Development of Knowledge Management Skill and Nursing Innovation Development Competency among Thai Nursing Students

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Abstract
The demand on quality health care service leads nursing arena has been expected professionalism from society. Supporting nursing students to learn from knowledge management process, and promoting the development of nursing innovation are processes for encouragement them to be able to integrate their theoretical knowledge to practice. This action research was designed to develop knowledge management skill and nursing innovation development competency among 40 second year nursing students in Prachomklao College of Nursing, Thailand. The study consisted of 2 phases: 1) developing the learning and teaching method, and 2) experimenting and evaluating the effectiveness of the developed method; it lasted for 6 weeks.

The findings were as followed: 1) The nursing students' mean score of knowledge management skill that evaluated by themselves was at a "good" level (mean=4.18) which associated to mean score of knowledge management skill evaluated by nursing lecturer (mean=3.89). 2) The nursing students' self-evaluation mean score of nursing innovation competency was at a "good" level (mean=3.98). 3) The mean score of innovation in each group that evaluated by nursing lecturers was at a "moderate" level (mean=2.36). 4) A slow internet connection was the major barrier that affected a delay for searching and less knowledge sharing. Such finding could be a guideline for teaching and learning development that integrate the knowledge management process and self-development for enhancing knowledge management skill and nursing innovation development competency among nursing students. This leads to improve service quality and develop their skills to be modernized and congruent to knowledge-based society.

Keywords: knowledge management skill, innovation, competency, nursing students

Introduction

The idea of lifelong learning has cumulatively gathered momentum and consequently it has become an essential component of the nursing world (Robyn & Elaine, 2009). The demand on quality health care service from client leads nursing arena has been expected professionalism form society. Nursing knowledge and skills are required for providing care appropriately to clients and society (Hanuchareankul, 2001; Miller, 1988). Boyer (1996) asserted that to be a registered nurse and scholars, it is needed to research, integration of knowledge and teaching that able to apply for real situation. Healthcare reform and advanced technology is also another booster for nursing profession to develop quality of providing care. Therefore, nurses must keep continuing practice and shape their skills to ensure that consumers can rely on them.

Knowledge management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge. (Davenport, 1994) KM is the processes that accumulate information from multiple source such as personal's knowledge and documentary, then, systematical management all information to be reachable for any personnel. The goal of KM is to develop personnel to work effectively (Office of the Public Sector Development Commission (OPDC) & Thailand Productivity Institute, 2005; Senge, 1990). Using of KM in nursing practice is able nurses to improve quality of care and develop their skills to be modernized and congruent to knowledge-based economy. Therefore, nursing educational institute can use KM as part of process to achieve in producing nursing students to meet the requirement of Thai Qualifications Framework for Higher Education (TQF) (Ministry of Education, 2009). Nursing students should thus be promoted to devote in profession, and to have the awareness in self-development.

Self-directed learning, supporting nursing students to learn from KM, and promoting the development of nursing innovation are processes for develop the students to be able to integrate their theoretical knowledge to practice. The researchers, a team of teacher who taught "Nursing care of persons with health problems practicum I", realized the important of integration between self –directed learning and KM. Thus, teaching method that combined between self-directed learning and cooperative learning was developed in order to encourage nursing students to have continuously self-development.

By applying the results from Rungnoei's study (Rungnoei et al., 2010), this study used concept of self-development and professional life planning on graduate preparation for fourth year nursing students. The study presented that students increased their self-development ability and professional life planning. The study also recommended that using of life planning and self-development at the early stage of study; since first year would be able to develop continuously self-development which congruent to nursing competency of nursing council as promoting of seeking knowledge and chance for self-development (Thai Nursing and Midwifery Council, 2009). In this study, the researchers applied the quasi-experimental study for KM skills and ability to create nursing innovation on second-year nursing students. The benefit from this study would help students to obtain knowledge and skills for increasing confident and able to provide proper care to adult and older people who have sickness. Students would have experiences base on the objective of curriculum and TQF.

Conceptual framework

The Self-directed learning and self-development concept were used as a framework of this study. These two concepts were applied from Rungnoei's study (2010) and knowledge management (Office of The Public Sector Development Commission (OPDC) and Thailand Productivity Institute, 2005). The concepts were about tacit knowledge and explicit knowledge by dealing with specific process, searching, storing, exchanging knowledge, and evaluation of knowledge for students, social benefit and developing of nursing innovation. These concepts also took part in emerging of new nursing outcome and research.

Research Methodology

Design: This action research aimed to develop knowledge management skill and nursing innovation competency among Thai nursing students during studying in "Nursing Care of Persons with Health Problems Practicum I". This study was conducted between February and September 2012 using one-group posttest design.

Ethical Considerations: Approval to conduct the study was granted by the Ethics Review Committee for Research Involving Human Research Subjects, Prachomklao College of Nursing, Phetchaburi. All potential subjects were informed about: the nature and purpose of the study; what participation in the study involved; confidentiality and anonymity issues; and, the right to withdraw, at any time, without repercussions. All subjects consenting to participate were required to sign a consent form.

Sample and setting: The sample consisted of 40 second-year nursing students from one college of nursing under administration of the Ministry of Public Health. The criteria for inclusion involved: being a second-year nursing student in Bachelor program; having a GPA of at least 2.00; and, volunteering to participate. Those excluded: did not desire to participate; had a GPA below 2.00; or, had repeated classes in the first-year of college. The selected subjects tended to: be female (n=37; 92.5%); be male (n=3; 7.5%); be 18 to 20 years of age (average = 19.15 years); and, have a GPA of 2.97.

Research instruments*:* Based upon review of the literature. Five developed instruments were used to gather data. The instruments included a: (a) Demographic Data Questionnaire; (b) Nursing Students' Self-Development Planning and Knowledge Management Record (NSSDPKMR); (c) Nursing Students' Self-Assessment Knowledge Management Skill and Nursing Innovation Development Competency Questionnaire (NSSAKMSNIDCQ); (d) Assessment of Nursing Students' Knowledge Management Skill (ANSKMS); and, (e) Assessment of Nursing Students' Nursing Innovation Development (ANSNID).

The Demographic Data Questionnaire (DDQ) was administered to the subjects to provide demographic data regarding their: age; gender; college of nursing GPA.
The Nursing Students' Self-Development Planning and Knowledge Management Record (NSSDPKMR) was a 15-item record/diary in which the subjects recorded their self-assessment, self-development planning, self-evaluation, and learning

outcome from KM activities, regarding whether one met six week goals and what was learned from participation in learning program.

The Nursing Students' Self-Assessment Knowledge Management Skill and Nursing Innovation Development Competency Questionnaire (NSSAKMSNIDCQ) was a 20-item instrument. The instrument was developed for the purpose of assessing the nursing students' perceptions about their self-assessment knowledge management skill and nursing innovation development competency. The instrument consisted of two subscales: knowledge management skill (10 items), and nursing innovation development competency (10 items). The selected subjects were asked to respond to each item on a 5-point Likert-like scale (1= very poor to 5 = very good). Total subscale scores and the scores of their components, which could range from 1 to 5, were obtained by calculating the mean scores for all items. Mean scores were interpreted as: very good level (4.51-5.00); good level (3.51-4.50); moderate level (2.51-3.50); poor level (1.51-2.50); and very poor level (1.00 - 1.50). It took 3 - 5 minutes to complete the questionnaire.

The Assessment of Nursing Students' Knowledge Management Skill (ANSKMS) was a 10-item instrument. It was used for post evaluation students' skills. The lecturer evaluated the students' skill in each item on a 5-point Likert-like scale (1= very poor to 5 = very good) at the end of the 6 week program. Total scores of their components, which could range from 1 to 5, were obtained by calculating the mean scores. Mean scores were interpreted as: very good level (4.51-5.00); good level (3.51-4.50); moderate level (2.51-3.50); poor level (1.51-2.50); and very poor level (1.00 - 1.50). It took 3 - 5 minutes to evaluate each ANSKMS.

The Assessment of Nursing Students' Nursing Innovation Development (ANSNID) was used for group evaluation. It consisted of 14 items of three-level rubric score. The lecturer evaluated each group about their nursing innovation development, implementation, and presentation of their outcomes. Total scores of their items, which could range from 1 to 3, were obtained by calculating the mean scores. Mean scores were interpreted as: good level (2.51-3.00); moderate level (1.51-2.50); and poor level (1.00-1.50).

All instruments, with the exception of the DDQ, were assessed by three experts in nursing education for content validity. The experts determined the index of item congruence to be: (a) 0.90 for the NSSDPKMR; (b) 0.92 for the NSSAKMSNIDCQ; (c) 0.93 for the ANSKMS; and, (d) 0.90 for the ANSNID. Reliabilities of the NSSAKMSNIDCQ were determined to be: 0.89 (pilot test) and 0.90(actual study). Reliabilities for the ANSKMS were determined to be: 0.81 (pilot test) and 0.83 (actual study). Since the NSSDPKMR was a diary/record, and the ANSNID was an assessment form used for the group evaluation, their reliabilities were not determined.

Procedure: The overall purpose of the experimental study was to increase the nursing students' knowledge management skill and nursing innovation development competency. The experimental program was implemented in Nursing Care of Persons with Health Problems Practicum I for six weeks. Prior to the start of the program, subjects were placed into five groups of eight students each. Research methodology composed of two steps as follows:

Step 1: Development of integrated instructional method for strengthening of knowledge management skills of nursing students by applying knowledge management and nursing innovation development notion combining with self-directed learning and self-development idea from the study of Rungnoei (2010).

Step 2: Experimental study and evaluation for the effectiveness of the above teaching method. For trial used of the teaching method, all lecturers who involved were prepared for teaching method and the assessment processes. The selected subjects were divided into a small group; each group composed of eight students. They were assigned to join in planning for development of nursing innovation. The effectiveness of this teaching program was evaluated from individual knowledge management skill and competency in development of nursing innovation. The selected subjects were also arranged as follows:

1) ***Knowledge identification***: students had to be able to perform assessment and self-evaluate of their knowledge on pathology and caring for children, adult and aging. They have to be able to summarize and share knowledge through paper and within group.

2) ***Knowledge acquiring*** via textbook, documents, research and databases for pathology and caring a specific disease in some patients.

3) ***Knowledge Organizing***: make a conclusion of obtained knowledge by using mapping technique.

4) ***Knowledge Codification***: classifying, screening, summarizing, and presenting the obtained knowledge to mentors of each ward.

5) ***Knowledge accessibility*** by using an individual portfolio of self-development and knowledge management, then the students have to present through the documents, websites such as gotoknow.org or www.pckpb.ac.th.

6) ***Knowledge sharing***: presenting of idea mapping as individual requirement and group work.

7) ***Learning:*** summarizing of self-development, knowledge management practice and learning outcome.

Data analysis: Descriptive statistics were used to assess the demographic data and scoring of the study's instruments.

Results

Knowledge management skills and nursing innovation development competency of nursing students

Table 1: Mean scores and standard deviations of knowledge management skills evaluated by nursing students and lecturers after using integrated instructional program (n= 40)

Lists of evaluation	udents		Lecturers	
	$\bar{x}$	SD	$\bar{x}$	SD
1. Able to analyze self- strength and weakness and specify which aspect should be developed.	4.48	0.48	4.10	0.30
2. Able to perform self-analyze on weakness toward knowledge of learning subject.	4.25	0.51	4.05	0.32

Lists of evaluation	udents		Lecturers	
	$\bar{x}$	SD	$\bar{x}$	SD
3. Able to clearly state about obtained knowledge	4.18	0.50	3.98	0.16
4. Able to clearly plan for self-development and matching with the result of self-evaluation.	4.35	0.48	3.70	0.46
5. Able to inquire in indicated points of learning subject	4.20	0.46	3.58	0.50
6. Able to perform an academic search from variety and update sources	3.98	0.28	3.68	0.47
7. Able to apply knowledge from theory and clearly create concept mapping about pathology and caring	3.85	0.36	3.85	0.36
8. Able to search and accesses to variety sources of Internet such as Go to know.org, Web Board, Web Blog	3.90	0.30	3.90	0.30
9. Able to summarize completely and correctly the knowledge sharing within small group of each ward.	4.30	0.54	4.03	0.16
10. Able to clearly summarize the obtained benefits and self-development scheme base on knowledge management before end of the practicum.	4.35	0.46	4.00	0.00
Total	4.18	0.44	3.89	0.15

As shown in Table 1, the study's findings revealed all of the post-program mean scores of the students' knowledge management skills by self-evaluation were at a level determined as "good." ($\bar{x}$ = 4.18). The highest mean score was displayed in "able to analyze self-strength and weakness and capable to identify particular development issue ($\bar{x}$ = 4.48), followed by, able to clearly summarize the obtained benefits and self-development scheme base on knowledge management before end of the practicum. ($\bar{x}$ = 4.35). The lowest average presented in "able to apply theory in creating concept mapping of pathology and caring for patients ($\bar{x}$ = 3.85) and search and accesses to variety sources of Internet such as Go to know.org, Web Board, Web Blog ($\bar{x}$ =3.90).

The total mean scores of knowledge management that assessed by lecturers were at a "good." level ($\bar{x}$ = 3.89). The highest mean score was: able to analyze self-strength and weakness and specify which aspect should be developed. ($\bar{x}$ = 4.10). Followed by able to perform self-analyze on weakness toward knowledge of learning subject ($\bar{x}$ =4.05). The lowest average level was able to inquire in indicated points of learning subject ($\bar{x}$ = 3.58)

Table 2: The nursing students' mean scores of self-evaluation on nursing innovation development competency after using integrated instructional program (n=40)

Lists of evaluation		Ɔ
1. Able to analyze and solve the problems in development of nursing innovation.	4.33	0.47
2. Able to participate in planning for development of nursing innovation.	4.08	0.48
3. Able to apply knowledge management method from class to develop nursing innovation	3.97	0.16
4. The innovation was backed up by supporting theory and updated references.	3.68	0.47
5. The developed innovation supported by rationales and based on the evidence.	3.90	0.30
6. Traditional wisdom was integrated with your developed innovation	3.98	0.16
7. The developed innovation was systematically trialed and improved	3.73	0.45
8. The developed nursing innovation was represented worthiness and valuableness	3.96	0.36
9. The developed innovation represented creativity.	3.98	0.16
10. The developed innovation showed usefulness to clients.	4.23	0.27
Total	**3.98**	**0.33**

As shown in Table 2, the mean scores of students' self-evaluation on nursing innovation development competency was presented at a"good" level ($\bar{x}$ = 3.98). The highest mean score was presented in able to analyze and solve the problems in development of nursing innovation. ($\bar{x}$ = 4.33) Followed by, the developed innovation showed usefulness to clients ($\bar{x}$ = 4.23). The lowest mean score was the innovation was backed up by supporting theory and updated references. ($\bar{x}$ = 3.68).

Table 3: The mean scores of developed nursing innovation among groups of nursing students after using integrated instructional method (n=5)

Lists of evaluation		D
1. Name the innovation interestingly and corresponding with the purpose of study.	2.20	0.45
2. Clearly present the rationales of innovation.	2.20	0.45
3. The purpose of study was clearly presented and covered all related aspects.	3.00	0.00
4. Provide supporting theory and used present reference.	2.40	0.55
5. Clearly indicate steps in development of nursing innovation.	2.40	0.55
6. The developed innovation shows worthiness and economy.	2.00	0.00
7. The developed innovation presents creativity.	2.40	0.55
8. Apply and integrate proper technology and traditional wisdom to innovation.	2.60	0.55

Lists of evaluation		D
9. The developed innovation is trialed and improved scientifically.	2.00	0.00
10. The developed innovation is benefit to clients.	2.40	0.55
11. Using appropriate language.	2.00	0.00
12. Respond to question and suggestion accurately.	2.00	0.00
13. Using properly media for presentation.	2.40	0.55
14. Using appropriately time for presentation.	3.00	0.00
Total	**2.36**	**0.30**

As shown in Table 3, the mean scores of developed nursing innovation evaluated by lecturer was presented at a "moderate" level ($\bar{x}$ = 2.36). The highest mean score at a "good" level was displayed in 1) the purpose of study was clearly presented and covered all related aspects ($\bar{x}$ = 3.00), and 2) use appropriately time for presentation. The lowest mean scores at a "moderate" level were 1) the developed innovation shows worthiness and economy, 2) the developed innovation is trialed and improved scientifically, and 3) respond to question and suggestion accurately ($\bar{x}$ = 2.00).

The findings from qualitative data presented that majority of students (24 students) insisted that the teaching by using knowledge management skills and development of nursing innovation competency enhanced their self-evaluation and life planning. They increased their eagerness to learn after entering in this program. Ten of subjects asserted that using of knowledge management together with development of nursing innovation allowed them to shape their analyzing problem skills and improved their creative idea on pertinently development of nursing innovation for patients. Moreover, five of them explained that the linking of existing knowledge from class and perform a concept mapping of pathology made them understand more in caring for patients. However, the existed barrier of this study was about speed of internet. It affected on searching of information and online sharing knowledge. Some subjects indicated that there was no variety source of information. The slowly speed of internet delayed sharing knowledge process which time consuming.

Discussion

The integration of developed program into academic curriculum may be a mean to ensure that nursing students were trained to be active, yearn to know, lifelong learning and take responsibility of their individual study and group innovation creativity. All these skills could eventually increase their self-confidence to work as a nurse. Moreover, Thailand will face with the ASEAN Economic Community in 2015. Service careers such as nursing and medical practitioner are expected to see particular movement, resulting in high competition in the local workforce because that will be allowed to work across the ASEAN region in the next year. Change and uncertainty are now the only constants in contemporary health care, thus health-care professionals, including nurses, need to become lifelong learners if they are to remain competent in their fields. A supportive learning culture in the college is vital to the development of the lifelong learner. Nursing colleges have explicitly incorporated lifelong learning into their educational philosophies either via their mission statements, goals, strategies, and learning outcomes. This is evidenced through the emphasis placed on student-centered learning – including the promotion of critical

and analytical thinking skills as a part of the learning process. These integrated instructional methods assist in developing the attributes of lifelong learning in the students.

After the experimental study by using integrated instructional method in "Nursing Care of Persons with Health Problems Practicum I" for six weeks, the average levels of self-evaluation score and lecturer evaluation score toward knowledge management skills were showed at a "good" level. Also the development of nursing innovation competency was at a "moderate" level. These findings get in the same way as Gustafson's study (2003) that students enabled to communicate effectively with patients, increased of team cooperation and sharing. Students were able to perform holistic care to their clients as well.

The mean scores on knowledge management skill of nursing students were at a "good" level. The students were able to evaluate their strength, weakness, and specified issues that they need to improve themselves. Moreover students also abled to summarize gained benefit and self-development plan after the end of practicum. According to Hirschbuh & Bishop (2002) studied about knowledge management in distance learning. Their study revealed that KM can improve distance learning outcome. Additionally, the qualitative data discovered that knowledge management processes helped students to improve their self-evaluation skill and planning for self-development. It was also useful in learning by increasing the eagerness in searching information.

However, the barrier for this program was about the speed of internet. The internet affected on searching and sharing knowledge through online. The subject groups reported that they could not perform searching via variety of online sources because the providing internet had a very low speed even they had a limit of time for searching. Sridharan & Kinshuk (2002) asserted that information technology was an influent factor for achievement in knowledge management. The study of Milam (2001) also confirmed that e-learning was an important part for knowledge management because it was frequently used by learners. In this study, the results showed that the average score that evaluated by lecturers on nursing innovation of the students was in moderate level. It demonstrated that they had moderate skills because they studied in second year and just started in caring a patient. Thus, they might not perform well in analytical thinking. When consider in detail, using appropriately time for presentation and clearly stating purpose of study was presented at a "good" level. This reflected that students abled to link the existing problems and objective of the study. The using of knowledge management could be applied for nursing innovation development. The analytical problem skill and creative thinking could be obtained from development of nursing innovation which existed in the real working environment.

Conclusions and Recommendations

This study used integrated instructional program to promote knowledge management skills and nursing innovation development competency for Thai nursing students. It can serve a guide for faculty to enhance self-development, nursing innovation creativity and problem solving in nursing students. The institute should encourage and support the faculties to use continuously the developed program. The facilitating

factors for researching such as documents, journals, and high speed internet connecting point should be provided for students and lecturers. Finally, lecturers need to give systematic suggestion for students in order to create lifelong learning and develop nursing innovation. For further study, it was recommended that next study should use this teaching method with variety groups of participant and apply in other subjects and different settings such as community.

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