ผลของการเรียนรู้แบบนำตนเองด้วย SWU-Moodle ในรายวิชาการพยาบาลมารดาและทารก และวิชาการผดุงครรภ์ต่อความรู้ ความพร้อม และความพึงพอใจต่อการเตรียมความพร้อมเพื่อสอบขึ้นทะเบียนรับใบอนุญาตประกอบวิชาชีพการพยาบาลและการผดุงครรภ์

Effects of Self-directed Learning by the SWU-Moodle on Knowledge, Readiness and Satisfaction in Preparations for the Registered Nursing and Midwifery License Examination

นิพนธ์ต้นฉบับ

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Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่อเปรียบเทียบความรู้และความพร้อมในการสอบขึ้นทะเบียนและรับใบอนุญาตประกอบวิชาชีพการพยาบาลและการผดุงครรภ์ ก่อนและหลังการเรียนรู้แบบนำตนเองด้วย online SWU-Moodle รายวิชาการพยาบาลมารดาทารกและวิชาการผดุงครรภ์ และประเมินความพึงพอใจต่อ SWU-Moodle **วิธีการศึกษา:** การศึกษาแบบหนึ่งกลุ่มประเมินผลลัพธ์ก่อนและหลัง มีตัวอย่างเป็นนิสิตพยาบาลศาสตร์ชั้นปีที่ 4 ปีการศึกษา 2563 มหาวิทยาลัยศรีนครินทรวิโรฒที่มีคุณสมบัติตามเกณฑ์จำนวน 57 คน เครื่องมือวิจัยคือ online SWU-Moodle ของสองรายวิชาดังกล่าวจำนวน 8 หน่วย ใช้เวลาเรียน 12 สัปดาห์ แบบสอบถามข้อมูลส่วนบุคคล แบบทดสอบความรู้ แบบประเมินความพร้อมในการสอบเพื่อขึ้นทะเบียนฯ และแบบประเมินความพึงพอใจ ใช้สถิติเชิงพรรณนา วิลคอกซัน การทดสอบ one-sample t test และการทดสอบไบโนเมียล **ผลการศึกษา:** คะแนนความรู้ และคะแนนความพร้อมหลังการเรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติ (P-value < 0.001 ทั้งคู่) คะแนนความพึงพอใจต่อ SWU-Moodle สูงกว่าเกณฑ์ร้อยละ 80 อย่างมีนัยสำคัญทางสถิติ (P-value < 0.001) **สรุป:** การเรียนรู้แบบนำตนเองด้วย online SWU-Moodle ในรายวิชาการพยาบาลมารดาทารกและวิชาการผดุงครรภ์สามารถเพิ่มความรู้และ ความพร้อมในการสอบขึ้นทะเบียน และผู้เรียนมีความพึงพอใจ ควรนำรูปแบบการเรียนรู้แบบนำตนเองด้วย online SWU-Moodle ไปใช้ในการเรียนการสอนปกติ

คำสำคัญ: การเรียนรู้แบบนำตนเอง, SWU-Moodle, การพยาบาลมารดาและทารก, การผดุงครรภ์, การสอบขึ้นทะเบียนรับใบอนุญาตประกอบวิชาชีพการพยาบาลและการผดุงครรภ์

Editorial note

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Abstract

Objective: To compare scores of knowledge and readiness in preparing for the nursing and midwifery license examination before and after using the self-directed learning online SWU-Moodle of Maternal and Child Nursing and Midwifery subjects, and determine satisfaction on SWU-Moodle. **Methods:** This one-group pre-test-post-test pre-experimental study had 57 57 4th year nursing students in the academic year 2020, Srinakharinwirot University meeting eligibility criteria as participants. Research instruments were the SWU-Moodle of the two subjects, and questionnaires to measure knowledge, readiness and satisfaction in using SWU-Moodle. The data were analyzed by using descriptive statistics, Wilcoxon signed rank test, one-sample t test and binomial test. **Results:** Scores of knowledge and readiness at post-test were significantly higher than those at pre-test (P-value < 0.001 for both). Score of satisfaction at post-test was significantly higher than the criterion of 80% (P-value < 0.001). **Conclusion:** Self-directed learning with the SWU-Moodle of Maternal and Child Nursing and Midwifery increased knowledge and readiness for the license examination with satisfaction. SWU-Moodle learning platform should be used in regular class.

Keyword: self-directed learning, SWU-Moodle, maternal and child nursing, midwifery, nursing licensing examination

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Introduction

Professional nurses are essential for health care of healthy and ill individuals. Nurses need to have mandatory knowledge and skills for safe and effective care and graduate from institutes accredited by the Thailand Nursing and Midwife Council.[1] Nurse graduates had to pass the examination for the license for nursing and midwifery practice through 8 subjects including 1) maternal and child nursing, 2) midwifery, 3) child and adolescent nursing, 4) adult nursing, 5) geriatric nursing, and 6) mental health and psychiatric nursing, 7) community health nursing, and 8) laws and ethics in nursing. A minimum 60% pass criterion was applied for the examination of each subject. The number of nursing graduates passing the license

examination is also used as the quality assurance criterion for nursing schools. At least 70% of graduates taking the license examination for the first time of the three consecutive years have to pass all 8 subjects.[2] Therefore, nursing schools have to prepare their students for the license examination.

Faculty of Nursing, Srinakharinwirot University (SWU) is an accredited nursing school with standard curriculum and training under the SWU plan 2020 – 2023.[3] Based on data of graduates of academic years of 2014 – 2017, only 57.93% of them passed all subjects of the license examination. The downward trend was found in the next year.[4] It had been found that only 58.00% of graduates passed the examination only by 58.00% in subjects if maternal and child nursing and midwifery in the past 4 years with mean scores lower than the nationwide mean score. Students' evaluation on these courses and in-person discussion with students suggested that maternal and child nursing and midwifery courses contain a large portion of specific knowledge not commonly shared in other courses. These courses were taught first and only in their third year. The opportunity to be familiar with the content is relatively limited compared with other courses. Midwifery is the course with very specific knowledge and skills for the care of women at pregnancy, delivery and postpartum stage. In Australia, New Zealand, and the US, Midwifery is considered a special course that needs additional time for study other than courses in nursing to fulfill its mandated learning and skill training.[5-7] The classes of midwifery arranged along with other classes could limit the student's learning on this difficult subject. With the Covid-19 pandemic, in-person training for midwifery skills in the actual practice site was limited. Instructors arranged skill training using simulated scenarios and models for delivery skill before their actual training at the hospital. Students had to spend more time and put more effort to master the content and skill. The instructors also used team-based learning (TBL) and problem-based learning (PBL) which are group learning. However, most students reported that they could not summarize important points or issues of the content from group learning. Students were far from understanding the content. With the tutorial session provided before the license examination, students reported inadequate time for study, and they had no clear direction to self-study for the license examination.

Based on literature review, in knowledge management software Moodle and electronic media learning, factors affecting license examination included cumulative GPA in the third year, cumulative GPA in the fourth year, cumulative GPA throughout the curriculum, achievement motive, family factors[8], and learning styles in didactic classes and practicum training.[9] A qualitative study revealed that learning style for didactic courses that met students' needs including learning that attracts student's attention, self-direct learning experience, and availability of desirable learning media helped nursing students perform better in the license examination.[10] In the Middle East, Moodle encouraged nursing students prepare better before class and after class participation, self-directed and lifelong learning motivation, and putting more effort in their learning.[11] Self-directed learning using Moodle in the course of Ethics in Clinical Research for doctorate students from medicine, nursing, and dentistry allowed students to have better understanding and application of the knowledge in their clinical research project.[12] PBS on diagnosis using direct ophthalmoscope via Moodle helped medical students have a high academic achievement which was also higher than that before the learning and a good precision in diagnosis.[13] The use of Moodle on direct ophthalmoscope in the course of ophthalmology helped 5th year medical students had higher scores compared with those not using Moodle.[14] Electronic learning (e-learning) in nursing students with traditional class learning enhanced learning effectiveness. E-learning in addition to traditional class improved learning effectiveness than the traditional class alone.[15,16] Online learning is thus critical for nursing learning. Online learning is also convenient, less costly, and appropriate for social distancing.

Instructors of the Department of Maternal Nursing and Midwifery initiated the SWU-Moodle for the didactic courses in the first semester of the academic year 2020. Learning activities included traditional lectures through interactive real time VDO conference, Q&A via asynchronous board, and off-class self-directed learning with learning media in Moodle which was highly accepted by students. There have been no studies using Moodle for self-directed learning to prepare students for nursing license examination. The researcher aimed to develop self-directed learning to prepare 4th year nursing students for license examination using SWU-Moodle online learning system. On the SWU-Moodle platform, various learning media were placed including videos of nursing care skills for midwifery, videos summarizing main contents, e-book and exercise, sample questions, and examination question analysis. Students could use self-directed learning to review

content before examination whenever and wherever it was convenient in addition to their regular classes. Online learning was also suitable for the present situation of Covid-19 pandemic that needs new-normal living. This intervention was in the course of Maternal and Child Nursing and of Midwifery for 4th year students.

This study aimed to determine effectiveness in improving knowledge, readiness, and satisfaction of using the online SWU-Moodle platform for self-directed learning in the courses of Maternal and Child Nursing and of Midwifery for 4th year students to prepare for nursing license examination. We specifically aimed to compare knowledge scores and license-examination readiness scores of the courses of Maternal and Child Nursing and of Midwifery before and after self-directed learning using the online SWU-Moodle platform. We also compared satisfaction score toward the use of the online SWU-Moodle platform with the criterion of 80%. Lastly, rate of passing the license examination was compared against the criterion of 70%. Accordingly, it was hypothesized that knowledge scores and readiness scores after the use of the online SWU-Moodle platform were higher than those before the use, satisfaction scores were higher than 80%, and rate of passing the license examination was higher than 70%.

This study was conceptually framed based on the self-directed learning of Knowles (1975)[17] which consists of the learner, the teacher, and learning resources. The learner has to have potential for self-directed learning, self-control, and self-planned learning. The teacher acts as a facilitator than the teacher. Learning resources are clear in styles, objectives and/or technique in questioning, exercise to train skills, consultation, self-evaluation, proactive reading, outcome assessment and grading. Online learning uses various learning media to attract and meet learners' needs.

Methods

In this one-group pretest-posttest pre-experimental study, study population was 116 4th year nursing students of SWU in academic year completing the courses of Maternal and Child Nursing and of Midwifery which were in their 3rd year of study. Study sample was those in study population who met the study inclusion criteria. To be eligible, they had to pass the comprehensive exam in the fourth year and have devices for online learning such as mobile phone, notebook computer, and Tablet or iPad with internet service available.

The participants were selected by convenience sampling method. The research project was publicized through posters to attract student's participation. A total of 106 out of 116 students requested participation and met the inclusion criteria. These 106 participants completed the pre-test questionnaire but only 57 used SWU-Moodle and completed the post-test questionnaire.

Research instruments

The instruments consisted of the experimental tool and the questionnaire. The SWU-Moodle was a self-directed learning online platform containing content of the courses of Maternal and Child Nursing and of Midwifery as guided by the Nursing Council competency blueprint 2018. There were 8 units of learning, 4 for each subject. Students were allowed to choose to learn any unit regardless of order.

In each unit, learning media were E-book for summarized content, 2) 5–to-20-minute video of Powerpoint™ presentation of summarized content, 3) pre-test and post-test for each section with 10 to 40 questions for each test, 4) Line group classroom for preparing students in each unit. In this Line group, student could submit questions or request to the researcher at all time. The researcher answered back either through Line group or Line for individual students for clarifications in real time. Questions and issues from Line were further discussed and clarified through Google Meet online classroom for a tutorial before the license examination. The content of story board, topics, and learning media was examined for content validity and face validity by 4 experts namely one in information technology and three faculty members in Maternal and Child Nursing and midwifery.

The second instrument was the questionnaire which consisted of 4 parts. Part 1 collected demographic characteristics of students including gender, age, academic year entering the nursing school, cumulative GPA, type of residency, electronic devices used for learning and the Internet signal quality for learning. The second part assessed knowledge in Maternal and Child Nursing and midwifery. There were 75 4-choince multiple-choice questions, 10 – 40 questions for each unit. Questions for pre-test and post-test were the same but were shuffled in order of questions and choices.

The third part assessed readiness for license examination. The questions were from a previous work[18] which was developed based on concept of readiness. The original 20

questions were about confidence, perceived will-power in pursuing targeted and desired outcomes, confidence and feeling well-equipped with knowledge and capacity in taking the examination, perceived importance of the examination, planning and setting goals, and scheduling study time. Based on the experts' suggestions, there were two more questions added resulting in a total of 22 questions about attitude toward the license examination, plans for the examination, and preparations for the examination. The response was modified from 3- to 5-point rating scale ranging 1-highly disagree, to 2-disagree, 3-neutral, 4-agree, and 5-highly agree. With the possible total scores of 22 – 110 points, high scores indicated a higher level of readiness. Based on Bloom (1975)[19], levels of readiness were categorized as low, moderate, and high (22 – 50, 51 – 80, and 81 – 110 points, respectively).[20]

The fourth part assessed satisfaction in preparing for the examination by self-directed learning using SWU-Moodle. The questions were modified from a previous work on satisfaction in electronic learning media.[21] One question was added to the existing 14 to the total of 15 questions regarding satisfaction in content, media format, and usefulness. Questions were modified to suit learning platform in this study. Response was a 5-point rating scale ranging from 1-highly dissatisfied, to 2-dissatisfied, 3-neutral, 4-satisfied, and 5-highly satisfied. With the possible total score of 15 – 75 points, higher scores indicated higher satisfaction. Based on Bloom (1975)[19], levels of satisfaction were categorized as low, moderate, and high (15 – 34, 35 – 54, and 55 – 75 points, respectively).[20] An open-ended question was placed for additional recommendations.

Research instrument quality assurance

Part 2 – 4 of the questionnaire was tested for content validity and face validity by three experts, specifically two nursing instructors in Maternal and Child Nursing and midwifery from a public university and one nursing instructor with the same specialty from a private university. The questionnaire was further tested in 20 4th year nursing students with characteristics similar to the participants for difficulty level (P), discriminatory power (r), and internal consistency reliability as follows.

The test on knowledge of Maternal and Child Nursing and midwifery was tested for difficulty and discriminatory power[22]. Internal consistency reliability was tested using KR-20 The Maternal and Child Nursing test had difficulty index of 0.64 and discriminatory power of 0.20 which mean that the test was relatively easy for difficulty and acceptable or fair discriminatory power.[20] For midwifery test, difficulty index of 0.56 indicated appropriate difficulty and discriminatory power of 0.20 which indicated acceptable or fair discriminatory power.[20] The questions on knowledge had high internal consistency reliability with KR-20 coefficients of 0.79 for Maternal and Child Nursing and 1.00 for Midwifery.

For the readiness for license examination questionnaire, the content had high content validity with a Content Validity Index (CVI) of 0.95 and high internal consistency reliability with a Cronbach's alpha coefficient of 0.96. For the satisfaction in preparing for license examination using the SWU-Moodle, it had perfect content validity (CVI = 1.00) and very high internal consistency reliability (Cronbach's alpha coefficient = 0.96).

Participant right protection

The study was approved by the Ethics Committee for Human Study of Srinakharinwirot University (approval number: SWUEC/E-154/2563; approval date: July 16, 2020). The researcher approached prospective participants through online Google Meet to provide information about objectives, process, evaluation, support, and voluntary nature of the study. Participants were allowed to withdraw from study at any time with no consequences. Written informed consent was obtained through online communication before starting the study conduct.

Study procedure

The experimental part was as follows. Once written informed consent was obtained, the participants were asked to complete the questionnaire online. The online learning SWU-Moodle platform was open for participants. First, participants were introduced to SWU-Moodle online platform. Time needed for self-directed learning activities for each of the two courses (i.e., Maternal and Child Nursing and Midwifery) was provided. The activities included 1) pre-test before learning, review of content in E-book, 3) video viewing on 5-20 minutes of summarized content, 4) post-test with multiple-choice questions, written examination, and summary writing or mapping, and 5) post-learning review scheduled for ½ to 1 hour each day for 3 times per week, for all sections of the two courses, for 12 weeks.

Research outcomes assessment was done online through Google Meet. On day 1 of week 1, through Google Form, questionnaire on demographic characteristics, knowledge, and readiness for license examination was completed which took about 25 minutes. From week 1 to 12, participants learned all 8 units regardless of order. Questions and concerns were acknowledged and responded through Line group at all time. On day 7 of week 12, through Google Form, participants were asked to complete the questionnaires of knowledge, readiness for license examination and satisfaction on SWU-Moodle which took about 25 minutes to complete. After the last questionnaire completion, the researcher met all participants via online for ending remark and response for concerns and questions. Participants were given ค่าตอบแทน through participant's bank account as a token of appreciation.

Data analysis

Descriptive statistics including frequency with percentage and mean with standard deviation (SD) to summarize demographic characteristics, knowledge, readiness for license examination, and satisfaction. Answers for the open-ended question were summarized based on common themes found.

Scores of knowledge and readiness before and after the SWU-Moodle learning2 were compared using paired t test or Wilcoxon signed rank test, as appropriate. Score of satisfaction was compared with the criterion of 80% using one-sample t test. Proportions of participants passing the license examination for each of the Maternal and Child Nursing and Midwifery were compared with the criterion of 70% using binomial test. In addition, association between levels of post-test scores (high and low-to-moderate scores) and passing the license examination for each subject was tested using Fisher's exact test. Statistical significance was set at type I error of 5%. All statistical analyses were done using software program SPSS version 20.0.

Results

Of the 57 participants, most were female (98.2%). With an average age of 22.77 years, the youngest was 22 and the oldest was 26 years. Most entered the school in academic year 2017, had cumulative GPA of 3.00 – 3.49 (71.9%), and lived in the university dormitory (82.5%). About three-quarters had mobile phone with notebook computer and iPad online learning (77.2%) and about half used Wi-Fi signal at the dormitory or the nursing school with a sim card signal (45.6%). About half had completed tests in SWU-Moodle for at least 16 times (52.6%). The average number of tests completed was 14.74 times.

Scores of knowledge in Maternal and Child Nursing significantly increased from 37.26 ± 9.13 points at pre-test to 47.23 ± 9.85 points (P-value < 0.001). Similarly, scores of knowledge in Midwifery significantly increased from 41.14 ± 6.18 points at pre-test to 52.46 ± 8.14 points (P-value < 0.001) (Table 1).

Table 1 Scores of knowledge before and after SWU-Moodle learning (N = 57).

Course	Score of knowledge				P-value*
	Before learning		After learning		
	Actual range	Mean ± SD	Actual range	Mean ± SD	
Maternal and Child Nursing	15 - 55	37.26 ± 9.13	28 - 75	47.23 ± 9.85	< 0.001
Midwifery	23 - 52	41.14 ± 6.18	32 - 72	52.46 ± 8.14	< 0.001

* Wilcoxon signed rank test.

Score of overall readiness for license examination for the two courses significantly increased from 89.91 ± 12.11 points at pre-test to 97.53 ± 12.12 points at post-test (P-value < 0.001) (Table 2).

Table 2 Scores of readiness for license examination before and after SWU-Moodle learning (N = 57).

Aspects of readiness	Score of Readiness						P-value*
	Before learning			After learning			
	Actual range	Mean ± SD	Level (%)	Actual range	Mean ± SD	Level (%)	
Attitude	27 - 45	38.93 ± 4.44	High (87.7)	25 - 45	41.32 ± 4.29	High (89.5)	
Plan	7 - 30	23.35 ± 4.40	High (59.6)	13 - 30	26.11 ± 4.16	High (80.7)	
Preparation	15 - 35	27.63 ± 5.06	High (63.2)	17 - 35	30.11 ± 4.57	High (75.4)	
Overall	66 - 110	89.91 ± 12.11	High (70.2)	55 - 110	97.53 ± 12.12	High (84.2)	< 0.001

* Wilcoxon signed rank test.

At post-test, mean score of **satisfaction** in preparing for license examination using SWU-Moodle online learning was 68.05 ± 7.32 points or 90.73% of the total score of 75 points. This 90.73% was significantly different from the criterion of 80% (one-sample t test = 8.31, P-value < 0.001). In accordance with the mean score, it was found that 84.2% of participants had satisfaction score at least 80% of the total score of 75 points.

When compared with the 70% criterion of the license examination, i.e., at least 70% of examinees need to pass the national examination, 100% and 93% of 57 participants in our

study passed Maternal and Child Nursing and Midwifery subjects, respectively, with statistical significance (P-value < 0.001 for both) (Table 3).

Table 3 Proportions of participants passing the license examination compared with the criterion of 70% (N = 57).

Examination subjects	License examination results				P-value*
	Passed		Not pass		
	N	%	N	%	
Maternal and Child Nursing	57	100	**0**	0	< 0.001
Midwifery	53	93.0	4	7.0	< 0.001

* Binomial test.

In addition, it was found that those with high and low-to-moderate scores of post-test pass the license examination assed Maternal and Child Nursing and Midwifery, respectively, with no statistical significance. For Midwifery, there were more participants with high post-test scores who passed the license examination (94.1%) those with low-to-moderate post-test scores (83.3%) with statistical significance (P < 0.001) (Table 4).

Table 4 Association between levels of post-test scores and passing the license examination (N = 57).

Examination subjects	Post-test score	License examination results				P-value*
		Passed		Not pass		
		N	%	N	%	
Maternal and Child Nursing	High	51	100.0	0	0.0	0.292
	Low-to-moderate	6	100.0	0	0.0	
Midwifery	High	48	94.1	3	5.9	0.367
	Low-to-moderate	5	83.3	1	16.7	

* Fisher's exact test.

Discussions and Conclusion

In this one-group pretest-posttest pre-experimental study, the SWU-Moodle online self-directed learning was tested in 4th year nursing students who had passed the courses of Maternal and Child Nursing and of Midwifery in their 3rd year of study. Knowledge scores of the two subjects after self-directed learning increased significantly. This could be attributable to repeatedly reviewing and testing the content through summarizing E-books, viewing videos, and taking tests. There repeated learning activities allowed participants to memorize and comprehend each important contents of the two subjects for the post-test, and ultimately the license examination.

Based on Bloom's learning concept[23], SWU-Moodle allowed for learning from memorization, to comprehension, application and so on. Basic knowledge was provided for memorization and participants were subject to summarization (e.g., comparison and contrast, grouping, and explanation). which was based on comprehension. The comprehension led to application with cases or problems presented in repeated interactive media in SWU-Moodle including videos, E-books, and. application. These media enabled this self-directed learning[10,11,24,25] which could enhance the knowledge at post-test.[13,21,26] However, this kind of self-directed online learning resulted in similar results of knowledge, skill and satisfaction as the traditional learning among nursing student in studies in other countries.[27]

Readiness scores at post-test (97.53 points) were higher those at pre-test (89.91 points) significantly (P-value < 0.001). The increase of readiness score was 8.47%. The readiness before the review in SWU-Moodle could be low since students were not familiar with the content of the license examination. In addition, the regular courses of Maternal and Child Nursing and of Midwifery were taught in their 3rd year; they could have forgot a large part of the content. The confidence was thus not at a high level. Thus only 70.2% of them evaluated their overall readiness for license examination at a high level at pre-test and as high as 84.2% at post-test. The repeated interactive reviews and exercises could have promoted participants' confidence in taking license examination. The increase in readiness scores is consistent with a previous study where score of readiness for nursing license examination score after review session was significantly higher than that before the program.[18]

At post-test, mean score of **satisfaction** in preparing for license examination using SWU-Moodle online learning was 68.05 ± 7.32 points or 90.73% of the total score of 75 points. This 90.73% was significantly different from the criterion of 80% (one-sample t test = 8.31, P-value < 0.001). In accordance with the mean score, it was found that 84.2% of participants had satisfaction score at least 80% of the total score of 75 points.

Score of satisfaction on SWU-Moodle self-directed learning to prepare for license examination (mean = 90.73% of the total score) was significantly higher than the criterion of 80% (P-value < 0.001), corresponding to 84.2% of participants with satisfaction score of at least 80%. This could be because content, media format, and usefulness of the interactive

learning media were functional, and attention drawing. These interactive media could be viewed at any time anywhere for convenience either online or offline.[16] The media contained exercises with answers for convenient practice.[10] Participants in our study were highly satisfied with the media of SWU-Moodle which is consistent with previous studies.[21,26] Participants in our study also provided suggestions as follows. With its useful for reviewing the content, E-book should incorporate all subjects other than the two courses. Exercises and questions after each learning unit helped them think thoroughly. More exercises and questions should be added for an extensive training. In regular classes, interactive learning platform for self-directed learning like SWU-Moodle should be provided.

Participants passed both courses in the license examination more than the criterion of 70%, specifically 100% for Maternal and Child Nursing and 93% for Midwifery with no statistical significance in either subject. It has been known that passing the license examination is affected by various factors.[8-10] Content review and practice with questions could help examinees to pass the examination.[10,16,21,26] The subject of Midwifery is in general more difficult that Maternal and Child Nursing, it was not unexpected that 93% passed the Midwifery examination compared with 100% passing the Maternal and Child Nursing. We also found that all participants either with high or low-to-moderate scores of post-test passed license examination at very high proportions. This high proportion of passing license examination could also be because we also offered all students additional tutorial sessions after the study conduct which was close to the national nursing license examination.

This study has certain limitations. Since it was a pre-experimental research, study outcomes could be confounded by various factors such as additional review session 3 months before the research, no mechanisms to promote compliance in attending learning units, no control group, and no randomization. Another limitation was that the questions testing knowledge for pre-test and post-test were the same. This could make the study suffer from bias of recalling the questions. However, the researcher tried to reduce this bias in part by shuffling the questions and choices in the post-test.

Study findings and conduct suggest that providing and learning through SWU-Moodle is possible and effective. It should be developed for all courses subject to the license examination and provided for nursing students in regular courses. Future studies with a control group should be conducted to examine the actual benefits of this online learning platform.

In conclusion, the interactive online SWU-Moodle for self-directed learning helped 4th year nursing students to prepare for license examination through summarization, content review on E-books and videos, and exercise questions on the subject of Maternal and Child Nursing and Midwifery. Scores of knowledge and scores of readiness at post-test increased from those at pre-test significantly. Scores of satisfaction of using the platform were higher than the criterion of 80%. Participants passed the license examination by 100% for Maternal and Child Nursing and 93% for Midwifery which was more than the criterion of 70% for both subjects.

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