

DEVELOPMENT OF KNOWLEDGE CREATION SYSTEMS USING TEAM LEARNING METHODS FOR NURSING INSTRUCTORS IN HIGHER EDUCATION INSTITUTIONS

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Abstract

The purpose of this research was to study, develop and test, and propose a knowledge creation system using team learning methods for nursing instructors in higher education institutions. The research method was comprised of three steps: Step 1: Study knowledge creation systems using team learning methods for nursing instructors in higher education institutions by analyzing and synthesizing related documents, and interviewing seven experts. Step 2: Develop and test a knowledge creation system using team learning methods for nursing instructors in higher education institutions. Step 3: Propose a knowledge creation system using team learning methods for nursing instructors in higher education institutions. The instruments consisted of a team learning test, an opinion questionnaire, a product evaluation form, and an observation form. Fifteen nursing instructors teaching in the 2005 academic year from the Faculty of Nursing, Mahidol University, participated in the study. They were divided into three groups of five members each and performed the activities based on the knowledge creation system using team learning methods for 12 weeks. The data were analyzed using means, standard deviations, and a dependent t-test.

The research results indicated that:

- 1. The five components of the knowledge creation system using team learning methods were: 1) Organizational culture; 2) Leadership; 3) Information technology; 4) Team; and 5) Evaluation.*
- 2. The eight steps of the knowledge creation system using team learning methods were to: 1) Prepare knowledge creation activities; 2) Identify problems or knowledge; 3) Establish knowledge creation team; 4) Share knowledge, experiences, and opinions; 5) Create and justify knowledge; 6) Build a knowledge creation prototype; 7) Implement prototype; and 8) Conclude and evaluate.*

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3. *There were significant differences between nursing instructors' posttest and pretest scores in team learning. This means, after participation in this program, the participants perceived that the knowledge creation system using team learning methods will improve team learning skills.*

Keywords: knowledge management, knowledge creation, action learning; team learning

Introduction

The revolution of a knowledge-based society and economy makes knowledge become an important resource that promotes competitive advantages. Nonaka and Takeuchi (1995) proposed that knowledge is not only regarded as data or information that can be stored in a computer. It also involves emotions, values and intuition. Knowledge can be created through a process of dynamic interactions between explicit knowledge and tacit knowledge (Nonaka et al., 2000). The concept of knowledge creation has become increasingly prevalent in the academic system. Thus, knowledge creation is a necessary process that will be continuing in real practice. From this revolution, it is imperative that nursing instructors in higher education institutions realize the need to change and respond to these alterations. Nursing instructors must become users of the knowledge resources to keep abreast of the times, continuously develop their learning skills, and enrich their personal intellectual growth to perform their professional responsibilities. Historically, the domains of nursing knowledge have had both broad professional foundations and domains of specialized nursing. Specific domains in nursing are called nursing science and are concerned with human science, practical science, caring science and health oriented science. The professionalism of nursing requires that nurses must have knowledge,

skill, specific preparation, and time spent in classroom learning and clinical practice in order to pursue knowledge for nursing practice in responsible roles and social services. Nursing instructors play an important role in transferring this general and specialized knowledge to nursing students, nurse practitioners, and the general public. Thus, nursing instructors must always study and seek more knowledge to maximize the professionalism of their nursing practice and education.

Recently, the term "team learning" has been adopted for knowledge management in many disciplines world wide, including nursing. It is also suggested that the creation of knowledge in the organization should occur through team learning (Senge, 1990). It is necessary for nurses to cooperate with other members in the organization for learning together. Team learning makes the members think insightfully about complex issues which are necessary for the developing organization. Each member who joins the team can identify and select new ideas and integrate them into a new perspective. Also, each member must have an understanding of his or her own roles and responsibilities, thus building alignment to enhance a team's capacity to think and act in new synergistic ways with full coordination and a sense of unity. Furthermore, each member must bring knowledge and the concept of sharing with other members in

order to develop the capacity of the team (Senge, 1990). Thus, team learning will have more powerful learning than individual learning, and the discipline of team learning involves mastering the practices of dialogue and discussion to exchange the concepts, beliefs, and experiences of each individual member (Senge, 1994).

However, many organizations create knowledge through learning techniques such as: on the job training, coaching, job rotation, and learning by doing. These learning techniques focus on transfer of experiences in their own work place that encourages work efficiency. It supports the concept (Revans, 1980) that there is “no learning without action and no action without learning”. It is a source of the learning technique called “Action Learning” that is currently being disseminated. Thus, the creation of knowledge in nursing should be based on the principle of the technique that knowledge creation flows from a real organizational knowledge, problem, or issue that needs to be addressed and exists in a real time frame. Action learning helps nursing instructors reflect on their own personal development and the sharing of that development (Heidari and Galvin, 2003). An example is that to create knowledge for problem solving in her own work place, it is necessary to identify a problem to be solved and also one that is related to practice. Knowledge examples may include learning and instructional problems, organizational problems; standards in nursing practice in order to build an alignment guideline, a handbook of clinical practice, a handbook of health promotion in nursing, and teaching using media resources. The creation of knowledge takes place cooperatively, focusing on the team working together in

every step of the process which can bring about sharing and learning from each other’s experience. The members will analyze the issue through learning and reflection, explore the situation, suggest alternatives for action, test alternatives, and take action. They will come together with proposals to impact practice and evaluate the practice outcomes in order to adjust future action (Marquardt, 1999).

From reviewing the literature, the researcher found that there is no clear model for educators to participate in for knowledge creation and that the design of activities in a knowledge creation system is not clearly defined. Thus, the researcher was interested to develop and test a knowledge creation system using team learning methods for nursing instructors in higher education institutions. The results of this study will provide guidelines for future studies or be used to create knowledge in other fields of nursing.

Objectives of the study

The three objectives of this study were:

1. To study the opinions of the experts in knowledge creation system using team learning methods for nursing instructors in higher education institutions;
2. To develop and test a knowledge creation system using team learning methods for nursing instructors in higher education institutions; and
3. To propose a knowledge creation system for nursing instructors in higher education institutions.

Methodology

The study's methodology was divided into three steps:

Step 1: To study the knowledge creation system using team learning methods for nursing instructors in higher education institutions. This step was to study, analyze, and synthesize the basic information about components and processes of knowledge creation system and to interview seven experts in the knowledge management field.

Step 2: To develop a knowledge creation system using team learning methods for nursing instructors in higher education institutions. The researcher developed a model of a knowledge creation system using team learning methods for nursing instructors in higher education institutions. Content validity of the instruments was also obtained from five judges considered to be experts in the field. This model was revised with the suggestions of the experts. The researcher conducted an experiment to test the appropriateness of this model.

Step 3: To propose a knowledge creation system using team learning methods for nursing instructors in higher education institutions. This model was validated by review of five judges considered to be experts in the field, with revision based on the suggestions of the experts, and proposed as a knowledge creation system using team learning methods for nursing instructors in higher education institutions.

In step 2, the process of developing the knowledge creation system involved the following characteristics:

Subjects: The subjects were fifteen nursing instructors and three facilitators working in the Faculty of Nursing at Mahidol University. They were divided into three

groups of five members each and had one facilitator per group.

Instruments: Instruments in this study consisted of the team learning test, opinion towards knowledge creation system questionnaire, product evaluation test, and observation form which were developed by the researcher. Content validity of these instruments was also obtained from three judges considered to be experts in the field. These instruments were revised with the suggestions of the experts. The reliability coefficient of the team learning test was found to be .95.

Experimental Stage:

1. The subjects completed the pretest of the team learning test prior to starting the knowledge creation activities.

2. The subjects performed the activities from the knowledge creation system using team learning methods for twelve weeks.

3. The subjects completed the posttest of the team learning test and the opinion towards knowledge creation system using team learning instrument after finishing the experiment.

4. The researcher observed the participation of the subjects during the experiment and evaluated the product in each process of the knowledge creation system and the final product.

Data analysis: Team learning was analyzed by using a dependent t-test. The opinions about the knowledge creation system using team learning, the product of each step in the process of knowledge creation system, as well as the final product, and the observations of the participants were analyzed by using averages and standard deviations.

The Model

The results of the model revealed that:

1. The knowledge creation system using team learning methods for nursing instructors in higher education institutions consisted of 5 components (See Figure 1), they were organizational culture, leadership, information technology, team and evaluation. The components are described below:

1.1 Organizational culture. The organizational culture consisted of:

1) Concept and attitude. This focus was on changing the concepts and attitudes of nursing instructors by helping these persons realize the value and the importance of knowledge creation and having an alignment of the concepts and attitudes. The academic institution must inform nursing instructors about the ways of knowledge creation in the academic institution, provide knowledge, promote an alignment of the concept, practice and purpose to success, and create a shared vision by understanding their own vision and the organization's vision concerning knowledge creation in order to share a cooperative vision and an alignment of practice.

2) Motivation. This focus was on creating motivation for nursing instructors to be willing to participate in the process of knowledge creation. Nursing instructors who were interested in the same things would join a group in order to work together. The academic institution must provide nursing instructors with full cooperation in the process of knowledge creation, and give them autonomy in their own work, decision making, and problem solving. The academic institution must create an environment that facilitates knowledge creation in accordance with an improvement and modification of the

environment in the organization such as: preparing a place for informal meetings, providing equipment and facilitation for meetings, such as electronic communication.

3) Trust. This focus was on creating trust for nursing instructors to be willing to share with each other and transfer their knowledge. Nursing instructors must avoid concealing behaviors and mistrust of each other. They should bring friendly feelings, opening a dialogue based on the facts, creating a friendly environment of openness, acceptance, and respect for the ideas of each other, and providing a sense of safety in facing risks, forgiveness and encouragement.

1.2 Leadership. Leadership in a knowledge creation system was important for the knowledge creation team. The academic institution must select a leader who uses participatory leadership. The leader must cooperate with the nursing instructors in planning and decision making, and provide the opportunity to share ideas. The characteristics of the leader include worldwide vision, stable emotional quotient, ability to motivate, skill of problem solving, creative thinking, capacity to communicate effectively, good interpersonal relationships, responsibility and enthusiasm.

1.3 Information technology. The academic institution strongly supported the computers and network by setting up Internet / Intranet technology in the institution for distributing knowledge throughout the organization for easy and timely communication among team members. The academic institution must create a knowledge management web site for dissemination of knowledge and to be a center for storage, and collection of the various fields of nursing knowledge. In addition, the academic

institution must identify communication tools such as a chat room, webboard, and e-mail for sharing with others.

1.4 Team. The academic institution must set up knowledge creation teams to take responsibility for knowledge creation activities. The teams might consist of a leader, members and a facilitator. The academic institution must identify members to participate on the team by bringing together members with different expertise to bring about effective

sharing, and identified roles and responsibilities of members. Attention should also be given to including rules, covenants, and polite behaviors of the team, and preparation of a facilitator in helping members with knowledge creation activities.

1.5 Evaluation. The academic institution must evaluate the process of knowledge creation and all of the products in each step and the final product of the knowledge creation process.

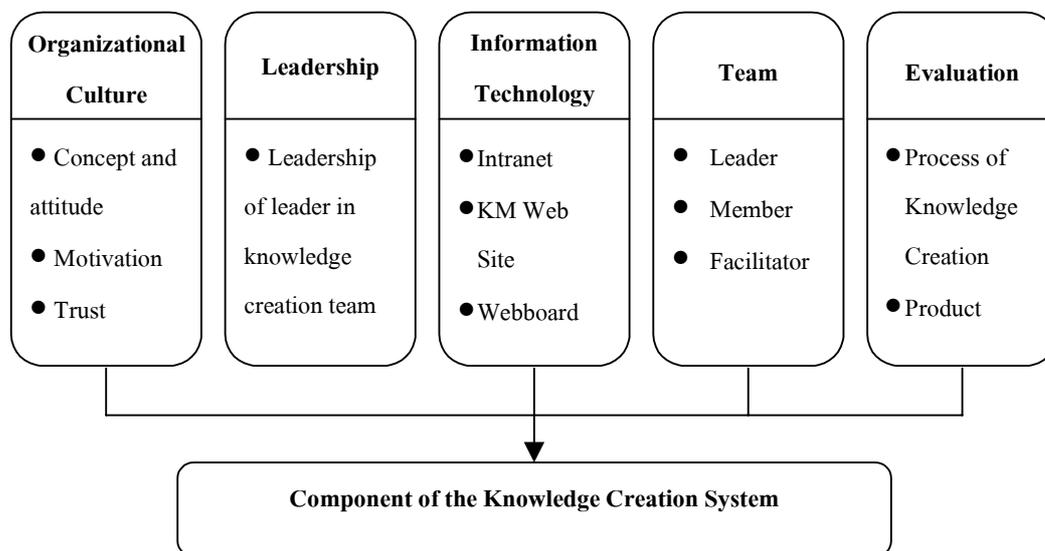


Figure 1: Component of the Knowledge Creation System

2. The knowledge creation system using team learning methods for nursing instructors in higher education institutions consisted of 8 steps (See Figure 2), as follows:

2.1 Prepare knowledge creation activities. Preparing knowledge creation activities began with communication and understanding about the activities of knowledge creation in the higher education institution before starting the activities. Nursing instructors were informed about knowledge

creation activities, including creation of the alignment of concepts and practices, motivation, trust, preparing the facilitator, and developing a knowledge management web site. The practice must be performed as follows:

1. Create the alignment of concepts and practices. To create the alignment of concepts and practices, the methods of public relations such as newsletters and knowledge management web site are necessary to be used , as well as

seminars arranged to enable nursing instructors to have an alignment of the knowledge creation concepts, knowledge sharing, practice, and plan for success.

2. Create motivation in knowledge creation activities. To create motivation, nursing instructors described their own vision and what they needed in their lives in order to help them to achieve their vision. After that, they shared the vision with the other members in order to create the corporate vision. Finally, nursing instructors developed an understanding of policy, vision, and mission regarding knowledge creation activities in the organization. They must understand the knowledge available in the organization, what new knowledge was being created, and how the new knowledge would be accessed.

3. Create trust. To create trust, nursing instructors used dialogue techniques for sharing ideas about cooperation in knowledge creation activities. Dialogue was a technique for improving trust, acceptance, respect for the ideas of each other, and willingness to participate in the process of knowledge creation. This technique required a desire to build a context for thinking together and creating trust among the members.

4. Create environment. To create environment, the place and equipment must be prepared to facilitate the meetings of the nursing instructors in knowledge creation activities. It must include a room which can hold a small group, and equipment and resources such as white board, food and drink, computer for searching for information and a printer.

5. Prepare facilitator. To prepare a facilitator, the organization must identify

the members who have knowledge and skills of group process and arrange training for them to understand the role and responsibility of facilitator. Characteristics of an effective facilitator include listening skills, ability to provide feedback, understanding of group processes, good judgment, openness and frankness, patience, and empathy. The facilitator will help the members to reflect on what is happening and on how they are solving problems.

6. Develop a knowledge management web site. To develop the knowledge management web site, the organization must set up Internet / Intranet technology, create a knowledge management web site, and communication tools, such as chat room, web board and e-mail. The organization should encourage members to access this web site for information collection, searching, and sharing, and to use communication tools for sharing with each other.

2.2 Identify problems or knowledge needed. Nursing instructors cooperated in identifying the proposed problems which needed to be addressed and in finding the solution, or new knowledge which needed to be created in order to use and disseminate it to the others. This step had three core activities. The first step was to propose the problems or knowledge to be developed. The problems or knowledge would be relevant to the academic institution or department of the group members. The second step was to select the problem or knowledge. The problems or knowledge deficit must be a real organizational problem, knowledge, or issue that needed to be addressed and existed in a real time frame, and must be feasible to implement in practice.

The third step was to summarize the problems or knowledge deficit. Group members chose problems to be solved or knowledge to be created. These problems or knowledge should be of interest to all group members.

2.3 Establish a knowledge creation team. Nursing instructors established a knowledge creation team in order to develop cooperation, coordination, and responsibility in knowledge creation activities. This step had four core activities. The first step was to select the members. The team would have five members who were interested in the same issue. The second step was to identify a leader. The third step was to define roles and responsibilities of leader, members, and facilitator. Members would acknowledge their own roles and responsibilities, and play their own roles. The fourth step was to set up rules, covenants, and polite behaviors of the team. Members would strictly respect rules, covenants, and polite behaviors of the team. This would make the team activities orderly and productive.

2.4 Share knowledge, experiences, and opinions. Nursing instructors shared knowledge, experiences and opinions by using action learning technique which included a questioning and reflection process. This step had five core activities. The first step was to select the problem or knowledge deficit that the members identified in step 2. Members would collaborate with others on the same team in choosing the problems or new knowledge deficit. The second step was to propose the context of the problem. The third step was to use the questioning process. The questioning process would prompt members to recall the activities in the past in order to clarify and understand the problem or new

knowledge. The fourth step was to use the reflection process. Reflection generated mutual support as group members listened intently and drew out each other's experiences and practical judgments. The fifth step was to search for knowledge. Members would search for more knowledge to be used in the solution or creation of knowledge. Members searched for the information from many resources, such as books, journals, printed materials, electronic materials, and expert interviews, and brought the results to share in problem-solving and knowledge creation sessions.

2.5 Create and justify knowledge. Nursing instructors created and justified knowledge by using team learning techniques which included discussion and brainstorming in order to share knowledge and provide the results in new knowledge.

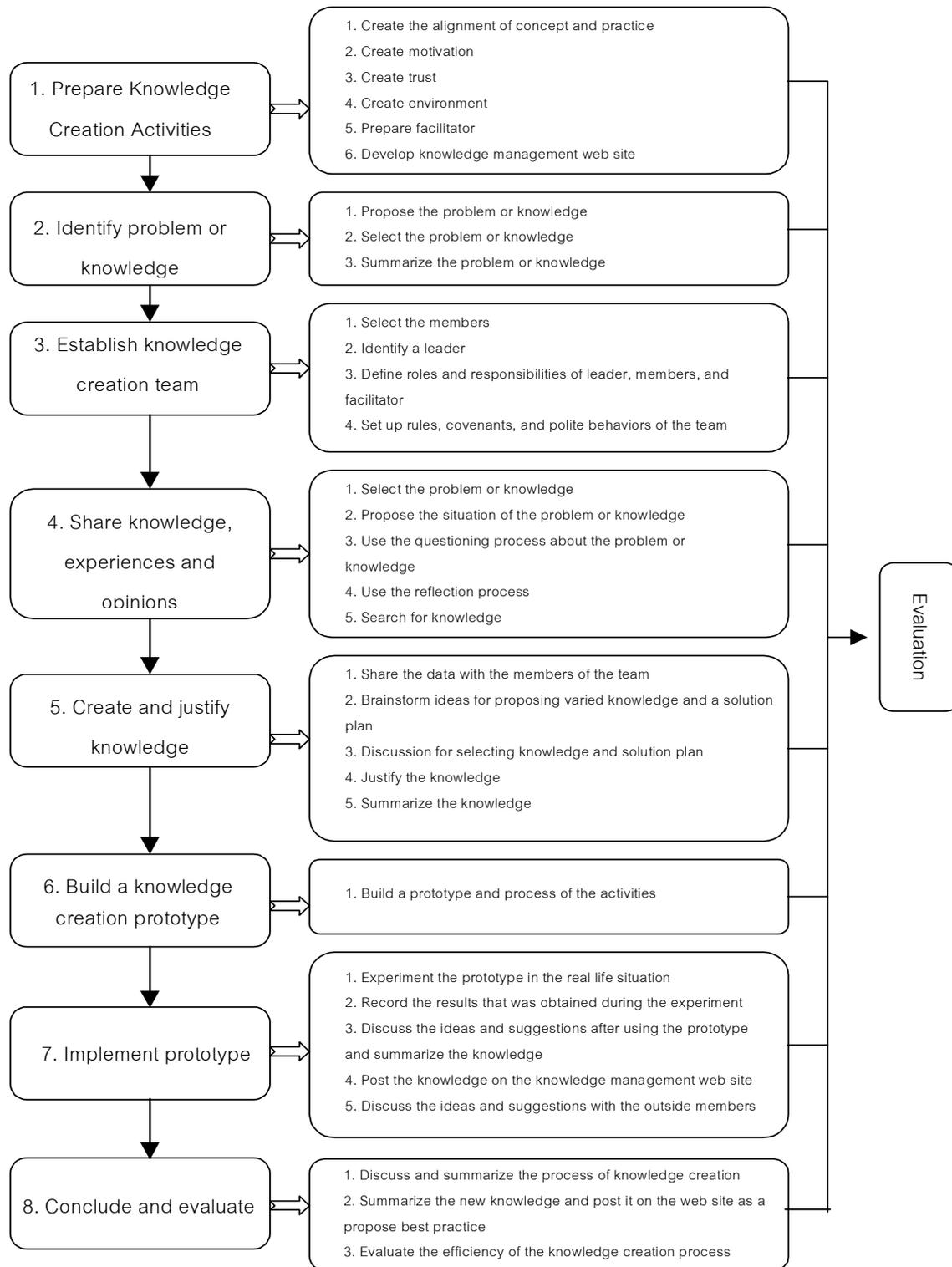


Figure 2: Process of the Knowledge Creation System

This step had five core activities. The first step was to share the data with the members of the team. The members would

share the data that they found with the other members. The second step was brainstorming. The members got together and

brainstormed ideas for proposing varied knowledge and solutions. The third step was discussion for selecting knowledge and solutions. The members discussed the issues in order to make a decision, reach agreement, or identify priorities. The fourth step was justifying the knowledge. After the solution or new knowledge had been proposed, the members would evaluate them again in order to select proper solution or new knowledge. The fifth step was to summarize knowledge.

2.6 Build a knowledge creation prototype. Nursing instructors built a prototype which was gathering knowledge, identifying components of knowledge, and process the activities in the form of a project for experimentation. The prototype consisted of title, rationale, objectives, target group, solution, indicator, timeline and evaluation.

2.7 Implement prototype. Nursing instructors would experiment with the prototype in the real life situation. This implementation phase had five core activities. The first step was to experiment with the prototype in the real life situation. Members experimented with this prototype in the real life situation which was the process of testing and justifying knowledge in order to confirm the feasibility of the knowledge. The second step was to record the results that were obtained during the experiment. The third step after using the prototype was to discuss the ideas and suggestions among the members of the team about the problem, successes, obstacles during experimentation, and to summarize the knowledge. The fourth step was to post the knowledge on the knowledge management web site. The fifth was to discuss the ideas and suggestions from outside readers, and use these results to revise the solution or knowledge.

2.8 Conclude and evaluate. Nursing instructors concluded and evaluated all the results from the process including successes, failures, problems and obstacles. This included the evaluation of the effectiveness of the process. This step had three core activities. The first step was to discuss and summarize the process of knowledge creation. The second step was to summarize the new knowledge and post it on the web site as a proposed best practice that everyone in the organization could access and use. The third step was to evaluate the efficiency of the knowledge creation process.

Results

After using this model, team learning skill was analyzed by using a dependent t-test and found that there were significant differences between instructors' posttest and pretest scores in team learning at the .05 level (See Table 1). The subjects were highly satisfied with the knowledge creation system using team learning methods for nursing instructors in higher education institutions (Mean = 4.14, S.D. = 0.38). The mean score of 4.14 almost reached the maximum possible score of 5.0. The investigation of participation of the subjects found that the subjects participated in the activities of a knowledge creation system using team learning methods at a high level (Mean = 1.83, S.D. = 0.05). The mean score of 1.83 was close to the maximum possible score of 2.0.

Table 1: Means, standard deviations and t-test result of the difference between the pretest and posttest team learning scores

<i>Team learning</i>	<i>Mean</i>	<i>S.D.</i>	<i>t-test</i>
Pretest	4.06	0.30	2.551*
Posttest	4.25	0.43	

*Significant at the .05 level

The product of each step in the process of a knowledge creation system (Mean = 2.74 from a possible total score = 3, S.D. = 0.08) and final product (Mean = 2.61 from a possible total score = 3, S.D. = 0.25) revealed high scores. And this model was

validated through review by five judges considered to be experts in the field to include 5 components and 8 steps, both rated at a high level (Components Mean = 4.37, S.D. = 0.74; Steps Mean = 4.32, S.D. = 0.61) (See Table 2).

Table 2: The mean score and standard deviation of the opinion scores of five judges
 Conclusion

<i>Opinions</i>	<i>Mean</i>	<i>S.D.</i>
Components of the model	4.37	0.74
Steps of the model	4.32	0.61
Total	4.33	0.61

Knowledge is an important resource that has value and benefit for the academic institution. It makes a change in continuous learning and innovation. Higher education institutions must place more emphasis on knowledge creation, rather than only using knowledge gained from others. Thus, knowledge creation is a necessary process that should be continuing in practice in order to maintain the value in today's competitive global economy. In this research, we concluded that the success of knowledge creation depends on many components such

as organizational culture, leadership, information technology, team, and evaluation. Therefore, it is necessary for nursing instructors to simultaneously develop these components in order to develop the most effective knowledge creation system for the academic institution. The process of knowledge creation is an important strategy. If there is not an effective process, the creation of knowledge may not be successful. The eight steps identified in this research will help nursing instructors to create effective new knowledge in higher education institutions.

Discussion

Based on the results of the data analysis, there was a significant difference between instructors' average posttest and pretest scores in team learning. It indicated that the knowledge creation system using a team learning method was effective in increasing the level of learning and working together as a team in order to create new knowledge. It improved the characteristic of team learning. This finding is consistent with Varaporn Tragoolsrid (2002) that team learning happens by the members working together, helping each other, learning together, sharing knowledge and experience, and participating in cooperative learning. The knowledge creation system using team learning methods provided a system that brings experience, knowledge and the capacity of each member in the team for utilization in the creation of new knowledge or problem solving. This includes the coordination of activities with the other members and effective collaboration in learning. These methods led to the successful experience of working together. As Senge (1990) stated, the members must coordinate synergy by using the knowledge and expertise of each team member for utilization in working. These include the power of the team, success of working together, developing the performance of the team, and increasing effective working relationships. In addition, the identification of roles and responsibilities of each member was necessary for the members to cooperate in learning. The members would acknowledge their own roles and responsibilities, and act to fulfill expectations for their roles. This finding was consistent with Siriluk Chichareon (2002),

who found that responsibility in working positively correlated with the characteristic of team learning, because it provided an opportunity for participants to perform and learn by doing which promoted an increase in team learning.

Nursing instructors were highly satisfied with the knowledge creation system using team learning methods. They suggested that the knowledge creation system using team learning methods was a good and useful system because knowledge should be created by the practitioner and could be applied for further utilization. Particularly if the system was used in a regular work setting, it would be an increasingly effective system. The finding was consistent with the suggestion of Panita Ponpai (2001) that we should establish responsibility for developing and disseminating knowledge in routine practice. In addition, nursing instructors also suggested that the facilitator would help the group to proceed with effective knowledge creation activities. As Marquardt (1999) proposed, the facilitator was an important person for helping the members to reflect on what the members learned, and how the members solved the problem. Senge (1994) stated that the facilitator would promote an atmosphere of dialogue in enhancing learning together. Roth (2003) also suggested that the facilitator would help to create the context for creating knowledge by playing three roles: as a catalyst, as a coordinator of knowledge creation, and as the one who provided the general direction for knowledge creation.

Recommendations

In order to implement the knowledge creation system using a team learning method

for application in an academic institution, it is recommended to be performed as follows:

1. The administrator must realize the importance of knowledge creation in the academic institution, in readiness for bringing this principle into practice and provide continuous support in knowledge and budget;

2. The academic institution must identify the policy, vision, and mission that promote knowledge creation in an overt strategic plan of the academic institution;

3. The academic institution must establish the knowledge creation team with direct responsibility for knowledge management in order to attain effective management;

4. The academic institution must integrate the knowledge creation system using team learning methods in routine practice so that it will lead to an effective and efficient outcome;

5. The academic institution should develop the necessary competencies, such as the skill of team learning, systems thinking, personal mastery, shared vision, and mental models for the members who lack of these skills; and

6. The academic institution must put into place a process for preparing and selecting the facilitator who will guide the members in knowledge creation activities.

In addition, the academic institution that wishes to apply the knowledge creation system using a team learning method should be aware of acceptance by its members. This model would change the behaviors of the members in working together. The members must have an attitude that is accepting of change and be willing to share with each other. Thus, the academic institution should inform

the members how to understand the knowledge creation activities, including introducing the concept and practice, motivation, and trust before starting the activities.

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