigation, observation, or experience. The association between data, information, and knowledge can be arranged in a form of a pyramid. Data forms the foundation, information forms the

middle section and knowledge stays at the top. Extracting knowledge involves interpreting volumes of data and information to arrive at concepts and guidelines that can be documented, packaged and delivered [4].

Knowledge can be classified as tacit or explicit. Tacit knowledge is subconsciously understood and applied. This type of knowledge is difficult to articulate but may be developed from direct experience and action, and usually shared through highly interactive conversation, storytelling, and shared experience. Explicit knowledge can be consciously understood and because it is more precise and formally articulated. Such knowledge is readily codified, documented, transferred, and shared. Between these two types of knowledge, tacit knowledge has become a challenge in KM particularly in explicating, sharing, and leveraging the knowledge [4]. Even though KM is a discipline originating from management studies, it has always been going hand in hand with information technologies in term of its necessity and as a technical solution for the implementation.

An efficient e-learning system is developed based upon knowledge, and not exclusively on information [4]. KM allows effective control and management of the knowledge created within an organization. Besides a classic live training program, a virtual classroom provides dialogue or interaction capabilities even though the users are not at the same place. This is the objectives of the UUM Learning Zone application that offers e-learning facilities to enable knowledge sharing between lecturers and students and accessibility of the learning materials anywhere and at anytime. As the number of internet users increases the information patterns have transformed the electronic information systems into the use of cyber technologies. Therefore, knowledge transmission patterns within academic organizations must be developed and changed so that information to be transmitted effectively [5]. Due to the above reasons, KM method is becoming a perfect education development tool for all academic levels.

Knowledge should be managed by human, not a system [6]. Therefore, when designing KM strategies things to consider systems and tools; people involved; an organization's operational context, history, ICT capacity, and its intention, are among the factors that need to be considered. In fact, people, processes and, technologies are the three core elements in preparing a KM strategy [7].

## III.  CASE STUDY

Postgraduate students refer to those who continue their study after finishing their first degree. In UUM, there are Master and PhD programs that are offered in three (3) colleges, namely; College of Arts and Sciences (CAS), College of Business (COB), and College of Law and Government and International Studies (COLGIS). The postgraduate students are taught and managed by each college according to their respective programs. There are three (3) modes of completing a postgraduate program in UUM: (a) Coursework – students are required to attend lectures, tutorials, and examination, (b) Coursework and Thesis/Dissertation – Besides completing coursework credit

requirements and sit for examinations, student are required to submit written thesis/dissertation for examination, (c) Research – candidates undertake research under the supervision of a principal supervisor appointed by the Center for Graduate Studies of the respective college and are required to submit a written thesis for examination.

Based on personal observations on the usage of the UUM Learning Zone system, the following issues have been identified:

a)  Strong interaction between lecturers and students throughout the semester.

b)  The non-IT background lecturers prefer to teach using the conventional method rather than using the learning zone.

c)  Some lecturers prefer to use the old system (learning care) rather than the new system (Learning Zone) because they are not familiar with the new system.

d)  Even though some of the teaching staff who taught the same course for a number of years have depth of knowledge about the program, it is difficult to transfer this knowledge to other lecturers.

e)  Some lecturers prefer to read from the paper (assignment) rather than through online documents because it is easier to give comment immediately.

f)  Face-to-face interaction is more convenient for communicating and delivering messages especially the transfer of tacit knowledge between lecturers and students.

LMS is a broad term used to define the collection of software tools that are used for aiding, facilitating and managing of educational materials for the purpose of learning activities and teaching services [13]. Learning Zone is an example of LMS software used by UUM for online education purposes. The Learning Zone application is based on Modular Object-Oriented Dynamic Learning Environment (Moodle), a free Open Source software package. The application makes teaching and learning more effective by providing an online environment to ease the distribution of materials and encourage collaboration and interaction within and outside the classroom. It also allows lecturers to create and modify reading materials for their students. The reading materials can be in the form of video, audio, PDF, excel spreadsheet, Web page, or Word documents. The Learning Zone application comprises of a range of functionality which allows content creation and delivery, communication, collaboration and assessment. In addition, it also provides various services such as assignment, chat, forum and online quiz for both students and lecturers usage [13].

## IV.  METHODOLOGY AND RESEARCH QUESTIONS

Generally, the research framework can be divided into five phases; (a) awareness of problem, (b) suggestion, (c) development, (d) evaluation, and (e) conclusion.

In the first phase, the problem of this research is defined through literature study and content analysis. The problem statement was established based on these activities and from the aspects that motivate the study. Apart from that, a preliminary study was conducted in order to find out the key issues of methods employed in teaching soft skills.

Content analysis is a process to obtain knowledge about the intended study, where content can be acquired from many sources of information including text, video, audio, and other forms of elements [8]. In this study, the aim of the content analysis is to discuss the knowledge creation process [2]. Knowledge creation process refers to the processes of knowledge conversions between tacit and explicit knowledge through the stages of Socialization, Externalization, Combination, and Internalization.

This study employs a questionnaire as the main research instrument. The questionnaire was developed by adopting works from [2][11][12]. A number of factors were investigated based on a study by [2], which are student's perceptions of the LMS and the level of Socialization, Externalization, Combination and Internalization. A pilot study was conducted to establish the validity and reliability of the instrument. The instrument was checked by an experienced lecturer and also by the respondents.

In the final phase, claims and evidences were justified through analysis of findings. Structural Equation Modeling (SEM) was employed to analyze the relationship of the SECI processes. Analysis of Moment Structures (AMOS) was used to analyze the data and present model in a path diagram to show the relationships among the variables. AMOS is a software solution from SPSS that extends standard multivariate analysis or multiple regressions.

The main aim of this study was to investigate students perceptions towards the Learning Zone and the level of SECI processes of students' learning, thinking and decision making skills. The following research questions provide a focus for further investigation:

**RQ1** How is the LearningZone system perceived by the students?

**RQ2** What are the levels of Socialization, Externalization, Combination, and Internalization among the students for learning skill, thinking skill and decision making skill?

## IV. FINDINGS AND DISCUSSION

Based on the SECI model, constructs for Socialization, Externalization, Combination and Internalization are endogenous and exogenous variables in which Socialization are exogenous and the rests are endogenous. Knowledge creation process starts from Socialization to Internalization for the creation of new knowledge [2]. The cycle continues from one cycle to another complete cycle. However this study only focused on one complete cycle from Socialization to Internalization only. Cronbach alpha for the questionnaires is

r=0.95. Table 1 summarizes number of items and scale reliabilities for each construct of the SECI model.

TABLE I
NUMBER OF ITEMS AND SCALE RELIABILITIES

| | No. of items | Cronbach alpha | Mean | Standard deviation |
|---|---|---|---|---|
| Socialization | 8 | 0.853 | 3.204 | 0.224 |
| Externalization | 20 | 0.898 | 3.309 | 0.197 |
| Combination | 11 | 0.866 | 3.481 | 0.274 |
| Internalization | 12 | 0.811 | 3.452 | 0.3 |
| Total | 51 | 0.946 | 3.363 | 0.259 |

Values of Chi square ratio for the three skills are satisfactory that is less than 5 [15]. Majority of the values for GFI, CFI, NFI and TLI for thinking and decision skills are good which are greater than 0.8. The acceptable GOF values should be at least 0.7 or at least 0.8 but higher reliability is better [16]. However the GOF values for learning skill are lower than 0.8. The RMSEA values for all skills are greater than the cut off value, 0.08 [17]. Most of the GOF indices for the thinking and decision making skills within an acceptable range. These indices indicate an acceptable fit between the SECI model and data for thinking and decision making skills. Thus, the discussion of the SECI model will only focuses on the thinking and decision making skills. The values of GOF indices are depicted in Table II.

TABLE II
GOF INDICES FOR LEARNING, THINKING AND DECISION MAKING SKILLS.

| Indices | Learning skill | Thinking skill | Decision making skill |
|---|---|---|---|
| CMIN/df | 4.218 | 2.663 | 2.375 |
| GFI | 0.752 | 0.839 | 0.864 |
| CFI | 0.728 | 0.876 | 0.882 |
| NFI | 0.676 | 0.818 | 0.816 |
| Tucker-Lewis | 0.672 | 0.848 | 0.855 |
| RMSEA | 0.142 | 0.102 | 0.093 |

*Note. CMIN/DF = ratio of the minimum discrepancy to degrees of freedom; GFI = Goodness fit index; CFI = Comparative fit index; NFI = Normed fit index; TLI = Tucker Lewis index; RMSEA = Root mean square error of approximation.*

Figure 1, Figure 2, and Figure 3 report the relationship and GOF indices among the SECI processes for learning skill, thinking skill and decision making skill. All paths were significant at the 0.001 level.

Socialization process contributes positively and significantly to the students' tacit knowledge transformation for thinking and decision making skills (ß = 0.88). The relationship between Externalization process and Combination process is similar for thinking skill and decision making skill (ß = 0.86). The Externalization process contributes positively and significantly to the Combination process for both skills.

The Combination process contributes positively and significantly to the development of students' tacit knowledge for thinking (ß = 0.62) and decision making skills (ß = 0.60).
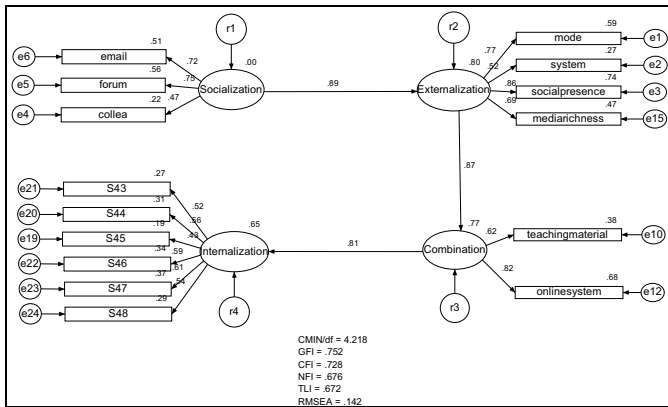
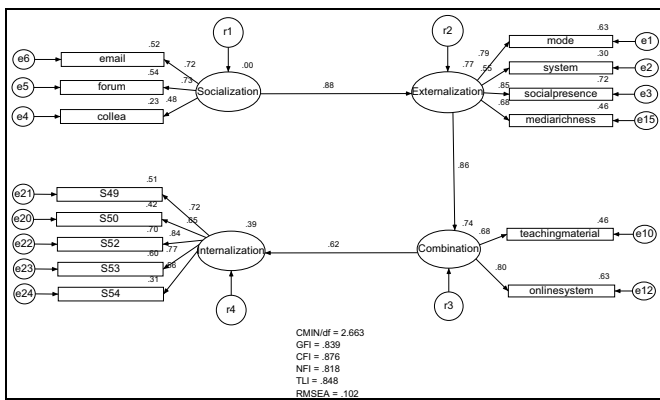Figure 1. SECI model for learning skill
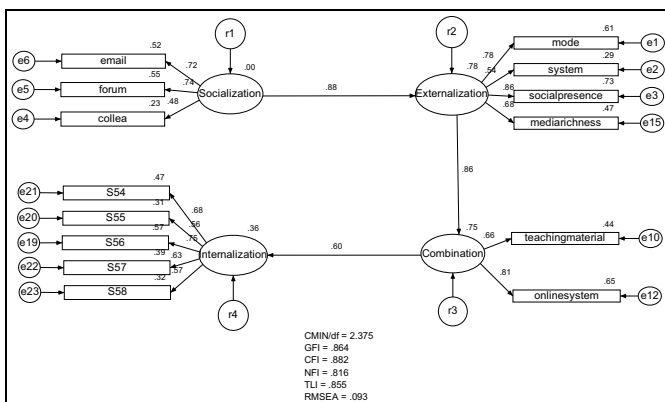


Figure 2. SECI model for thinking skill



Figure 3. SECI model for decision making skill

Findings show that the SECI model exists significantly and complete by the term of thinking and decision making skills. Thus, these skills are suitable to be practiced in LMS environment because students can discover new knowledge from the external sources and teaching materials in developing individual tacit knowledge. New knowledge discovery and exploitation of existing knowledge are important elements in developing tacit knowledge to a higher level [18]. The finding is supported by [19-21] with regards to the importance of

LMS in providing teaching materials, external sources and interaction space between students and lecturers or other friends in acquiring new tacit knowledge.

For the learning skill, the findings show that the model does not fit with the data. The findings are supported by [8][22] who claimed that students require strong support from the lecturer in the beginning of teaching and learning process. On the early stage of higher education, lecturer involvement is needed in guiding students through discussion and preparing teaching materials. The lecturer's roles are important in sharing knowledge with the students effectively [24-25] with support of the online technology [26-29]. On the other hand, the model is applicable for postgraduate students in terms of thinking and decision making skills since they have already possessed the learning skill during their first degree education.

## VI. CONCLUSIONS

The issues highlighted in this paper are in twofold; 1) the postgraduate students' perception on knowledge transfer using LMS supported environment and 2) the intensity of knowledge creation processes for transforming tacit knowledge in the learning, thinking, and decision making skills. Based on the result presented above can be concluded that the Learning Zone could be made as an alternative teaching and learning platform to support knowledge transfer from lecturers to postgraduate students. Although the SECI model was less significant to generate postgraduate students' learning skills, it showed high impact in generating thinking skill and decision making skill.

The lecturers approach at postgraduate level was based on student centered learning. Students were expected to be more independent and take control of their studies. Focus was mainly given on the critical thinking and problem solving as compared to learning skill. Similarly, the online learning environment was also seen as able to support every process of SECI model in transferring the skills of decision making and thinking. The online learning environment could be used as an alternative in learning and teaching process besides face to face meeting.

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