Research Article

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Knowledge Management with SECI Model to Develop Sustainable Learning Process under the Principles of Sufficiency Economy of Non-Formal and Informal Education Students, Rusamilae Sub-District, Pattani

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Abstract

The research aimed to study and understand the practices of the principles of sufficiency economy philosophy through the application of the knowledge management innovation cycle using the SECI Model in the instruction. This mixed-method research approach was employed by using lesson plans, learning recording form, learning behaviour observation form, and questionnaire to collect data from the sample group of 50 students from the non-formal and informal education systems in Rusamilae sub-district, Pattani province. The data were collected from December 2020 to April 2021, a period of 4 months. Qualitative data were analyzed through content analysis, while quantitative data were analyzed using statistical methods. The results can be summarized as follows:

1. The application of knowledge management innovation cycle using the SECI Model in instructional management was found to comprise 4 steps and 6 activities: (1) Socialization – including Activity 1: Setting of shared vision and Activity 2: Free Writing; (2) Externalization of tacit knowledge – including Activity 3: Reading and applying; (3) Combination of knowledge – including Activity 4: Study trip and Activity 5: Producing learning media; and (4) Internalization of explicit knowledge – including Activity 6: Knowledge sharing on page to disseminate knowledge to others and add values to the knowledge.

2. The evaluation of students related to learning activities, based on recording their overall learning acquisition, showed that the students set goals for using the obtained knowledge for self-development. They acquired knowledge and understood the principles of sufficiency economy better, could explain, discuss and exchange with others. The evaluation of the overall learning behaviors of students showed the result – it could be clearly observed that the students frequently carried out cooperated in activities according to the course goals.

3. The overall satisfaction towards the learning activities showed the high level of satisfaction ($\bar{x}$ = 4.24). The activity receiving the greatest satisfaction was Activity 5: Study trip ($\bar{x}$ = 4.46).

Keywords: Knowledge management; Learning behaviors; Sufficiency economy; Non-formal education; Informal education

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การจัดการความรู้ด้วยวงจร SECI Model เพื่อพัฒนากระบวนการเรียนรู้ที่ยั่งยืนตามหลักปรัชญาเศรษฐกิจพอเพียงของนักศึกษาการศึกษานอกระบบและการศึกษาตามอัธยาศัย ตำบลรูสะมิแล จังหวัดปัตตานี

นวพล แก้วสุวรรณ[1*] และ ฐาณิดาภัทฐ์ แสงทอง[2]

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาความรู้ความเข้าใจในหลักปรัชญาเศรษฐกิจพอเพียงสู่การปฏิบัติผ่านกระบวนการประยุกต์ใช้นวัตกรรมวงจรการจัดการความรู้ SECI Model ในการจัดการเรียนการสอนตามหลักปรัชญาเศรษฐกิจพอเพียง ใช้ระเบียบวิธีวิจัยแบบผสมผสานวิธี โดยใช้แผนการสอน แบบบันทึกการเรียนรู้ แบบบันทึกการสังเกตพฤติกรรมการเรียนรู้ และแบบสอบถามกับกลุ่มตัวอย่างที่เป็นนักศึกษาศูนย์การศึกษานอกระบบและการศึกษาตามอัธยาศัย ตำบลรูสะมิแล จังหวัดปัตตานี จำนวน 50 คน เก็บรวบรวมข้อมูลระหว่างเดือนธันวาคม พ.ศ. 2563 ถึงเดือนเมษายน พ.ศ. 2564 รวมเวลา 4 เดือน วิเคราะห์ข้อมูลเชิงคุณภาพด้วยการวิเคราะห์เนื้อหาและวิเคราะห์ข้อมูลเชิงปริมาณด้วยวิธีการทางสถิติ ผลการวิจัยสรุปได้ว่า

1. ผลการประยุกต์ใช้นวัตกรรมวงจรการจัดการความรู้ SECI Model มี 4 ขั้นตอน ประกอบด้วย 6 กิจกรรม คือ (1) ขั้นการแลกเปลี่ยนเรียนรู้ ประกอบด้วยกิจกรรมที่ 1 การตั้งเป้าหมายในการเรียนร่วมกัน และกิจกรรมที่ 2 การเขียนอย่างอิสระ (2) ขั้นความรู้ชัดแจ้งจากความรู้ฝังลึก ประกอบด้วยกิจกรรมที่ 3 การอ่านและประยุกต์ (3) ขั้นการรวมความรู้ ประกอบด้วยกิจกรรมที่ 4 การศึกษานอกสถานที่และกิจกรรมที่ 5 การผลิตนวัตกรรมสื่อการเรียนรู้ และ (4) ขั้นการนำความรู้ที่ชัดแจ้งมาปฏิบัติ ประกอบด้วยกิจกรรมที่ 6 การแบ่งปันความรู้ในเพจ เพื่อช่วยกระจายและเพิ่มมูลค่าให้กับความรู้ด้วยการเผยแพร่แก่บุคคลอื่น

2. ผลการประเมินนักศึกษาเกี่ยวกับกิจกรรมการเรียนการสอน โดยการบันทึกการเรียนรู้ภาพรวม พบว่า นักศึกษามีเป้าหมายในการนำความรู้ที่ได้ไปใช้เป็นแนวทางในการพัฒนาตนเอง และได้รับความรู้และมีความเข้าใจเกี่ยวกับหลักปรัชญาเศรษฐกิจพอเพียงเพิ่มมากขึ้น สามารถอธิบาย ร่วมพูดคุยและแลกเปลี่ยนกับผู้อื่นได้ ในส่วนของการบันทึกการสังเกตพฤติกรรมการเรียนรู้ ภาพรวมนักศึกษา พบว่า มีพฤติกรรมการเรียนรู้โดยทำกิจกรรมร่วมกันตามเป้าหมายของรายวิชาบ่อยครั้งโดยสามารถสังเกตเห็นได้ชัดเจน

3. ความพึงพอใจต่อการจัดกิจกรรมการเรียนการสอน ภาพรวมมีความพึงพอใจอยู่ในระดับมาก ($\bar{x}$ = 4.24) โดยกิจกรรมย่อยที่มีความพึงพอใจมากที่สุด คือ กิจกรรมที่ 5 ศึกษานอกสถานที่ ($\bar{x}$ = 4.46)

คำสำคัญ : การจัดการความรู้; พฤติกรรมการเรียนรู้; ปรัชญาเศรษฐกิจพอเพียง; การศึกษานอกระบบ; การศึกษาตามอัธยาศัย

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Introduction

Human resource-centered development is the heart of the 12th National Economic and Social Development Plans (2017-2021) (Office of the National Economic and Social Development Board, 2019), under the 20-year National Strategic Framework (2017-2036). The aim is to enable Thai society to progress with security. The importance is placed on developing human quality so that they are well-prepared and well-balanced in all dimensions: physical, mental, knowledge, skills and competencies; and can face the structural transformation towards Thailand 4.0. Use of information and knowledge is emphasized to lead the country towards a high-quality society and is the tool and role in developing human quality to meet the direction of the national economic and social development (Kaewbanjong, 2018).

Knowledge Management (KM) is a tool or process applied by today organizations to increase the potentiality in personnel and organizational development, including enhancement of competitive competencies (Bixler, 2000). Advanced competitions both inside and outside an organization can bring about direct impact (Malhotra, 2003). The educational institutions at present that prepare graduates for the job market, both governmental and private sectors, therefore, need to adjust themselves in preparing graduates with higher competency to meet the competition related to knowledge asset or intellectual capital. Modern organizations must emphasize intellectual capital at 50-90%, while there is only 10-50% of monetary capital (Sirisampan, 2005). Thus, knowledge management brings benefits to the operations of an organization in many dimensions. It can assist operating officers to create knowledge through sharing and transferring of best practices among themselves, to increase organizational products and innovations until the organization is successful and competitively competent. Knowledge management also means storing of knowledge existing in an organization so that it is not lost with personnel, especially when they are retired (Cruthaka, 2019).

The National Education Act, 1999 and the Amendment (Version 2) 2002, Sections (2) and (s) stipulated the education guideline based on the principle that all students are knowledgeable and competent in self-development. Thus, the important role of instructors requires them to be able to invent teaching and learning innovations to enhance students to develop themselves and continuously acquire knowledge to the greatest extent. The non-formal and informal education of the Office of the Permanent Secretary of the Ministry of Education includes basic education management that enables learning in many patterns, namely, (1) learning from group meeting, (2) self-learning, (3) distance learning, and (4) classroom learning. These methods suit the students who have time to come to class and participate in other learning approaches that emphasize group meeting. These methods are called non-formal and informal education (NFE).

Non-formal and informal education offers supplementary teaching of compulsory subjects such as Mathematics, Sciences, English and Sufficiency Economy. The classes are taught by experts specialized in the fields. Students can also learn from DVDs of different institutions. The learning approaches promote students to learn from personnel having real theoretical and practical experiences who train students in the thinking process, so that they are able to integrate the science of learning with other sciences until they are able to lead their lives based on the principles of sufficiency economy and manage themselves under the community and local lifestyles.

Sufficiency economy is the philosophy created by His Majesty King Rama IX, who recommended the guidelines for existence and practices of people of all levels to lead their lives along the moderate ways. Economic development is particularly carried out to catch up with the globalized world. Sufficiency means moderation, reasonability and necessity to be well immunized against any impact arising from internal and external changes. Use of different sciences in planning and implementation of all steps relies on omniscience, bodies of knowledge, knowledge management, prudence and cautions.

The importance of the afore-mentioned facts necessitates educational institutions at all levels to incorporate the principles of sufficiency economy philosophy in a curriculum in order to enable learners to efficiently apply in their living. Knowledge management science is appropriately integrated with the philosophy of sufficiency economy. From the study, especially on the issue of the effectiveness of learning management that integrates research and Socialization (S), Externalization (E), Combination (C), and Internalization (I) or SECI Model (Ruangdej & Chaosuansreecharoen, 2014), the following was found: knowledge creation, research, creativity of Thai traditional medicine (Wanichakorn, 2017), development of writing skill in English (Insan, 2023), value adding for agricultural products of sufficiency community enterprises (Suwannakhae et al., 2023), the learning management patterns that create in-depth knowledge for developing the teaching and learning of Thai language (Chaytaveep & Kanorm, 2023). No study has been conducted on knowledge management with the SECI Model cycle to develop the learning process under the philosophy of sufficiency economy of non-formal and informal education students. The approaches of this model are flexible, and in each local context, there is the difference. This is considered the gap in knowledge that leads to the extension of the educational scope in order to develop the learners' informal learning process in other areas in the South of Thailand.

The aforementioned reasons and necessities became the topic of interest to conduct a study on knowledge management with the SECI Model cycle to develop the learning process and create instructional bodies of knowledge and innovations. The researcher integrated the knowledge management science with the principles of sufficiency economy philosophy, and applied the "SECI" – knowledge construction – of Nonaka & Takuchi (1995) in the learning activities. It can be expected from the results that students are able to compile the knowledge related to the philosophy of sufficiency economy obtained from practical works as their knowledge asset, and further produce valuable innovations.

Research Objectives

To study the knowledge and understanding of the principles of sufficiency economy philosophy in practices through application of knowledge management innovation with SECI Model in the teaching and learning under the principles of sufficiency economy of non-formal and informal education students in Rusamilae Sub-district, Pattani Province.

Study of Related Literature and Conceptual Framework

1. Concept of Knowledge and Knowledge Management

Knowledge Management (KM) is a tool or an approach in developing working efficiency, personnel development, and efficient organizational and operational development (Dusit Thani College, 2018). Yosyingyong (2006) said that knowledge management is a new systematic management and administration process that emphasizes development of processes in parallel with learning, through classification, analysis and ordering of knowledge to locate, select, and disseminate accurate and appropriate information. Likewise, Turban et al. (2004) emphasized that knowledge management is a process that assists an organization to identify, select, organize, disseminate, and transfer key information and expertise of an organization with unclear structure. Suanpang (2009), on the other hand, said that knowledge management is the integration of sciences in knowledge and administration and management, with an emphasis placed on the process of managing the news, information and knowledge (Dusit Thani College, 2018). This knowledge covers both the tacit knowledge hidden in the thought of a person and the organization, and the explicit knowledge that appears in the various records or reports of organizations. Management of the two types of knowledge is systematized by constructing new knowledge, knowledge exchange, and knowledge transfer to continuously develop the organization (Cruthaka, 2019).

2. SECI Model Learning Process in the Course: Sufficiency Economy

The 4 processes of mixture of tacit knowledge and explicit knowledge with the students' knowledge of the philosophy of sufficiency economy in order to continuously upgrade their knowledge in cycles include: (1) Socialization (S): Tacit to Tacit – explaining social relationship in mutually transferring tacit knowledge. (2) Externalization of knowledge from a person (E): Tacit to Explicit – explaining relationship with the external in transferring tacit knowledge to explicit knowledge, which can be presentation on an academic stage, publication of articles, front-of-classroom talks – all of which are development of tacit knowledge and simply conveying it externally. (3) Combination of knowledge (C): Explicit to Explicit – explaining the relationship in combining explicit knowledge that has undergone systematization and integration of different forms of knowledge together. (4) Internalization of knowledge: Explicit to Tacit – explaining the internal relationship where explicit knowledge is transferred to tacit knowledge, and is used at an individual level, covering learning and practice.

Construction of knowledge in which the design of learning activities in the course was associated to each step of the process of SECI knowledge construction. The design covered details of activities that researchers were able to set the research conceptual framework, as illustrated in Figure 1.

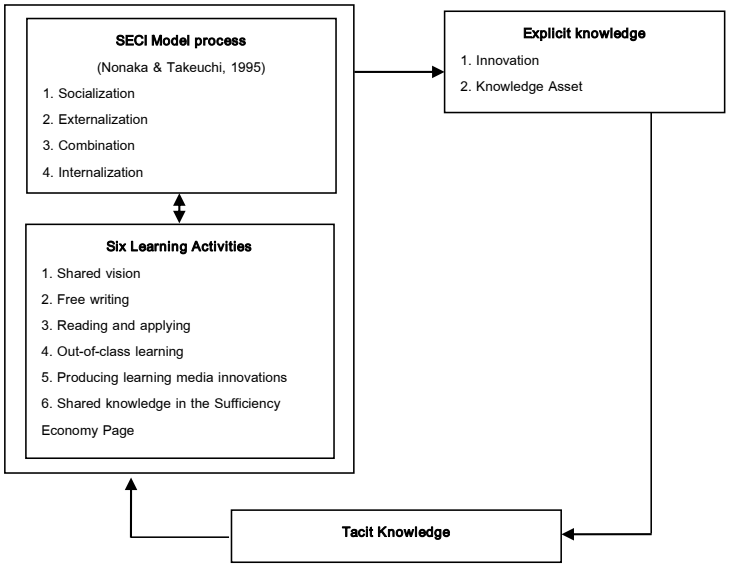

Figure 1 Conceptual Framework

Methodology

This research applied the mixed-method approach based on the following procedures:

1. Population and Sample Group The population was the students in secondary education of the Non-formal and Informal Education Center, Rusamilae Sub-district, Pattani who registered the course: Sufficiency Economy (ทช 31001) in the second semester of academic year 2020. The sample group was 50 students selected from the population using the purposive sampling method with the following inclusion criteria: not dropping from and having registered the course: Sufficiency Economy (ทช 31001) in the second semester of Academic Year 2020. The students signed the informed consent to participate in the study and in data collection.

2. Variables in the Study The independent variable was the teaching innovation under the philosophy of sufficiency economy with the SECI Model. The dependent variable was the learning process under the philosophy of sufficiency economy of the non-formal and informal students, Rusamilae Sub-district, Pattani.

3. Scope of Content

The content of the compulsory course: Sufficiency Economy (ทช 31001) includes the topics related to guidelines for survival, practices of people of all levels and economic development to catch up with the globalized world. The students were expected to be able to appropriately apply the principles of sufficiency economy in their occupation. The course covered 120 hours (3 credits) or 180 minutes per week.

4. Research Tools The research tools comprised (1) the teaching plan of the course: Sufficiency Economy (ทช 31001) under the Foundation Education Level of Non-formal and Informal Education Curriculum, Office of Non-formal Education, Office of the Permanent Secretary, Ministry of Education; (2) the learning record form, which contains open-ended questions for students to express their opinions and feelings towards the teaching and learning activities; (3) the learning behavior observation form for the teacher to observe and evaluate the working and learning behaviors of each

individual student; and (4) the questionnaire asking for the students' satisfaction towards the teaching and learning activities using the SECI Model in the Sufficiency Economy course.

Evaluation of the Quality of Research Tools The following steps were performed:

1. Verification and Reliability of the Research Tools by Experts The questionnaire constructed by the researcher was examined by 3 experts to verify the content validity and appropriateness of the language used. Next, the Index of Congruence (IOC) of the questions and the objectives was checked, and the content validity was analyzed. The IOCs of most questions in the questionnaire were found to be from 0.6 - 1. The questions were improved as recommended by the experts.

2. Tryout of the Research Tools The research tools were tried out with 30 students who were not in the sample group but were from the Non-formal and Informal Education Center of Khok Po District, Pattani in order to see the congruence with the research objectives. The results were then taken to analyze the reliability according to Cronbach's method (Leekitwatana, 2016), by finding the alpha coefficient (α–Coefficient). The reliability analyses showed that (1) the reliability value of the teaching plan of the course: Sufficiency Economy (ทช 31001) was 0.87, (2) the reliability value of the learning record form was 0.90, (3) the reliability value of the learning behavior record form was 0.84, and (4) the reliability value of the questionnaire on the satisfaction of learning activities was 0.90 – 0.96.

5. Data Collection Data were collected by the researcher, the NFE teachers, and teachers from the Community Learning Center, using the research tools above with 50 students in the sample group. The researcher first asked the students for permission by showing the official letter issued by the Faculty of Humanities and Social Sciences, Prince of Songkla University, attached with the letter of consent. The data were collected from December, 2020 until April, 2021, totaling a period of 4 months. The data collected were 100%, and were analyzed in the next step. (This research project was authorized by the Human Ethics Research Committee, Prince of Songkla University, holding the Project Code: 2021 - LL - Huso – 001 (Internal)).

6. Data Analysis

6.1 The statistical analysis was conducted on the teaching plan of the course: Sufficiency Economy (ทช 31001), the learning behavior record form and the questionnaire on the satisfaction towards the teaching and learning activities, which were in the form of rating scales. A software program was used in the analysis, to obtain the frequency distribution, percentage, mean ($\bar{x}$), and the standard deviation (SD).

6.2 The learning record form was in the form of open-ended questions. Content analysis was performed and the classification approach was applied for the data, into the major and minor groups for further conclusion of the content.

Results of the Study

1. Baseline Data – It was found that most of the students (N = 27, 54%) were female, and (N = 40, 80%) were studying in Year 2. The age range of the participants was mostly from 19-22 years (N = 44, 88%).

2. Results of the Application of Knowledge Management Innovation with SECI Model in Instruction under the Principles of Sufficiency Economy – It was

shown that the students had the knowledge and understanding of the principles of sufficiency economy in practices through the 4 steps and 6 activites of SECI Model knowledge construction.

2.1 Socialization – covered Activity 1: Shared Vision and Activity 2: Free Writing. During these two activities, the students attempted to understand information and knowledge based on the developmental science, the philosophy of sufficiency economy in practices and then set the learning goal. The shared vision activities promoted learning and sharing between the teacher and the students in the class. At the end of the activity there was the shared vision by reading one's writing in the class, with others expressing their creative opinions.

2.2 Externalization of Tacit Knowledge – covered Activity 3: Reading and Applying. In this activity, the students extracted their tacit knowledge and changed it to explicit knowledge. The knowledge is reflected in the form of talks, conveying ideas and sharing to the teacher and classmates. Besides, they were able to transfer knowledge in the form of writing to explain different things they perceived. As a result, the students were able to revise their former knowledge and connected the former knowledge or experiences with the new knowledge being transferred to them, or sharing it together, such as the trick they used in applying the philosophy of sufficiency economy in their daily life, which is considered like extraction of tacit knowledge into explicit knowledge.

2.3 Combination of Knowledge – covered Activity 4: Study Trip at the Community Sufficiency Economy Center, the Smart Farmer Learning Center, Prince of Songkla University Pattani Campus; and Activity 5: Producing Learning Media Innovation. These two activities enabled the students to receive direct experience from the real sites and received the transfer of knowledge from the trainers' experiences. The students were able to combine the acquired knowledge and experiences into their own knowledge and, in turn, were able to organize and transfer the knowledge to others in the topic of their interest or the topic they wanted to study more to increase their knowledge. This could be in the form of information documents, infographic or different media. The activities in the knowledge combination steps enabled the students to train in analytical thinking skill, synthesis and classification of the knowledge to be further constructed into a knowledge bank, which is ready to be disseminated in various forms.

2.4 Internalization of Explicit Knowledge – comprised Activity 6: Sharing of knowledge in the Sufficiency Economy Page. It was the activity in which the students brought their self-made media in different forms to transfer and share to others. This activity also promoted the students to transfer their learning process, direct experiences, and their own learning technique to others. Therefore, it is considered knowledge distribution and value adding.

3. Results of Student Evaluation on Learning Activities with SECI Model could be categorized in accordance with the research tools as follows:

3.1 Learning recording – The students showed the following opinions and feelings towards different aspects: (1) Setting learning target (before learning): Mostly, the students had the target for the use of the knowledge for self-development or to improve themselves for happy living, or to continue their studies and hold an occupation in the future; (2) Learning outcomes (after learning): Mostly, the students did acquire the knowledge and understand the principles of sufficiency economy philosophy more

and were able to explain, talk and exchange their thought about the principles of sufficiency economy. They also produced media on the basis of their knowledge and understanding and could disseminate it on the online media; (3) Sharing, exchanging, or transferring the knowledge acquired: it was found that most of the students principally transferred the knowledge to members of their families, and they intended to transfer it to close friends and neignbors in the community. There was the activity to present the students' innovation media in the course, comprising the knowledge combination document, infographic, and multimedia; (4) Storing or keeping the knowledge acquired from learning: In general, the students reported that they stored or kept the knowledge by recording it in the notebook of this course, compiling the knowledge in a report and producing an infographic media or multimedia; and (6) Problem or obstacle in learning: In general, the students were found to face two major problems, i.e., lack of digital technology tool for practicing the teaching and learning activity due to constraints in economic status, lack of multiple learning resources due to constraint of area context. Nevertheless, the teacher had recommended the students other learning resources on the Internet.

3.2 Recording of Learning Behavior – It was found that the students had the following working and learning behaviors: (1) Interest in learning and punctuality: Mostly, the students were evaluated at Level 1, i.e., sometimes; (2) Cooperation in working in steps: Most of the students were evaluated at Level 2, i.e., frequently and could be clearly observed; (3) Accepting others' opinions: Most were evaluated at Level 2, i.e., frequently and could be clearly observed; (4) Being generous and helping friends to work: the evaluation result in general was at Level 2, i.e., frequently and could be clearly observed; (5) Having responsibility over the assigned work: Most were evaluated at Level 1, i.e., sometimes; and (6) Expressing their opinions: Most were evaluated at Level 2, i.e., frequently and could be clearly observed.

4. Satisfaction of Learning Activities with SECI Model in the Course: Sufficiecy Economy – In general, the students showed that they were satisfied with the teaching and learning activities at the great level ($\bar{x}$ = 4.24). When considering item by item, it was found that the averages of all aspects were at the great level, with the highest average being the learning activity ($\bar{x}$ = 4.36), followed by the benefits obtained ($\bar{x}$ = 4.21), and the atmosphere ($\bar{x}$ = 4.14), respectively.

As for the 6 learning activities in the teaching plan, it was found that the activity the students were mostly satisfied with was Activity 5: Study Trip ($\bar{x}$ = 4.46), followed by Activity 6: Producing Learning Media ($\bar{x}$ = 4.39) and Activity 4: Sharing Knowledge in the Sufficiency Economy Page ($\bar{x}$ = 4.35), respectively.

Discussion of the Results

The application of knowledge management innovation cycle with SECI Model, in the instruction under the principles of sufficiency economy philosophy enhanced the students' learning from the 6 activities in cycle according to the SECI Model process. The students extracted the tacit knowledge or experience and turned it to explicit knowledge in the form of documents or various forms of innovations, and then changed back to tacit knowledge again by means of learning and sharing among themselves through talking, conversing and doing activities. In addition, knowledge management with SECI Model in instruction can help upgrading the level of knowledge of the

students, beginning from the Socialization step, which comprised Activity 1: Shared Vision and Activity 2: Free Writing. This was followed by the step of Externalization – tacit to explicit knowledge, comprising Activity 3: Reading and Applying; and the Combination step, comprising Activity 4: Study Trip and Activity 5: Producing Learning Media Innovation. The final step was Internalization or putting explicit knowledge into action, comprising Activity 6: Sharing Knowledge on the Page. The cycle repeated from the first step to the last step, again and again. This corresponded to Chaytaveep & Kanorm (2023), who said that learning management with SECI Model will enable learners to construct their own knowledge, until they possess tacit knowledge and are able to manage the knowledge systematically. The results of the application of knowledge management innovations with SECI Model can be explained as follows:

1. The use of innovation cycle in knowledge management with SECI Model was the process that promoted the students to have knowledge and understanding of the principles of sufficiency economy in practices (Jaitiang, 2019). The process of knowledge construction of SECI Model consisted of 4 steps and 6 activities as follows:

Socialization – consisted of Activity 1: Setting Shared Vision and Activity 2: Free Writing. From the study, it was found that the students attempted to understand information and knowledge with the developmental sciences and the philosophy of sufficiency economy in practices. They were able to effectively set the learning target by themselves, possibly because in the socialization step, the students who were interested in the same issue could easily talk and exchange knowledge and experiences (Nonaka & Takeuchi,1995). Each student had information or data of the issue of interest and thus could easily transfer the story or experience he or she had to friends. Therefore, the students learned and shared knowledge and set the learning target together. This corresponded to Brockett & Hiemstra (1993) who said that learning and sharing is the process and major part that enable an individual to use as the venue or space for exchanging of knowledge and enable the students to develop themselves and acquire knowledge in groups. Moreover, it led to team working (Jaitiang, 2019).

Externalization – consisted of Activity 3: Reading and Applying. The study showed that the students had extracted their tacit knowledge into explicit knowledge and were able to reflect the knowledge in the form of talks, discussion, transfer and sharing with the teacher or classmates. This could occur from the fact that the explicit knowledge from tacit knowledge step allowed the students to exchange information and had a chance to express their opinions and shared their experiences (Jaitiang, 2019), leading to regular research and finding of further knowledge (Deekarnkol & Thammetar, 2015). Moreover, they were able to connect former knowledge (Nonaka & Takeuchi, 1995) or existing experiences with new transferred or shared knowledge (Chaytaveep & Kanorm, 2023).

Combination – consisted of Activity 4: Study Trip and Activity 5: Producing Learning Media. The study showed that the students received direct experience from the real site and received the knowledge and experiences from the experts, enabling them to combine the obtained knowledge and experience into their own knowledge. They were also able to organize the knowledge in order to transfer to others, possibly because they were able to practice in the combination step. They also received direct experience from the experts at the real place. This activity made the students acquire the observation skill, analytical and synthetical skills, the skill for self-adjustment and living with others in the society, and team working skill (Deekarnkol & Thammetar,

2015). This finding agreed with the concept and theory called "Cone of Experiences" of Dale (1996), which explained that learning occurred from experiences through the perceptive nerve, resulting in understanding followed by thought. Learning through direct experience makes learners learn at a profound level and have more access to information than reading and remembering by heart, and able to increase the understanding of that topic.

Internalization – consisted of Activity 6: Sharing Knowledge in the Page. The study showed that the students brought their produced media in different forms to effectively transfer and share to others, possibly because in this step, the students were able to transfer what they learned, their experiences (Boonrom, 2017) and their own learning technique to others. They were able to build their own pride for being able to add values to their own knowledge. This agreed with Nonaka & Takeuchi (1995) who mentioned that putting explcit knowledge into practice could build the innovation that will lead to transfer to others. It also helps in promoting explicit knowledge and systematic knowledge management (Chaytaveep & Kanorm, 2023).

2. Evaluation of Students on Learning Activities with SECI Model – This included the learning record, observation of the learning behaviors, and the satisfaction towards the teaching and learning activities. The results can be discussed as follows:

The learning record – It was found that the students had their target in applying the obtained knowledge as the guidelines for self-development, or using the knowledge to adjust themselves in their living. After learning, they had more knowledge and understanding of the principles of sufficiency economy philosophy. They were able to explain, talk and exchange opinions related to the principles of sufficiency economy and were able to disseminate their own knowledge via online media. From the observation of learning behavior and from the study and evaluation, most of the students showed the working behavior and learning at Level 2, i.e., frequently and could be clearly observed. From the evaluation of the satisfaction towards the teaching and learning activities with SECI Model, the students in general were satisfied with the activities at the high level, with the greatest satisfaction in the learning activity, especially Activity 5: Study Trip. This could be because the teaching and learning through the application of knowledge management cycle innovation with SECI Model helped enhancing the students' thinking, analyzing and synthesizing skills (Jaitiang, 2019). The students had a chance to participate and practice, visited the real place, which allowed the students to receive direct experience from the trainers who were experts in specific fields. This also promoted the learning and sharing process and agreed with Gerdruang et al., (2021) who said that the exchange of knowledge in the teaching and learning process could promote the students to exchange information and knowledge together. It also leads to the co-learning process among the students' friends, with positive cooperation and relationship (Chaibuth et al., 2015), and the interaction that mutually enhances one another (Johnson & Johnson, 1994). In addition, the learning management that allows students to receive direct experience enables students to have a chance to change the explicit knowledge into tacit knowledge (Nonaka & Takeuchi, 1995), which is the final process of knowledge construction. Moreover, it can enhance the extension of knowledge towards lifelong learning by themselves.

Recommendations

The results of the study of knowledge management with the SECI Model cycle to develop sustainable learning process according to the principles of sufficiency economy philosophy could be concluded for recommending the guidelines for the learning process as follows:

1. Recommendations for the Use of Research Outcomes: Educational institutions should develop curricula that incorporate additional activities connecting and integrating courses to support learning and sharing of experiences among students. Practical skills should be trained alongside study trips, allowing students to gain direct experiences from specific experts. The learning and teaching activities designed from these study trips should be emphasized, practiced, and extended as innovations. Knowledge obtained from classrooms or various information resources should be recorded and shared (Knowledge Sharing).

2. Recommendations for Further Research: The results of the instruction and activities based on the SECI Model cycle should be applied and extended to other courses to develop the learning process further and promote learning that enables students to construct knowledge for greater learning potential.

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