



A Development of Open Online Lessons on “Reasonable Drug Use for Nursing Students”

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Abstract

The aim of this study was to develop and evaluate the effectiveness of an online learning program called “rational use of drugs for nursing students”. The sample consisted of 155 third-year nursing students from the Faculty of Nursing at Burapha University. This study was conducted from February 2022 to April 2023. The research instruments were two assessment forms to evaluate the quality of online teaching and satisfaction with the use of online lessons. The data were analyzed using descriptive statistics. The results showed that 1) the online courses define learning units RDU, RDU to case study, case study and knowledge integration RDU with 10 hours of the learning time. Students must have a total score of at least 60% to be considered qualified. 2) Overall quality and factors related to the quality of online courses were ranked at the highest level ($M = 4.52$, $SD = .37$, and $M = 4.62$, $SD = .48$), followed by outcomes and process quality ($M = 4.37$, $SD = .46$, and $M = 4.09$, $SD = .53$, respectively). Students were very satisfied with all the five aspects of the online learning program. This online course aids the preparation of healthcare professional students during their internship period in clinical practice. This may also guide the professional nurses in conducting further research in the promotion of rational drug use.

Keywords: nursing students; online learning; rational drug use



Introduction

The rational use of drugs refers to the administration of medication in correct dose in appropriate time and at low cost.¹ A situation analysis of the drug usage to treat diseases at national and global level indicated that countries such as Britain, spent 466 million pounds for unreasonable drug use that exceeded the need for treatment, adverse reactions. The increasing number of drug-resistant deaths were reported in Asian and African countries accounting for an economic expenditure for 3.5 billion.² In Thailand, the problem of unreasonable drug use is reported, with a usage of around 128 million pills every year.³ An estimated number of 38,481 patient deaths occurred resulting from antibacterial drug resistant.⁴

Professional nurses play an important role in the healthcare team as service providers, in drug administration and pre-medication evaluations that include preliminary investigation, collecting medication history, monitoring side effects, inappropriate drug use, identify at-risk patients for drug use and intervene to reduce drug use.⁵⁻⁶ Thailand Nursing and Midwifery Council (TNMC), indicated ten criteria for evaluating the reasonable drug use competencies that include evaluation of the necessity of drug use. Communicating with patients about the necessary information for rational drug use decision making, drug management, treatment monitoring and appropriate medication use, and collaborating with other multidisciplinary team members could promote rational drug use.⁷

The institution has started to introduce the rational drug use curriculum that the TNMC has made in teaching and learning in the academic year since the academic year 2018 by integrating knowledge and administrative skills.⁸ The health care students should cultivate knowledge of rational drug use to promote the health of the patients. It will create awareness and increase expertise in providing care for patients.⁸ In 2018, some educational institutions have introduced rational drug use in the nursing curriculum to integrate knowledge and administrative skills. Angsirirak and colleagues evaluated the effect of a case-study teaching and learning program on the rational drug use of patients and found a high level of knowledge on rational drug use among students.⁹

The existing literature on the ability of medical students to use medication reasonably found that the students had low knowledge on rational use of antibiotics, with 64.16% of students having moderate skills on rational use of antibiotics. In addition, nursing students of different grades had a high attitude towards the rational use of antibiotics.¹⁰ Another study revealed that college students' age and knowledge of rational use of antibiotics were significantly able to predict the rational drug use of nursing students.¹¹

Sornkasetrin, Rungniyom and Yumuang investigated the perceptions on rational drug use performance during clinical practice among 50 second-year nursing students in an educational institution. The study found the following competencies: the ability to assess patient problems related to drug use or the need for medication in the treatment of drug administration, the ability to correctly administer drugs according to the prescription, the ability to conduct a follow up on treatment results, the ability to report any side effects that may occur from taking the medication, and the ability to administer drugs in such a way that is safe for both the patients and the society as a whole. Nursing students often rely on these competencies during practice in the ward.¹² Charoensuk and colleagues found a high level of overall understanding of reasonable drug performance, moderate



performance in collaborating with multidisciplinary team and lowest level in appropriate drug selection among nursing graduates. Besides, a high positive correlation was found with the rational drug use performance of nursing graduates.¹³

The existing literature focused on developing program on the online teaching media programs for patient health care regarding medication adherence. But very few studies focused on continuously improving the medication management competencies of public health personnel. For example, In Thailand many programs were developed on smartphone application for taking medication and recommendations for taking medicine but few study on this has been done on the issue of developing the ability to use medicines rationally for nurses.¹⁴⁻¹⁵ Therefore this study aimed to develop an open network courseware on “Rational Drug Use for Nursing Students”.

Research Objective

This study aimed to develop and evaluate the effectiveness of an open network courseware “Rational Drug Use for Nursing Students”.

Conceptual framework

The CIPP model under guiding this study was developed by Stufflebeam & Shinkfield's¹⁶ as shown in figure 1.

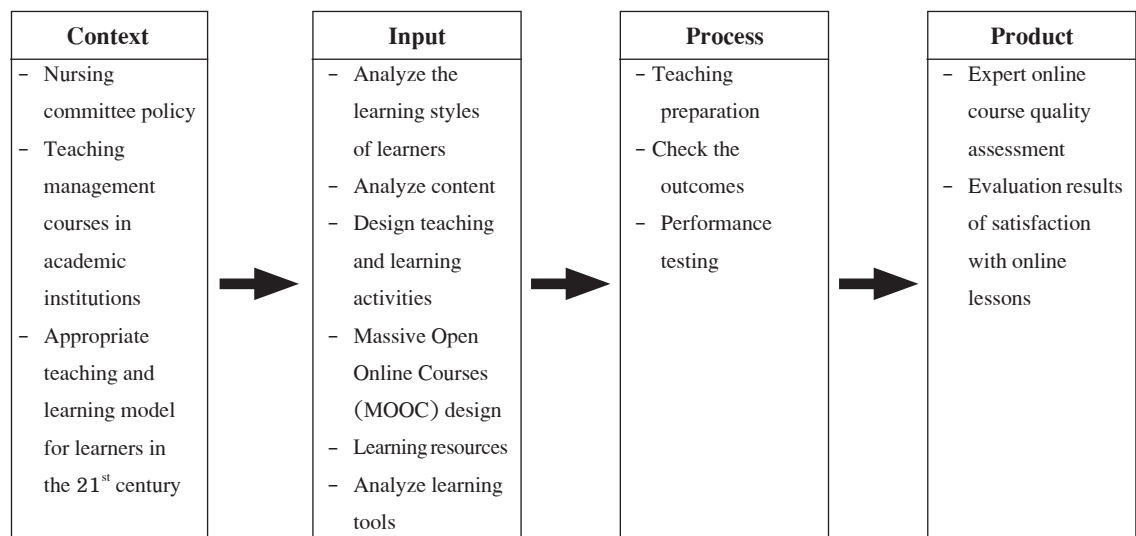


Figure 1 Conceptual Framework



Research methodology

This was a research and development study. The study recruited 155 third-year nursing students from the college of Faculty of Nursing. A total of 30 nursing students from the Faculty of Nursing Burapha University volunteered to become the online lesson assessment group. The inclusion criteria were as follows: a) second year nursing students studying in their third semester, who received no clinical practice and showed willingness to participate in this program.

Research Instrument

Online courseware quality evaluation model was comprehensively evaluated for its content and structure in the aspects of input factors, teaching management process and learning achievement evaluation. The 15-item evaluation scale ranged from 1 to 5 points. It had seven aspects including content integrity, appropriateness of content, language, and illustrations, convenience and feasibility, durability, reusability, and the modernity of learning styles.

Quality of the Instrument

The satisfaction assessment form for using online lessons was validated by five experts for its content, structure and concepts, theories, appropriateness of language and the IOC (Index of item objective congruence) value was .82. The reliability test was conducted among 30 nursing students and the Cronbach's alpha coefficient was .85.

Ethical Consideration

This study was approved by the ethical board of Burapha University (approval number- HSO49/2564). The participants were informed about the research objectives, expected benefits, and risks, voluntary participation, and no aftereffects if discontinued. The questionnaire used code rather than a name, and sample extension.

Research methods

Step 1- This online course was developed based on the teaching philosophy suitable for 21st century students and intended to reduce course management costs. This could be repeated and reviewed at any time. This program was designed based on the reviewed literature on the rational drug use competencies of nurse graduates.

Step 2- The outline of the online lesson was developed and comprised four components: (1) structure and content chapters on rational use of drugs (2) expected learning outcomes (3) planning of learning activities, and (4) measurement and evaluation of learning outcomes. Subsequently, the online course layout was validated by five experts for its consistency, content, conceptual structure, and theory of rational drug use. A flowchart and a storyboard of an online lesson was prepared.

Step 3- Develop an online courseware using efficiency evaluation model. Developed a test with 40 multiple choice items with four options to measure learning achievement. Based on the assessment of conformity (IOC) from five experts, statements with a consistency value of .5 or more were selected and tested in the sample group. After that, it was analyzed using the KR-20 formula¹⁷, and the obtained value was .89. Also, a competency



assessment form (19 items) for evaluating rational drug use competencies among nursing students was designed. This five-point scale covers four competencies namely, assessment of patients' problems related to drug use or requiring drug treatment (4 items), appropriate administration as per the physician's prescription (7 items), ability to monitor treatment outcomes and report potential side effects (4 items), and safe drug use (4 items). The scale had a Cronbach's alpha as .87.

Data collection procedures

The researcher invited 30 volunteers through advertisement. The participants were informed about the study process and were asked to register and access the Burapha MOOC online learning program. The approximate duration for completing this study was ten hours.

Data analyses

Descriptive statistics including percentages, frequency, and standard deviations were used to describe the quality evaluation of experts and the satisfaction evaluation results of online courses.

Results

The researchers divided the research results into two parts: 1) online course development (format, content, activities) and 2) online lesson quality assessment and the satisfaction assessment results for online lessons were as follows:

Online course development

The course description on "Reasonable medication for nursing students" was as follows: It had 10 online learning hours. The scoring criteria for obtaining a certificate included a Pre-test score of 20%, discussion content (no points), in-class quiz score of 40%, and final exam score of 40%. The students who have a total score of at least 60% are considered qualified to receive a certificate in the system. The content of the online course is described in Table 1.

Table 1 Description of the online course program

Time	Activities
Week 1	Orientation, introduction of courses, learning methods, online training calendar, and filled in the pre-test form to evaluate the effectiveness of rational drug use. Preliminary test on the students' knowledge on the topic "Natural with RDU (Rational Drug Use) and 10 right part 1"
Week 2	The students learned the topic "Rational Drug Use (RDU) and 10 right part 2"
Week 3 & 4	Following the topic "RDU to case study and 10 right part 3" students complete a post-test between the second and third classes
Week 5	At the last week, the learners practice analyzing case studies to integrate RDU (Rational Drug Use) knowledge and a preliminary knowledge test after learning and complete a satisfaction assessment form for open online teaching and learning.



The results consisted of 3 parts: the online lesson quality assessment, the evaluation of online learners who could pass the exam with a score of 60 percent or higher, and the assessment result of satisfaction in online lessons.

Evaluation results of open online lessons “Reasonable drug use for nursing students”

Regarding the quality of online lessons, the network courseware had the highest quality ($M = 4.52$, $SD=.37$). According to the evaluation results of online teaching courseware, it is concluded that the online teaching courseware has passed the certification and its comprehensive quality has reached the highest level, which can be applied to the construction of online teaching courseware based on open online teaching mode (Table 2).

Table 2 Evaluation results of the quality of open online lessons “Reasonable drug use for nursing students”

Quality criteria	M	SD	Quality level
1. Import factors	4.62	.48	highest
2. Process	4.09	.53	high
3. Results	4.37	.46	high
Over all	4.52	.37	highest

Statistics of online learners who fulfilled the assessment criteria

We applied the one sample t-test statistic to see whether there was a significant difference between the sample mean and the proposed population mean for online learners (60 %).

$$H_0 : \mu < 60 \%$$

$$H_1 : \mu \geq 60 \%$$

Table 3 One sample t-test for online learners

N	mean	Standard. Dev.	CI for μ	t-test	p-value
30	70.43	3.20	(67.23, 73.63)	17.85	.000

We see from table 3 that the null hypothesis $H_0 : \mu < 60 \%$ is rejected which means that the exam score of online learners is higher than 60 %. Additionally, the 95% confidence interval exam score of online learners is between 67.23 and 73.63.

Online learners' satisfaction towards open online lessons

The assessment results of student satisfaction towards open online lessons in all aspects were as follows: modernity ($M = 4.72$, $SD=.49$), appropriateness of communication language ($M = 4.67$, $SD=.37$), content appropriateness ($M = 4.59$, $SD=.52$), persistence ($M = 4.58$, $SD=.56$) and the convenience and ease of use ($M = 4.52$, $SD=.54$) followed by other aspects. (Table 4).

**Table 4** Learners' satisfaction with online courses (N = 30)

Criteria	M	SD	Level of satisfaction
1. The integrity of the content	4.32	.57	high
2. Appropriateness of content presentation	4.59	.52	highest
3. Appropriateness of communication language	4.67	.37	highest
4. Appropriateness of illustrations in the media	4.28	.48	high
5. Convenience and ease of use	4.52	.54	highest
6. Novelty of modernity	4.72	.49	highest
7. durability	4.58	.56	highest
Over all	4.55	.44	highest

Discussion

The researchers divided the research discussion into two parts: 1) online course development (format, content, activities) and 2) evaluation of the open network courseware “Rational Drug Use for Nursing Students”, which were as follows:

Online course development (format, content, activities)

This study found high level quality of the open online lessons as this form of online learning focuses on learning, reviewing, exchanging knowledge, and self-learning communication which can be learned and accessed at any time. Moreover, this online course is beneficial as it could meet the needs of learners in the 21st century who used online technology to develop themselves. The MOOC method will improve the efficiency and effectiveness of the learners' learning process.¹⁸⁻²⁰ Considering each aspect, this study found a high quality in the input factors which outlines the basic information in this learning design, student learning styles, content analysis, instructional activity design, MOOC design, learning resources and tools used in learning. This was consistent with other studies²¹⁻²², that found MOOC instructional module is an online teaching and learning system that improved the quality of learning through various mechanisms such as creating necessary content materials, performing activities, exercises, communicating the teaching content and in the context of the learner.²³ In addition, the online teaching model is open and the elements of learner and content analysis were identified among the most significant inputs. It was consistent with another study²⁴, that utilized instructional design in MOOCs, and indicated content analysis, analyzing students set learning objectives and learning environment as the most important factor in instructional design.

Evaluation of the open network courseware “Rational Drug Use for Nursing Students”

The quality of the online lesson was at the highest level. From the results of online lesson quality assessment according to the open online teaching model which is a lesson divided into 5 units, each unit has 2 hours of learning and quality of language and sound, The quality was at the highest level. This was in line with another studies^{18,25} that indicated the internationally recognized standards of learning materials and guidelines for teaching



and learning MOOCs. It emphasized the quality and appropriateness of learning materials and to be designed based on media design principles with a video length of less than 10 minutes. In addition, Klaisang has studied and analyzed popular MOOC formats such as Coursera, MITx, EDx, Class 2go, Udacity YouTube Education.²⁶

1) Short videos with learning demonstrations 2) Online documentation 3) Discussions 4) Online activities and 5) Learning assessments which are in line with the results of learner needs assessment from the media. Open teaching in this research as well Udacity YouTube Education found key components: 1) short videos with learning demonstrations, 2) online documentation, 3) discussions, 4) online activities and 5) learning assessments that correspond to the needs assessment results, of learners from open teaching media in this research as well Udacity YouTube Education found key components: 1) short videos with learning demonstrations, 2) online documentation, 3) discussions, 4) online activities, and 5) learning assessments that correspond to the needs assessment results, of learners from open teaching media in this research as well.

This study found high satisfaction level among students towards online lessons in terms of modernity, novelty, and the appropriateness of language. The researcher used the concept of teaching and learning that is suitable for students in the 21st century in organizing online lessons, making students interested and easily accessible to lessons, modern and interesting, This, was consistent with another study,²⁷ that highlighted the important factors for online teaching that included creating a safe environment, increasing the learners' convenience to access lessons, determining the learning topics addressing the learners' needs.

Conclusion and Suggestion

These findings aid the nursing students to develop their medication administration skills to clinical practice and nurses to improve their ability to use rational medical use. Furthermore, nursing institutions can encourage the students to utilize this online course. This study recommends designing teaching models should be designed and developed for learners with different learning concepts, to compare which teaching model is most helpful for learners to succeed in open network teaching. An open online teaching mode of "rational drug use" should be designed and developed for other target groups, such as professional nurses, risk control nurses and patient nurses, to provide responsive learning resources for further lifelong learning of rational drug use.

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