An investigation of Knowledge Creation Process

in an Interdisciplinary Project Team:

A case study

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Research Background

In the current educational field, computer-based game or video game implementation is booming in numerous university and K-12 environments. Organizations within higher educational institutes are promoting educational game or application design projects for their students. For example, the University of Wisconsin-Whitewater Engender Games Group (EGG) Lab provides authentic project opportunities for students interested in gaming and communications to hone their skills. Northern Illinois University (NIU) has a Digital Convergence Lab, which provides experiential learning opportunities for interdisciplinary students to practice professional design and development skills. Ever since the advent of Web 2.0 applications, these types of interdisciplinary or multidisciplinary collaborative learning processes have become the norm in several discipline areas, such as game development collaboration across animators, artists, and scientist, designers, robotics and software engineers, and researchers and theorists (Fleischmann & Hutchison, 2012; Olsen, Bekken, McConnell, & Walter, 2011). Although higher education students are benefiting from such learning environments, new participants from higher education systems are often unprepared for the challenges of managing interdisciplinary relationships and the complexity of team and group dynamics (Fleischmann & Hutchison, p. 24).

Newell (2001) described that the collaborative and experiential learning communities approach contains “multiple perspectives on a complex phenomenon for insights that can be integrated into a richer, more comprehensive understanding” (p. 198). Kelin (2005) addressed that "students [who participated in an interdisciplinary project] need to tolerate ambiguity and paradox if they are to take grounded stands in the face of multiple and sometimes conflicting perspectives. The relational skills they gain also foster the ability to adapt knowledge in
unexpected and hanging contexts” (p. 8). Different from a formal learning environment, participates in interdisciplinary projects attempted to find the answers or solve the problems that are not listed in the textbook (Kelin, 2005). In order to complete the tasks, interdisciplinary groups of students’ prior knowledge play heavier roles in the collaboration process (Ivanitskaya, Clark, Montgomery, & Primeau, 2002).

Purpose Statement

The purpose of this study seeks to understand how interdisciplinary students create and obtain knowledge as a part of the knowledge management (KM) process. The key components of KM include, but are not limited to, people, processes, technology, culture, and specific perspectives (Spender & Scherer, 2007). As the trend of game-based learning and technology integration continually booms in the educational field, it is expected to have more interdisciplinary or multidisciplinary students collaborate with each other in the higher education systems. This study plans to take the lens from knowledge management’s perspective to explore an interdisciplinary group of upper-level college students’ learning processes in completing an authentic project. This study will take place in the NIU Digital Convergence Lab (DCL) and the participants are from computer science, time art, and instructional technology.

Problem Statement

Polanyi (1969) claimed that each individual possesses two types of knowledge, tacit knowledge and explicit knowledge, and we need to admit that we know more than we can tell. Scholars defined that tacit knowledge is personal, context-based, and hard to formalize and articulate (Schwen, Kalman, Hara, & Kisling, 1998; Sternberg & Grigorenko, 2001). Some scholars believed that explicit knowledge, on the other hand, can be shared in formal and systematic ways (Nonaka, 1991; Spector & Edmonds, 2002). For over 25 years numerous
scholars have been debating the transitions between tacit knowledge and explicit knowledge. Several scholars followed Nonaka (1994) and Nonaka and Konno (1998) in studying the possibilities and methods of sharing both tacit and explicit knowledge among a group (Bryceson, 2007; Hosseini, 2011; Shim & Roth, 2008; Tee & Lee, 2011; Yeh, Huang, & Yeh, 2011; Yli-Luoma & Naeve, 2006). Some scholars believed that tacit knowledge itself is debatable (Schmidt, 2012; Shim & Roth, 2006), others believed that tacit knowledge is a skill (Ambrosini & Bowman, 2001; Nelson, 1982). Some assert that knowledge in a specific context has both tacit and explicit characteristics (Alavi & Leidner, 2001; Ambrosini & Bowman, 2001; Jasimuddin, Klein, & Connell, 2005; Nonaka & Konno, 1998), while other argues that tacit knowledge is just symbolic in contrast to explicit knowledge (Schmidt, 2012) or that tacit knowledge cannot be codified (Cowan, David & Foray, 1999). Through the literature, a variety of perspectives were found that concern knowledge transfer from one person to another. This study takes the point of Nonaka and Konno (1998) that knowledge can be codified within a specific context because the nature of the interdisciplinary students must go through interactions and discussions within a technology orientated learning environment, whether is formal or informal, in order to create a technology program.

Shim and Roth (2008) conducted a study focused on capturing expert professors’ (who received a Presidential Teaching Professor award) shared tacit knowledge about teaching with novice professors. In their study, Shim and Roth recognized the difficulties in capturing one’s tacit knowledge, especially experts’. Shim and Roth found that experts’ possession of considerable tacit knowledge is the key to effective job performance, in which the importance of knowledge transfer between organization members is about transferring the know-how instead of know-what. Shim and Roth’s findings were consisting with Polanyi’s (1969) description of the
depth of tacit knowledge. Their findings are also aligned with Leonard and Sensiper’s (1998) explanations of the barriers in sharing tacit knowledge, and Dreyfus and Dreyfus’ (1986) description of fluid performance during the performance. Shim and Roth (2008) recognized that some teaching practices were just “difficult to articulate in words, even though they were transformed into explicit knowledge to some degree” (p. 14). Moreover, their study revealed that with enough educational resources and background knowledge, one could articulate tacit knowledge into explicit knowledge by words (p. 13).

One of Shim and Roth’s (2008) conclusion is that on the top of observation of experts’ teaching performance, novice professionals might mistake techniques because experts’ performance “did not provide cues for the observers” (p. 23). In order to transform tacit knowledge into explicit knowledge, communication and metacognitive skills for sharing (e.g. probing, metaphors, storytelling, and visualization) are required. Shim and Roth (2008) stated that these skills are consistent with one of Nonaka and Konno’s (1998) knowledge creation processes, the externalization process that individuals’ mental models and skills are converted into common terms and concepts through dialogues and reflections (p.24).

Nonaka and Konno (1998) proposed that a group knowledge creating process rests upon tacit knowledge and explicit knowledge and that knowledge creation occurs as a consequence of the interaction between these two. The process comprises four modes of interaction between tacit and explicit knowledge: socialization, externalization, combination, and internalization (SECI), in which knowledge is rehabilitated from one type to another. Each mode employs different theoretical approaches. In the socialization process, learners share experiences and observe each other and the learning environment in recognizing and determining their roles through social interactions. In the externalization stage, consistent information and knowledge exchanging,
adding, sorting, and group reflection allow group members to construct new knowledge that belongs to this learning group. In the combination stage, group members learn by doing to preserve the new knowledge from the externalization process in a creative format. In the internalization stage, learners reflect from on combination process and create individual knowledge that will benefit the next task.

Scholars have identified that tacit knowledge is the most difficult knowledge to articulate but the most valuable knowledge to know (Shim & Roth, 2008; Stemberg & Grigorenko, 2001). Shim and Roth (2008) revealed that through observation (as the socialization process) and communication and reflection (as the externalization process), individuals may have the potential to elicit tacit knowledge transfer to explicit knowledge. Studies have shown that in Nonaka’s SECI processes, the externalization stage allows individuals to articulate their tacit knowledge through dialogue and reflection (Bryceson, 2007; Tee & Lee, 2011; Yeh et al., 2011). Rice and Rice (2005) acknowledged that the SECI processes did not only describe how knowledge flows and is created through individual and group settings, but also how knowledge is distributed and preserved within the organization. However, there are fewer empirical studies related to the SECI model in higher educational environments than one would expect (Rice and Rice’s, 2005).

Among interdisciplinary group projects, students and coaches are faced with ambiguity and challenges to identify what the problem is and how to solve the problem. Instructional designers are often facing challenges in identifying resources and the design process. By understanding the process of how interdisciplinary students construct, create, and management knowledge, the novice or intermediate instructional design professionals may gain some insight in fostering students' interactions in this informal learning process. Therefore, the goal of this study is to explore the movement of knowledge in an interdisciplinary group of students.
Significance in Instructional Technology

The experiential learning has been recognized as a critical and meaningful learning method that it focuses on problem solving and critical thinking (Strivens & Maudsley, 2000). Technology integration merges different knowledge management methods, especially in obtaining and managing knowledge in improving human performance (Tidd & Bessant, 2011). The goal of this study is aiming to have potential benefit to provide instructional design professionals with insights regarding students' interactions and intellectual capital under an authentic but time restricted project. Moreover, this study hopes to provide a holistic example of knowledge management process of an interdisciplinary experiential learning group in higher education institution. Ideally, this study will contribute to the discussion of how best to incorporate knowledge management and instructional strategies into practice.

Research Questions

This study seeks to explore the knowledge creation process among a group of interdisciplinary students who collaborate in creating a new technology for a real client. The major research question that guides this study is to know how students navigate knowledge creation process. The sub-questions are

1. How do student participants make their knowledge visible to others through the discussion?
2. How do student participants manage the knowledge they capture?
3. What are the influential factors in the knowledge convergence process?

Definitions

For this study, the following terms are defined:
Ba: Knowledge is embedded in a specific context environment where participants acquire or reflect one’s own experience with each other. This environment can be referred to as a physical environment (e.g., meeting room or office) or virtual environment (e.g., email or text). They named this environment “ba” (場) as it originally means space in Japanese. (Nonaka & Konno, 1998)

Combination: the most complex process in knowledge creation. It includes three major factors: acquisition and integration, synthesis and processing, and dissemination (Nonaka, 1994; Nonaka et al., 2000)

Explicit knowledge: Explicit knowledge refers to the knowledge that is able to be shared in formal and systematic ways (Nonaka & Takeuchi, 1995).

Externalization: the process of gathering individuals’ explicit knowledge through adding, sorting, categorizing and recategorizing, and recontextualizing, within a dialoguing ba that facilitates the transfer of tacit knowledge into a new knowledge (Nonaka 1994; Nonaka et al., 2000; Chao & Tsai, 2004).

Internalization: the process in which individuals internalized the understanding and absorbing of explicit knowledge to tacit knowledge (Nonaka, 1994; Nonaka et al., 2000).

SECI Model: a spiral knowledge creation includes four stages of interactions between tacit knowledge and explicit knowledge. The stages includes individual’s tacit knowledge to tacit knowledge (Socialization), from an individual’s tacit knowledge to group explicit knowledge (Externalization), from group explicit knowledge to group explicit knowledge (Combination), from group explicit knowledge to an individual’s tacit knowledge (Internalization) (Nonaka, 1994, p.19).
Socialization: Socialization refers to the process of individuals adapting new tacit knowledge through sharing experiences with each other (Nonaka, 1994).

Tacit knowledge: also known as implicit knowledge refers to the knowledge that dwells in an individual’s mind more than he or she shares (Polanyi, 1966)

Delimitations

Participation in this study is delimited to a population of Midwestern University upper-level students from a computer science major, a time art major, and instructional technology majors. Students’ school year range is between undergraduates (i.e., junior, senior) and graduate students (i.e., master, doctoral students). The faculty coach is from the Department of Educational Technology, Research and Assessment. The assistant coach is directly appointed by the Digital Convergence Lab (DCL). The project clients are from different departments in the Midwestern University or partnership with the university. The result of knowledge creation through collaboration and creativity are limited to students from three different disciplines and the content knowledge experts.

Limitations

The study may be limited by the project itself and the recruited students. The project this study focuses on is a two-semester project. Therefore, the nature of the semester flow and project request by clients could limit the study to examine a single project in only the development stage. The participants will also change due to the nature of students’ enrollments in and graduation from the university. The researcher hopes to include design stage data in this study in order to have a holistic understanding of knowledge creation of a product among interdisciplinary students. However, this hope will be upon IRB approval. If the use of design stage data is approved, the knowledge flow will become complex because the participants could
change. In addition, the coach, assistant coach, and participants might be different between the design stage and development stage.

**Chapter One Summary**

This chapter described different theories empowering the history of knowledge construction as well as the role of educational technology in the history of knowledge construction. Technology innovations, such as the Internet and Web 2.0 tools, change the way people learn and the way people manage and share tacit knowledge. The SECI model introduced in this study describes knowledge creation that includes individual’s tacit knowledge and explicit knowledge interaction within four stages. It is assumed the researcher will be able to identify if the SECI model can support Web 2.0 collaborative learning and to provide a detail of collaborative interactions in these four stages. Chapter 2 will introduce the theoretical framework and the review of literature on Knowledge Management, the SECI model, and related applications.
CHAPTER TWO

Knowledge creation process involves the combination of retrieving information or thoughts from prior knowledge, experience, and perceptions (Eraut, 2000). The process of producing new knowledge through action and interaction with others occurs in both formal and informal contextualized learning environments (Nonaka & Konno, 1998). Nonaka, Toyama, and Konno (2000) argued that knowledge is “a dynamic human process of justifying personal belief toward the truth” and knowledge is created in the spiral that goes through two opposing notions, such as from cognition to action, logic to emotion, explicit to tacit, macro to micro, and order to chaos (p. 6). Through these actions and interactions, this particular group then defines problems and develops new knowledge and action plans to solve the problem. This chapter contains two sections: theoretical framework and the literature reviews of Knowledge Management and the SECI model applications in different learning environments.

Theoretical Framework

Piaget (1976) identified the human cognition development processes go through four stages of perceiving, remembering, believing, and reasoning. Piaget believed that cognitive development is an accumulation process, that is, understanding a new experience extends from a previous learning experience (Singer & Revenson, 1997, p. 13). Built upon Piaget’s cognitive learning theory, it is believed that knowledge exists and is produced through schemata process. Schema theory is considered as “a hypothetical mental structure for representing generic concepts stored in memory” (Rumelhart, 1980, p.34) as well as "an abstract knowledge structure ... that represents the relationship among its component parts" (Anderson & Pearson, 1984p.10). Schema theorists believe that schematic signal cues help learners recall perceptions from previous learning experiences and thus cause changes in their actions. In this study, schema
theory applies to students’ prior knowledge selecting process in contributing during the meet discussions. With the progress of identifying the problem and solve the problem, students may recall knowledge from different in-class practice or reading materials. This generally happens during the socialization and the internalization process.

Constructivism posits that only when the knowledge and the actions are consistent in a learners’ learning environment and transparent within that environment can knowledge be constructed (Sessoms, 2008; Vygotsky, 1978; Wang and Vasquez, 2012). That is, learners are able to apply their prior knowledge and experiences when constructing new knowledge through physical collaborative learning processes. Scholars and practitioners also found that teaching abstract and decontextualized formal concepts at schools did not assist students in constructing knowledge or applying skills. They were more interested to know how knowledge is transferred or applied to the tasks of daily life (Brown, Collins, & Duguid, 1989; Driscoll, 2008; Kolb, 1984; Januszewski & Persichitte, 2008; Nonaka 1994). In this study, students learning by doing through applying their prior knowledge and experiences in identifying potential problems, searching for the possible resources, and attempting solving the problems through discussion. The constructive practice typically happens during the externalization and the combination process.

Social constructivists, such as Vygotsky (1981), claimed that “any higher mental function necessarily goes through an external stage in its development because it is initially a social function” (p. 162). As Vygotsky described in higher mental processes and internalization processes, learners learn and carry knowledge through understanding and internalizing meanings from social interactions. The intellectual skill development can be found when learners internalized the context and subsequently used it (Driscoll, 2005; Tudge & Rogoff, 1989).
Built upon these solid theories, the current Association for Educational Communication and Technology’s (AECT) definition of educational technology given by Januszewski & Molenda (2008) stated that “Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources” (p. 1). This definition emphasizes the fact that current learners’ roles are changing from knowledge recipient to constructor. The role of technology was changed from controlling (as earlier definition in 1963) the learning to facilitating and supporting a productive and deep learning through the environment, resources, and useful tools (Januszewski & Molenda). Instructional technology was applied mainly to reduce cognitive load and allow knowledge to be transferred to long-term memory (Sweller & Merrienboer, 1998). The educational technology theory was primarily based on the behaviorist perspective, a widely accepted understanding of how learning occurs. Behaviorists believe that learners gain, learn, and apply knowledge by doing, experiencing, and engaging in activities within different schema contexts (Burton, Moore, & Magliaro, 1996). Through an instructor’s reinforcement of instructions and a learner’s discrimination of his/her response, the learner is able to apply knowledge in a similar context with a positive behavior change or correct response. Knowledge transfer is identified as the moment learners realize how to apply knowledge into a new context. Behavior change is a consequence of learning and evidence of when knowledge has been constructed. A learner’s knowledge is evaluated by behavior change or by correct response regardless of the individual differences, the usability of the knowledge, or the interest level of the class (Burton et al, 1996; Driscoll, 2012; Januszewski & Persichitte, 2008). Even today, the behaviorist perspective still affects instructional technology on the change of human performance technology to improve work performance.
From the instructional technology perspective, Schwen, Kalman, Hara, and Kisling (1998) identified two areas of knowledge management (KM) literatures have the potential to improve human performance technology (HPT) research and practice: 1) KM literature provides a common point of intersection for the instructional technology fields in the relationships among information, learning, and performance. This common point has the potential to enhance Instructional Technology (IT) professionals in analyzing and implementing information solutions as well as informing and expanding conceptual and theoretical understanding of the field, and 2) both KM and HPT practitioners are increasingly concerned with informal learning environments. Schwen et al. (1998) believed that knowledge is a process. Knowledge Management toward IT refers to the management of knowledge flow. Spector and Edmonds (2002) argued that instructional design (ID) professionals seek to utilize a systematic approach to improve individual and organizational performance. ID professionals often work with individuals with different backgrounds and areas of expertise. Spector and Edmonds viewed KM as a technology that focuses on particular knowledge components in solving problems within a system. They believed that KM is “a technology that focuses on the knowledge involved in a set of problem situation or in a system” and knowledge management systems (KMSs) are “tools aimed at supporting knowledge management” (p. 3). According to Spector and Edmonds (2002), knowledge is viewed as an object and can be stored within a system.

The SECI process and the Knowledge Management

Overview of Knowledge Creation and Knowledge Management

Knowledge is a more concise version of a mix of experience, values, contextual information, expert insight, and intuition as well as information in context with understanding (Bryceson, 2007, p. 194). With the purpose of assisting university students in developing
employment abilities, scholars are seeking numerous ways to increase students’ critical thinking and problem-solving skills through collaborative learning processes (Harris & Rea, 2009; Resta & Laferrière, 2007). Through communication and discussion, the flow of knowledge construction and creation is often found in such collaborative learning processes. Nonaka (1994) described this process as “[E]pistemological and ontological dimensions of knowledge creation” process (p. 15). He illustrated that knowledge creation should look like a spiral involving two opposing notions. Within the two opposing notions, two individual’s tacit knowledge and explicit knowledge consistently exchange ideas through experience sharing, conversation dialogue, and organization of the ideas to reach an agreement, internalize and reflect the new knowledge.

Knowledge Creation

Nonaka (1994) proposed the idea of knowledge creation. He believed experience dwells in tacit knowledge that influence human’s action and decision making. He suggested the social interaction, such as communication between individuals, is a process of building understanding by sharing tacit knowledge. Individual’s mindset and knowledge influence the new knowledge development amongst the organizations and communities. Nonaka stated that “knowledge is created and organized by the very flow of information, anchored on the commitment and beliefs of its holder” (Nonaka, 1994, p.15).

Nonaka (1994), Nonaka and Konno (1998), and Nonaka et al. (2000) emphasized that knowledge is created in the spiral that goes through two opposing notions, such as from cognition and action, logic and emotion, explicit and tacit, macro and micro, and order and chaos. This spiral relationship demonstrates the knowledge creation between the epistemological and ontological dimensions. Knowledge production is a constant information exchange, and
knowledge is reproduced through diverse interactions among a group of people and their context environment (Nonaka et al., 2000). Several studies were conducted based on the SECI model and found that through these actions and interactions, participants then define problems and develop new knowledge and action plans to solve the problems or to produce products individually as well as within a group (Bryceson, 2007; Tee & Lee, 2011; Yeh et al., 2011).

In this literature review, five studies were selected. Two were from a corporate perspective: one used the SECI model to examine small to medium size companies’ knowledge management processes in a qualitative research approach (Desouza & Awazu, 2006), while the other examined the factors that influence knowledge flow in a quantitative research approach (Chou & Tsai, 2004). Three studies were conducted in academic settings. One out of the three studies applied instructional design by the SECI model in examining the outcome of each stage with a triangulation approach (Tee & Lee, 2011). Another tested the SECI flow in academic online courses from a qualitative research perspective (Bryceson, 2007). The last one used the SECI model to explore the underlying mechanisms that contribute to the success of knowledge management based on pre-service teacher training with a quantitative approach (Yeh, Huang, & Yeh, 2011). Two out of the three articles specifically focused on online learning environments, and the other one was focused on blended learning in professional development and creative instruction. The results from all studies supported the SECI knowledge construction and reconstruction processes but were interpreted from different perspectives. This inspires the researcher to utilize the DCL experiential learning environment as the ba context in investigating the process of tacit knowledge interact with explicit knowledge among interdisciplinary students through collaborative activities of producing, constructing, and managing new knowledge.

SECI Model
Nonaka (1994) explained that knowledge creation exists between four modes of process: socialization, externalization, combination, and internalization. Nonaka and Konno (1998) further stated that knowledge is embedded in a specific context environment where participants acquire or reflect one’s own experience with each other. This environment can be referred to a physical environment (e.g. meeting room or office), or virtual environment (e.g. email or text). They named this space “ba” as its original means space in Japanese. Without ba, knowledge is just information.

According to Nonaka et al. (2000), in an organizational learning process, different modes of knowledge conversion dwells in different ba. First, socialization (from tacit knowledge to tacit knowledge) dwells in originating ba. Externalization (from tacit knowledge to explicit knowledge) dwells in interacting or reflecting ba. Combination (from explicit knowledge to explicit knowledge) dwells in cyber or virtual ba. Internalization (from explicit knowledge to tacit knowledge) dwells in exercising ba.

**Socialization.** Socialization refers to the process of individuals adapting new tacit knowledge through sharing experiences with each other. Socialization occurs in a traditional apprenticeship or an informal social meeting. Individuals can obtain tacit knowledge through observing, imitating, and practicing through some forms of experience (Nonaka, 1994). Tacit knowledge is formed and influenced according to the cognition aspect of tasks as well as personal emotions, prior experiences, and spiritual features (Nonaka & Konno, 1998; Rice & Rice, 2005). It is often viewed as “contextually and culturally constrained and embedded within individual and small groups” (Rice & Rice, 2005, p.677). Researchers identified that in an online learning environment, the students’ prior knowledge and skills affected how they obtain the knowledge through reading online resources and present their transferred tacit knowledge into
individuals’ assignments (Bryceson, 2007; Yeh, et al., 2011). Researchers also identified that in an organizational context, socialization dwells in originating Ba, such as phone calls, meeting rooms, or online Discussion Board, where emphasizes the need to establish personal relationship through communication, exchange emotions, and develop shared mental models and experiences (Bryceson, 2007; Chou & Tsai, 2003; Rice & Rice, 2005).

In this study, socialization involves the participants gathering information about client requirements and team members’ task status and their strengths through regular face to face meeting, meeting notes, and emails (originating ba). The participants also engage in interactive experiences through their own departments by doing different subject assignments and interacting with other professionals or students outside of this project. In this approach, the researcher seeks to gather the experiences or prior tacit knowledge the participants shared that had change the outcome of the project.

**Externalization.** Externalization is a process in which the group members attempt to articulate tacit knowledge into explicit knowledge. Externalization is the process of gathering individuals’ explicit knowledge though adding, sorting, categorizing and recategorizing, and recontextualizing, within a dialoguing ba where facilitates the transfer of tacit knowledge into a new knowledge (Nonaka 1994; Nonaka et al., 2000; Chao and Tsai, 2004). Through discussion or decision making process, both individual and organization form a new knowledge through this process. Researchers found that in an online or blended study, the discussion board in course management system (e.g. Blackboard) facilitates the externalization process (Bryceson, 2007; Tee & Lee, 2011; Yeh et al., 2011). The externalization process was identifying as less evidence in small to medium-sized enterprises knowledge creation. Desouza and Awazu (2006) suggested that there is a need for more studies to verify the reason.
In this study, externalization can take place before and during regular meetings (interacting ba). Team members present, share, and explain their progress or changes since the previous meeting. Subject matter expert involvement is necessary if the team is making major changes to the game. The researcher wonders what factors could be identified through the approach that creates impact or conflict to participants’ prior experience or knowledge. How do they react or reflect on the impact?

Combination. The combination stage is the most complex process in knowledge creation. It includes three major factors: acquisition and integration, synthesis and processing, and dissemination (Nonaka, 1994; Nonaka et al., 2000). Combination process dwells in a systematizing context that involves team members collaborating on the complex explicit knowledge into a workable and functional format can be shared with other participants (Rice & Rice, 2005). This process often utilizes information technology, such as Web 2.0 tools, to facilitate the knowledge construction into an organized and manageable knowledge asset (Nonaka et al., 2000; Rice & Rice, 2005). Researchers also found that platforms such as wiki, blog, video, online game, and picture editing tools used as a platform to facilitate the teacher group to combine the explicit knowledge as well as the intervention of learning technology and its implementation (Tee & Lee, 2011).

This process takes place in large group meetings as well as small group discussions, such as programming team or graphic design team. In this study, the researcher aims to identify what technology is used during combination stage. What types of knowledge (e.g. document or artifact) is preserved in this stage?

Internalization. Internalization is the process in which individuals internalized the understanding and absorbing of explicit knowledge to tacit knowledge. One of the factors in this
process is about individuals acquiring knowledge from others, and applying others’ ideas to their personal experience to support or change their beliefs (Nonaka, 1994; Nonaka et al., 2000). This process often happens between students, especially during course enrollment seasons. Students discussed the course contents and professors’ preferences with each other. Then they decide which class to take or not to take. Another factor in the internalization process is virtual world knowledge acquisition within simulation and experimentation (Nonaka, 1994; Nonaka et al., 2000). Researchers had identified that the evidence of internalization was found in participants’ reflections (Tee & Lee, 2011; Yeh et al., 2011) and new strategies of business plans (Desouza & Awazu; 2006).

In design stage, final design document, final presentation, and debrief responses could reflect individual’s learning and internalizing process during the collaboration process. Different from design stage, development stage participants’ understanding of the design document, developing procedure, final product, and debrief responses could mirror their learning and internalizing process. The researcher aims to find the connections evidences on the change from preserved knowledge (e.g. documents or artifacts) to final products in any communication forms (e.g. meeting notes, emails, clients’ feedback).

This study is built upon the SECI model in at Northern Illinois University Digital Convergence Lab. The framework of this study is illustrated in Figure 1.1. This study establishes the experiential learning environment as the “ba” context that facilitates the process of project collaboration and knowledge creation. The researcher will focus on the new knowledge creation while student participants collaborate with each other. The literature review will discuss the previous studies and findings of how knowledge creation flows among the SECI model as well as the studies of utilizing Web 2.0 as knowledge management tools.
The SECI Application in Higher Education

The SECI knowledge conversion includes four major modes: socialization, externalization, combination, and internalization. This model explains the conversion of individual knowledge into organizational knowledge within a particular environment. It describes the knowledge creation process which involves the transmission of tacit knowledge and explicit knowledge (Nonaka, 1994). Because knowledge conversion involves individual knowledge distribution and organizational knowledge transformation, some empirical studies focused on individual knowledge conversion, but some included both individual and organizational perceptions.

Yeh, Huang and Yeh (2011) conducted quantitative research study focused on examining the effectiveness of the knowledge conversion model implementation on pre-service teachers’ professional knowledge development, creativity teaching efficacy, and the underlying mechanisms which contributed to the success of a knowledge management based training. Yeh et al. stated that the study first built a learning community among teachers (socialization), encouraged teachers to express their opinions in order to conduct a group presentation (externalization), asked teachers to present systematic lectures and designed creative products (combination), and provided activities to provoke teachers’ self-awareness and self-reflection (internalization). Teacher participants went through all four modes during group assignments.

Yeh et al. (2011) found that the mean scores in the post-test of IPTE-CI and IPK-CI were higher than the pre-test. This meant all simple main effects were significant. This result indicated there is an improvement in professional knowledge of creativity instruction. However, there was no significant finding between knowledge and skill improvement and disposition improvement. The result from the questionnaire indicated that over 85% of the participants supported a blended
learning environment. Because the study carefully applied instructional design concepts into SECI stages, Yeh et al. claimed that this study supported the suggestion that technology played an important role in the practice of knowledge management strategy (Gasson & Shlifer, 2007) and that the SECI conversion model can be an effective tool for educational training (Sammour et al., 2008) (as cited in Yeh et al., 2011). Yeh et al. (2011) suggested that there was a need to continue to develop empirical studies based on the SECI model.

Tee and Lee (2011) conducted a triangulation research that built upon the SECI model, exploring how technological pedagogical content knowledge (TPACK) be cultivated by twenty-four in-service teachers across language arts, mathematics, and social science disciplines from elementary, secondary, and tertiary schools. The SECI model served as a framework to understand how technological, pedagogical, and content knowledge (TPACK) was cultivated by teachers and students in problem-based learning activities. The self-progress survey results showed that the participants’ understanding of the relationships between technology and pedagogy, technology and content knowledge, and technology, pedagogy, and content knowledge were conclusively acknowledgeable. The results indicated that participant teachers’ views of technology were challenged and changed through the activities. Teachers’ reflection data revealed that the internalization process reflected on the change of their pedagogical strategy and their use of different technology intervention methods. Socialization and externalization happened both in In-class and out-of-class discussions. The evidence of externalization and combination processes was found in the wiki and final presentations. The internalization process was found in their in-class oral reflections and written reflections for the class. New uses of technology were implemented in their lesson plans. Tee and Lee (2011) stated
that through intense socialization, externalization, and combination processes, the participants' internalization processes “seemed to be quite profound” (p. 100).

Other researchers, such as Hosseini (2011) and Yli-Luoma and Naeve (2006) have conducted studies that utilized the SECI model as a framework in a virtual class or an online learning. These studies were carefully designed based upon the SECI model in order to trace knowledge flow and creation evidence between individuals and group. This provides the researcher with a framework of this study in tracing the knowledge flow. Online environments, such as the course management system, fulfilled the ba concept from which knowledge is created. Web 2.0 tools were used to facilitate the learning process for individuals and groups. The statistical result and personal reflection statements from these studies that support the SECI process exist in both formal and informal online learning environments.

Bryceson (2007) conducted qualitative research to test the SECI model at the University of Queensland between 2001 and 2005. She used informal student reflections to investigate five online courses which emphasized the use of the scaffolding mechanism in promoting and encouraging learning. Bryceson argued that non-alignment between instructional methods, scaffolding strategy application, and theoretical models of online learning courses created a problem in online education for both academic and corporate arenas. The study results showed that in an online course environment, students’ knowledge creation started from the externalization process by reading or viewing course materials. Then through socialization discussion, students were able to successfully combine the ideas from the externalization process, and then internalized knowledge in one task individually as a full loop of knowledge creation. Bryceson (2007) argued that the knowledge creation process in online learning
programs has a different sequence of flow. She suggested that the flow changes from SECI to ESCIE (externalization, socialization, combination, internalization, and externalization).

Instead of establishing the study upon the SECI model (Yeh et al., 2011; Tee & Lee, 2011), Bryceson (2007) examined the SECI flow in the online courses. Three constructs were identified in the study and changed the knowledge flow: Students had no prior knowledge, teaching strategy intervention, or individual learning approach. Bryceson (2007) suggested that the SECI process in such online learning environments can be identified as a loop in order to assist learners in constructing new knowledge. The instructors were able to facilitate students learning from topic to topic. Bryceson concluded that a viable online course facilitation strategy involves facilitating students’ management of each individual knowledge creation conversion and scaffolding students to push the boundaries of their own and other’s Zone of Proximal Development.

The SECI Application in Corporations

Building upon the SECI knowledge creation model, Chou and Tsai (2004) conducted a quantitative research study from a management information system perspective. This study involved examining the relationships between independent variable (IV) of user involvements, user cognition, and organizational mechanisms on the dependable variable (DV) of knowledge creation process from both an individual and organizational perspective. The finding indicated that both individuals’ involvement and cognition have an impact on knowledge creation, which explains why organizations naturally have a variety of SECI activities. Chou and Tsai (2004) concluded that the organizational mechanism has much more influence on knowledge creation than individual cognition (p.214). Moreover, the individuals’ personal judgment of information technology influenced the effectiveness of knowledge creation. Responding to Nonaka et al.
(2000), the critical role of information systems may then facilitate knowledge creation. The finding of this study provided a background for how individuals’ involvement and cognition have an impact on knowledge creation in an interdisciplinary collaborative work.

From a practitioner’s perspective, Desouza and Awazu (2006) completed qualitative research study on the knowledge management practices phenomena among twenty five small to medium-sized enterprises (SMEs) across food service, management and security, and technology companies. Desouza and Awazu believed SMEs play a vital role in the world economy. Managing the know-hows becomes a critical issue that directly relates to the success of small to medium-size business competitors as well as larger organizations. In their previous research studies of the SECI process, Desouza and Awazu (2006) revealed that the knowledge management of larger firms was found to be both applicable and insightful. In contrast to the larger firms, they stated that there is a variant of the SECI model in SMEs because the basic function of a SME’s owner or manager is to observe others’ business behaviors and business environments. It is more an individual knowledge construction process than an organizational knowledge conversion. This finding explained why there is less evidence of shared experiences in the socialization stage and its effectiveness on the externalization process within SMEs. Desouza and Awazu also noted that in order to validate the finding, more samples and more research would be necessary (p. 41).

The logic and clear description of knowledge creation and flow between tacit knowledge and explicit knowledge and the knowledge transfer within a spiral process in the SECI model has been widely recognized and accepted by management practitioners (Rice and Rice, 2005). Thus, more studies were conducted in corporate settings with knowledge management and information management. Because knowledge creation processes sometimes blur task boundaries within the
organization, storytelling, and experience sharing are important factors in the knowledge creation process (Nonaka and Konno, 1998). However, these factors were often excluded from any training or collaborative activities (Rice and Rice).

**Chapter Two Summary**

This chapter introduces the SECI model in detail and the studies that utilized the SECI model as the foundation for examining the knowledge flow between participants. In the higher education settings, the SECI model is used to explore students’ online learning progress and teaching and learning methods. In the cooperation environments, the SECI is used in organizational learning processes. Each individual involvement and cognition have an impact on knowledge creation. In order to prepare higher education students to have a real-world learning experience, generic skills are also required. Generic skills and ability cannot be taught in a single classroom. However, through the experiential learning process, students were able to apply their prior knowledge into a new project and develop skills through meta-cognition process.

Ba is situated and embedded within the context.
CHAPTER THREE

Methodology

This chapter details the inclusive methodology that will be used for this study along with a description of data sources, research procedure, and data analysis procedures. The methodology that will be used in this study is an exploratory case study. According to Creswell (2009), an exploratory case study is a methodology in which the researcher “explores a bounded system or multi-bounded system over time, through detailed, in–depth data collection involving multiple sources of information and reports a case description and case-based themes (p. 23).”

Based on this approach, this exploratory case study will closely follow Nonaka and Takeuchi’s (1995) SECI (socialization, externalization, combination, and internalization) process, particularly focusing on socialization and externalization process. In socialization stage, the SECI process focuses on the interaction between an individual’s tacit knowledge to tacit knowledge through observation, experience sharing, and understanding sharing of the project requirements (Nonaka, 1994; Nonaka et al., 2000). In the externalization process, the SECI process focuses on the interaction between an individual’s tacit knowledge to explicit knowledge through thinking aloud, adding, sorting, categorizing and recategorizing, and recontextualizing process during the discussion and decision-making process (Nonaka et al., 2000; Chao and Tsai, 2004).

Ethical Principles

Prior to submitting the IRB application, the researcher will ask for permission from the Digital Convergence Lab to conduct the study. The researcher has taken the requisite ethics courses before submitting the IRB application. However, the researcher will retake the test in January 2014 in order to ensure her eligibly continue the study. Following approval from
Northern Illinois University’s Institutional Review Board (IRB), each participant that agrees to participate will complete an informed consent form that includes the purpose of this study, potential benefit or risks of this study and their voluntary rights in participation in the research process. A script will be used to recruit subject and to inform them of the scope of the study and its purpose.

**Research Site and Participants**

This study will take place in a Northern Illinois University Digital Convergence Lab (DCL). The DCL receives a variety of e-learning requests from the diverse campus community. The e-learning requests vary from 2D video game-based learning to full body activity game-based learning, from science lab environment security training to student services App development. Every project is one of a kind because the final product is created based on the clients’ requests for their specific learners or users. The uniqueness of the DCL provides exceptional learning opportunities for the upper-level university students are 1) to demonstrate their professional skills to develop a product, 2) to strengthen their generic skills to collaborate with peers from other disciplines, 3) to extend the experience horizon in working with real clients. The project will start in the fall of 2013 and is estimated to on the spring of 2014. In creating the technology piece, DCL goes through two states: the design stage and the development stage. This study will focus primarily on the development stage.

All student participants will be recruited from the NIU Digital Convergence Lab. Expected student participants pool includes upper-level (e.g. junior, senior, and graduate level) students from Computer Science, Visual Communications, Time Arts, Education, and the sciences majors. In the regular setting of an interdisciplinary technology creation project, the coach comes from the Department of Educational Technology, Research and Assessment and the
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assistant coach is directly appointed by the Digital Convergence Lab (DCL). The project clients are from an Intuitive division at Northern Illinois University. All participants, including students, coach, assistant coach, are volunteers in this study. Subject matter experts may be involved in group collaboration process from time to time. They will be invited to participate in this study as well voluntarily.

The study will take place mainly during student participants’ regular meeting schedule. The primary location will be in the Digital Convergence Lab (DCL). However, the location is subject when necessary as dictated by participants. The researcher expects that members of the design team and the development team will vary from time to time due to the nature of students’ enrollment and graduation. The researcher hopes to include fall 2013 design stage data as a pilot study in this study to have a holistic understanding of the knowledge creation of a product among interdisciplinary students. However, this depends on the advising committee’s approval as well as IRB approval.

**Research Questions**

This study seeks to investigate the knowledge creation process among a group of interdisciplinary students who collaborate in creating a new technology for a real client. The major research question that will guide this study is to know how students navigate knowledge creation process. The sub-questions are

1. How do student participants manifest their knowledge to others through the discussion?
2. How do student participants manage the knowledge they acquire?
3. What are the influential factors in the knowledge convergence process?
Trustworthiness

As the qualitative approach will be taken in this study, several procedures will be used to establish the trustworthiness of data: triangulation, researchers’ reflective commentary, and examination of previous research findings. Three sources: observation, weekly videotaping and transcription, focus group, and project artifacts will be triangulated and examined in this study as suggested by Shenton (2004) so that a variety of data sources, such as observation, focus group, documents, all can be used “for their individual limitations and exploits their respective benefits” (p. 66).

Reflective commentary (memo) will be conducted after observing each meeting as recommended by Cuba and Lincoln (2001) and Shenton (2004). Cuba and Lincoln (2001) stated that “Progressive subjective (continuous checking of developing constructions against records of constructions that were expected prior to data collection)” is one of the criteria to secure research credibility (p. 6). Methodologists suggested that the most appropriate use of the commentary is to guide the data analysis stage while emerging codes, categories, and themes to secure the credibility of qualitative study (Baxter & Jack, 2008; Cuba & Lincoln, 2001; Shenton, 2004).

Data Collection Procedure

The purpose of the data in qualitative research is to provide evidence for the knowledge flow. The following is the data collection procedure used by the researcher: (a) protection of human subjects, (b) timeline, (c) demographic questionnaire; (d) focus group, (e) in progress artifacts, (f) digital videotaping, data transcription, and data storage.

Protection of Human Subjects

The researcher will follow the guidelines set forth by the Institutional Review Board (IRB) of Northern Illinois University prior to collecting data. All participants will be asked to
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sign a consent form. The consent form will include permission to videotape all meetings, debrief meetings, and focus groups. The consent form will include permission to use project related emails and social media text message. All participants will be asked to fill out a demographic questionnaire (anonymous). All participants will be given a pseudonym to protect each individual’s identity. All files including demographic, in progress artifacts, and videotapes will be stored in a password protected directory on the researcher's separate hard drive that is not accessible via the network. The demographic questionnaire will be scanned electronically, saved on the separate hard drive, and the physical copies will be immediately destroyed after they are scanned. All participants can withdraw from the study at any time without penalty. All data will be destroyed upon the completion of the analysis. The materials will be available only to the researcher and dissertation committee chair.

Timeline

The timeline of this study will be based on the requests and recruitment process by the DCL office. The ideal length of this study will be about one semester. The focus group will be conducted by the end of that particular semester.

Demographic questionnaire

The purpose of the demographic questionnaire is to enable the researcher to collect participants’ profile including their gender, course of study, year in school, age range, years of experience in creating instructional designed based project, and brief information about their previous experience participating in an interdisciplinary project. The demographic information will help the researcher to understand the participants’ background as well as professional role in the project.
Focus Group

The purpose of establishing the focus group is to have participants’ voice on how they obtain and manage their knowledge in completing an authentic project. The findings from the focus group will be used to cross-examine the researcher’s interpretation of the data. Focus groups meetings will only take place until the end of the semester. During the focus group meeting, the researcher will address the following areas:

1. Share previous or other experiences that applied to this project.
2. Share challenges, problem-solving experiences, and their feelings.
3. Share examples on knowledge transfer and management.

Share thoughts on what they will do differently if they have the opportunity to participate in next project-based experiential learning. Transcripts will be aligned with videotaped observational memo for data analysis followed by open coding method.

Digital materials, videotapes for observational notes, and storage

Documentary evidence can consist of written, oral, visual, or cultural artifacts (Creswell, 2007; Polkinghorne, 2005). In this knowledge convergence study, all students are expected to save their new ideas or knowledge in any creative format, such as screenshot or photos taken from drawing. These documents are the evidence of knowledge flow. Therefore, all participants’ project related documents (meeting notes, in progress artifacts, and photos), emails, and social media text messages will be saved to be used for data analysis of knowledge flow.

Observation Note

“Observation is the technique of gathering data through direct contact with an object—usually another human being” (Potter, 1996, p. 98) (as cited in Polkinghorne, 2005). Polkinghorne (2005) further stated that observational data includes “participant’s behavior, facial expressions,
gestures, bodily language, and other nonverbal indications” can be used to cross-examine the participant’s oral comments during this study (p. 143). Therefore, the videotapes will be used for taking observational notes.

**Data Analysis Procedures**

Data source for the study will include observation notes, weekly videotaping and transcription, meeting notes, and progress artifacts. Gues, MacQueen, and Namey (2012) stated that thematic analysis process is appropriate to be used in phenomenology case study that focuses on the human experience subjectively. Therefore, the natural flow of this study will adapt Braun & Clarke’s (2006) six steps thematic analysis method and triangulation methods to code the data source align with Nonaka’s SECI knowledge creation process. The researcher’s weekly reflective commentary of the progressive subjectivity will be used to ensure the trustworthiness of the study. Finally, to ensure that the study is less biased on interpreting learning process; the researcher will cross-examining students and the DCL director’s final debriefing meeting video.

**Thematic Analysis**

*Phase 1: Becoming familiar with the Data*

Braun and Clarke (2006) suggested that all researchers must immerse themselves in the data by reading and re-reading them until they feel comfortable about the data (p. 16). In this stage, note-taking is important in order to develop potential codes. In this stage, the researcher will also transcribe videotaped data recorded during both focus group and regular meetings. All data as well as weekly reflective commentary will be added into Nvivo qualitative research analysis system. Observational memo will be created within Nvivo while doing open coding on videotape transcripts.
Phase 2: Generating initial codes

In this stage, the researcher will start merging reoccurring or similar patterns into different labels or themes if there is any. In doing so, the researcher will be able to categorize data in order to try and answer the three sub-research questions. The codes will also be aligned with the SECI stage in detail description.

Phase 3: Searching for themes

After determining emerged patterns, the researcher in this stage will look for possible themes and identify relationships between themes or subheadings within a theme. Tables or concept map tools will be used in organizing the emerging themes. The outcome in this stage will be a list of possible themes include, but are not limited to, socialization, externalization, combination, and internalization these will be used for further analysis.

Phase 4: Reviewing themes

Braun and Clarke (2006) recommend that researchers re-read entire dataset in phase 4 for two primary reasons: 1) to ascertain whether the themes are clearly aligned with the data set, and 2) to code any additional data within themes that may have been missed in earlier coding stages (p.21). In this stage, the researcher seeks to examine the patterns and matches them to the data. The researcher will recode or reconsider the themes and codes if the themes lack of coherent pattern in answering the questions. In this stage, a larger theme is also expected to be identified.

Phase 5: Defining and naming themes

The researcher will document the description of each theme and the significance of the theme. If the theme cannot be defined, then it might be necessary to rethink and probably rename the theme. Braun and Clarke (2006) recommend to researchers that thinking about the
name of the theme will provide potential readers with a more holistic view and understanding of the theme and its importance. The result from this stage is expected to be an inclusive result.

**Phase 6: Producing the report**

This is the stage when all findings are incorporated into a concise, coherent, logical, and non-repetitive story of the data – within and across themes (Braun & Clarke, 2006, p. 23). The researchers in this stage will use examples or quotations in demonstrating the theme that is related or contradicted to the SECI process.

**The SECI Process in Coding**

During each videotaped sessions, the researcher will follow the SECI process in documenting students’ interaction. Therefore, the following four major coding themes will be identified:

**Socialization**

The socialization process involves the participants’ gathering information about client requirements and team members’ task status and their strengths through regular face to face meeting, meeting notes, and emails. The participants also engage in interactive experiences through their own departments by doing different subject assignments and interacting with other professionals or students outside of this project. The researcher will analyze the data source included but that are not limited to client Meeting note, regular meeting note, experience sharing from the observation notes, and emails and texting notes. The data analysis process will seek to identify a pheromone among tacit knowledge to tacit knowledge interaction.

**Externalization**

Externalization is a process in which group members attempt to articulate tacit knowledge into explicit knowledge through adding, sorting, categorizing and recategorizing, and recontextualizing (Nonaka 1994; Nonaka et al., 2000; Chao and Tsai, 2004). In data analysis,
the researcher will examine data source from video transcript particularly noting the interaction between participants as they present, share, and explain their progress or changes from the previous meeting(s) as well as the impact or conflict to participants’ prior experience or knowledge. From the videotaped data, the researcher will focus on identifying 1) what explicit knowledge in discussion is preserved and which not; 2) what content subjects were rapidly discussed and why; 3) what decisions were made and why; 4) what decisions changed from previous discussions and why; 5) what technology was used and why. This finding will be used in focus group for in-depth discussion.

Combination

The combination process is the most complex process in knowledge creation. It includes three major factors: acquisition and integration, synthesis and processing, and dissemination (Nonaka, 1994; Nonaka et al., 2000). This process takes place in large group meetings as well as small group discussions, such as programming team or graphic design team. In this study, the researcher will analyze data from the recorded video dialogue particularly on the progress of knowledge or language carries from previous weeks’ discussion. is reserved in a weekly based. For example, in week 5, what knowledge is saved, organized, and reused? In week 7, what knowledge is used and presented to the client?

Internalization

Internalization is the process in which individuals internalized the learned materials and the absorbing of explicit knowledge to tacit knowledge. One of the factors in this process is about individuals’ acquiring knowledge from others, and applying others’ ideas to their personal experience to support or change their beliefs (Nonaka, 1994; Nonaka et al., 2000). The design document, in progress artifacts; debrief meeting transcript, and focus group transcript will be
used in analyzing the connections between the change from preserved knowledge (e.g. documents or artifacts) to final products in any communication forms (e.g. meeting notes, emails, clients’ feedback).

Figure 3.1 Components that the researcher seeks to identify during the data analysis

**Researchers’ Role**

The role of the researcher in a qualitative research has been a challenge for decades. Some scholars believe that when the researcher is an insider he or she will have in-depth findings but could be biased (Asselin, 2003; Dwyer & Buckle, 2009). Therefore, a researcher as an insider must be aware and make sure that he or she leaves out prejudiced opinions and view the phenomenon with fairness and integrity (Dwyer & Buckle, 2009). Some scholars believe that when the researcher is an outsider, he or she might be less biased but also distanced from the participants (Dwyer & Buckle, 2009). Adler and Adler (1987) identified the role of qualitative researcher in observational methods in three ways: 1) peripheral member researchers, the one who do not participate in the core activities among the research participants; 2) active member researchers, the one who becomes involved with the central activities among the research participants and yet not fully committing themselves to be among the research participants’
values and goals; and (c) complete member researchers, who become fully affiliated during the course of the research (as cited in Dwyer & Buckle, 2009).

The researcher in this study has at least five years of experience as an internal instructional designer in the corporation and also had two DCL project experience. Hammersley and Atkinson (1983) warned that there is the danger of the researcher being too involved or having too close rapport with the person or persons being observed to the extent that you lose objectivity (as cited in Dwyer & Buckle, 2009). The researcher in this study is hoping to take the role as an active member of the team in contributing the tacit knowledge from previous experience but not fully engage in knowledge management and knowledge creation flow. However, it will be determined by the DCL director as to the nature of the challenges in recruiting students.

**Chapter Three Summary**

This research design is a qualitative case study. The collaboration between the SECI process flow and Braun and Clarke’s (2006) six-steps of systematic analysis is the theoretical framework for analysis and interpretation of the data. The trustworthiness of the research will be established through triangulation data examination, researchers’ reflective commentary, and examination of previous research findings. Braun and Clarke’s (2006) six-steps provides a browser view of data analysis, and the SECI process method provides a fundamental guidance on observing knowledge flow among the participants.
References


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