



Developing a blended learning curriculum using a digital notebook application for a surgical nursing practicum: The ADDIE model

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Abstract

Background: The COVID-19 pandemic has presented challenges to nursing practice globally. However, utilizing digital notebook applications to support nursing student practices may be an effective tool for surgical nursing practicum.

Objective: This study aimed to design a blended learning curriculum for surgical nursing practicum, utilizing a digital notebook platform.

Methods: This study applied the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model to create a blended learning curriculum for surgical nursing practicum, employing the OneNote application platform. The study included three experts and 90 third-year nursing students who evaluated the model. The study was conducted from July 2021 to March 2022 at the Faculty of Nursing, Chiang Mai University, Thailand. Data were analyzed using descriptive statistics.

Results: The experts rated the model highly (Mean = 4.33, SD = 0.57). The satisfaction level of the students with the blended learning curriculum using a digital notebook application was also high (Mean = 4.88, SD = 0.31).

Conclusion: The blended learning curriculum using a digital notebook application for surgical nursing practicum was satisfactory for learners. The results from this research can be applied in online learning or incorporated into nursing clinical practicum curricula during and even post-pandemic. The study results may also serve as an example or a piece of basic information to further develop an advanced online platform for teaching learning, either in Thailand or globally.

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Article info:

Received: 21 September 2022
 Revised: 19 October 2022
 Accepted: 16 January 2023



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E-ISSN: 2477-4073 | P-ISSN: 2528-181X

Keywords

nursing students; blended learning; digital notebook application; surgical nursing practicum; problem-based learning; COVID-19; ADDIE; Thailand

Background

The COVID-19 pandemic has had a significant global impact on education, with healthcare education being one of the areas severely affected (Tipon et al., 2022). In Thailand, the teaching and learning of surgical nursing suffered as COVID-19 restrictions prevented students from practicing in surgical wards with their instructors during their practicum (Thai Ministry of Public Health, 2021). In response to this challenge, a blended learning online format was designed to address immediate needs while maintaining the required quality of learning outcomes, with the ultimate goal of producing genuinely qualified nursing professionals who can effectively apply their learning when deployed in real clinical settings after graduation.

Despite the rapid technological changes and developments, the design of a blended curriculum in the 21st century has been a faltering and often unsuccessful process.

However, the COVID-19 pandemic compelled nursing educational institutions worldwide to transfer to novel technological solutions for educational service delivery, thereby galvanizing longstanding trends and requirements for updated learning formats appropriate for the 21st century (Syakur et al., 2020). In addition, due to lockdown and social distancing policies applied in most countries, instructors had to adjust and change curricula to be more flexible and accessible by reducing dependence on physical presence at certain times and places through the use of online formats.

It is imperative that the curriculum promotes students' learning and self-development at their own pace and potential to maximize the achievement of learning outcomes (Adams et al., 2010; Thongkaew, 2020). Furthermore, this approach is suitable for the modern student as it utilizes computers and information technology in daily communication. Therefore, this study aimed to design a blended learning curriculum for a surgical nursing practicum using a digital notebook platform

based on the ADDIE model. The results of the study will be beneficial not only during the pandemic but also in the future learning environment fulfilled by advanced technology.

Context of Surgical Nursing Clinical Practicum

This study was conducted at the Faculty of Nursing, Chiang Mai University (CMU), with the aim of providing students with clinical skills in surgical nursing. The curriculum focuses on developing students' clinical skills, including nursing processes and nursing care delivery to clients with chest, GI, urology, and orthopedic illnesses. In addition, it emphasizes basic and intermediate nursing skills, medication administration, communication, and critical thinking, as well as holistic nursing care for adults and older adults with acute and chronic health problems in various body systems receiving surgical treatment. In addition, the curriculum is designed to incorporate nursing ethics, cultural diversity issues, and evidence-based concepts concerning patients' rights and safety (Sattrapruek, 2017).

The Faculty of Nursing CMU strongly believes that students' most critical learning objective is to have academic knowledge and clinical skills in surgical nursing to care for patients effectively. Thus, curriculum development in the 21st century adopts the "active learner" concept to promote students' learning, incorporating innovative information technology skills, media literacy, and life and career skills (Sattrapruek, 2017). The curriculum uses active learning principles to develop ten skills, including critical thinking, collaboration, cross-cultural understanding, communication, computing, and self-motivated career enhancement, designed to meet the requirements of nursing in the 21st century (Kaewsang-on et al., 2021; Laohacharasang, 2018). The associated learning activities are designed to meet the learning objectives with a standard framework for learning knowledge and skills. In addition, the curriculum aims to produce quality students with good morals and ethics who can be good citizens of the world and promote socially responsible behavior (Kunaviktikul, 2015; Syakur et al., 2020).

CMU strives to become one of the world's leading universities, seeking to teach students to be active learners, including self-directed and autonomous learning, and to incorporate advanced technologies to facilitate the learning process (Thanormchayathawat et al., 2016). Technological readiness and development are central to CMU's quality improvement strategy, which emphasizes promoting socially responsible students who are outstanding in development. Instructors are responsible for ensuring that the curriculum meets the objectives of producing quality students with good morals and ethics.

The "smart CMU students" approach includes six categories, namely Smart IT, Smart English, Smart Character, Smart Health, Smart Brain, and Smart Heart, which aim to develop students' skills, promote critical thinking, and incorporate technology into their learning, resulting in a unique character as CMU graduates (Student Development Division of Chiangmai University, 2019). Ultimately, the curriculum aims to enhance the professional nurse's image and provide teaching and counseling to service users, including patients, relatives, and the community, in the future.

Designing a Blended Learning Curriculum: ADDIE Model

The study utilized the ADDIE model, which was originally developed in 1975 by the Center for Educational Technology (CET) at Florida State University for a project of the US Army. The model was later adopted by all branches of the US Armed Forces (Hannum & Briggs, 1982; Nurbaeti et al., 2021) and provided a structured design method for learning programs. In the current study, using the OneNote application platform, the ADDIE model was applied to design the blended learning curriculum for the surgical nursing practicum.

Analysis Phase

In this phase, the learning problems were assessed using interview techniques with 32 third-year nursing students on their first block rotation, from July to August 2021, to explore strategies during the COVID-19 restrictions to enable continuity of education using technology solutions and online learning and to achieve nursing curriculum goals. All agreed that a blended curriculum should be designed. In addition, every learning application was checked, whether it was appropriate for blended learning.

Designing Phase

In this phase, the outline, description, and contents of the application are created. This phase was conducted for one month, from August to September 2021, to create learning strategies. OneNote application platform from Microsoft 365 was used to design the blended learning curriculum (Microsoft 365, n.d.; MS-ONE, 2015; Protalinski, 2015). Such methods have been found to be suitable for adoption and development by instructors to meet course (and learner) objectives (Grissom, 2017; Grussendorf, 2020). In addition, it can be used with many other systems and inputs, such as forms, documents, nursing progress notes, learning images, suggestions, video files, drawings, or pictures. When designing the surgical nursing practicum, instructors need to use different delivery methods so that students can learn surgical nursing effectively and be effectively trained to begin practice on actual wards (Grussendorf, 2020).

Instructors can download OneNote as a platform using the CMU Microsoft network account. This platform will connect the instructors and students to learn, correct their work, and collaborate online and onsite. They can insert pictures, videos, and other learning activities so the students can see real images online, despite an inability to see the real cases on the ward (Bader et al., 2021). The instructors in this phase learned about the flow of the platform.

In addition, video clips demonstrating nursing care procedures in surgical practice were also developed and collected, such as changing ICD containers, pin and wound site dressing, walking aid, neurovascular status assessment, and exercise in orthopedic patients. The video clip demonstrated the application's effectiveness in terms of use, appearance, and learning.

Development Phase

The learning format model and materials were developed in this phase from September to October 2021 based on the design phase. The learning materials are based on the old

curriculum from the Faculty of Nursing CMU, including 1) the principles of holistic nursing practice for adults and elderly who have undergone surgical treatment; and 2) holistic nursing practice for adults and the elderly with an acute and chronic health problem in various body systems who received surgical treatment (Anthony et al., 2022; Topping et al., 2022). In addition, related literature on the materials and a learners' satisfaction questionnaire were included in the app (Figure 1), with a summary of the usage of the app also provided for instructors and learners. Next, the curriculum orientation was done, and samples for try-out were prepared.

Implementation Phase

In this phase, the first round of the learning curriculum was implemented from October 2021 to February 2022, with a total of 28 third-year nursing student participants. They were also

interviewed to determine the effectiveness of the application platform and identify its weaknesses. However, the interview results revealed that virtual documents in OneNote were arranged in a sparse way, making it difficult to access documents for some nursing records that need to be completed, resulting in incomplete reporting of operations. Based on students' feedback, we organized all virtual documentation on the platform into separate groups. In addition, we prioritized key documents, like the patient's hospital chart, so that the students could learn and write realistically. Some modifications were made for the final program (second round) for use with 30 third-year students, which was calibrated to meet students' learning needs during the COVID-19 lockdown restrictions. The results showed that the program was effective for use by learners.

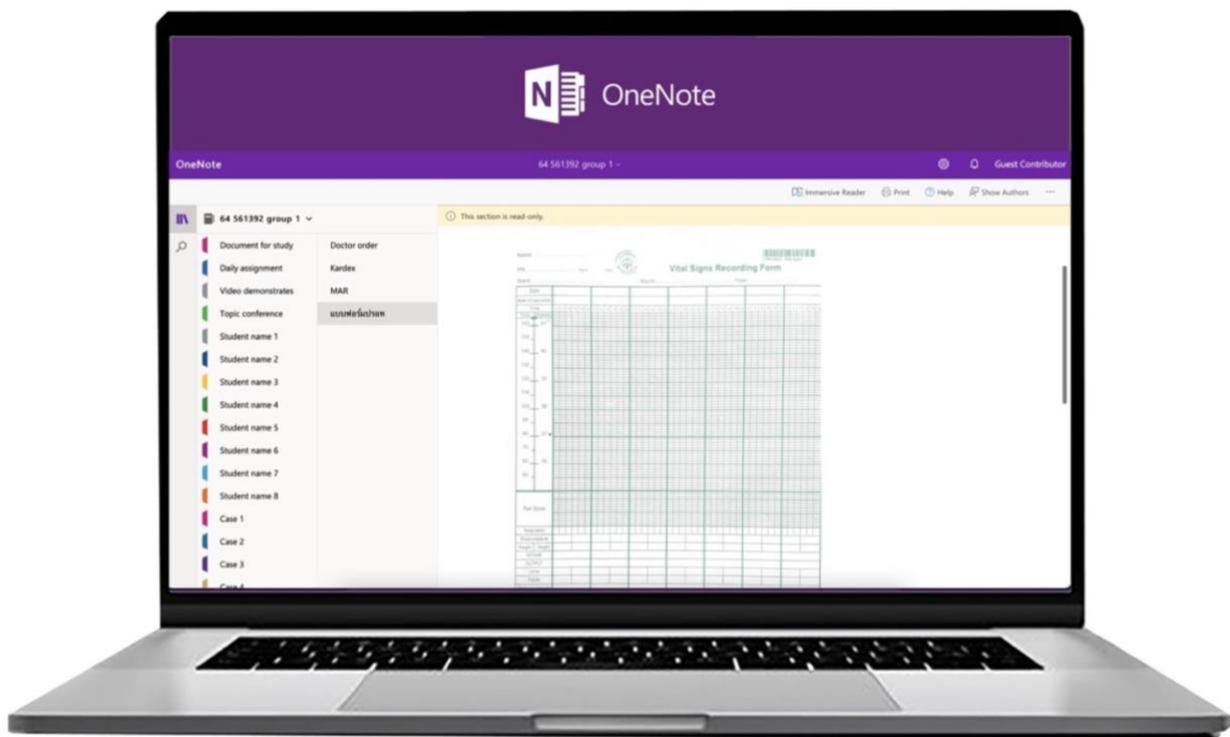


Figure 1 Example of the digital notebook application platform using OneNote [<https://shorturl.asia/KerYH>]

Evaluation Phase

In this phase, expert and student feedback was sought in March 2022. However, to evaluate the program, a questionnaire was first developed.

Questionnaire development

The researchers developed the questionnaire from July to August 2021.

Validity

A questionnaire for experts about the blended learning curriculum application was developed based on two studies (Carman, 2002; Henrich & Sieber, 2009), and the questionnaire uses a 5-rating scale (1 "most inappropriate" to 5 "most appropriate"). The researcher invited three experts, who rated the perceived validity of the questionnaire using the formula of the Index of Item-Objective Congruence (IOC). A three-rating scale was used to measure validity: 1 (if the expert is sure that the item measures the attribute), 0 (if the expert is not sure that the item does measure or does not measure the

attribute), and -1 (if the expert is sure that the item does not measure the attribute). The validity scores were analyzed using the formula of the Index of Item-Objective Congruence (IOC); if a question scores less than 0.5 for IOC, the researchers should delete the question and consider improving or changing the question before finalizing the questionnaire for use with the sample (Grove et al., 2012; Polit & Beck, 2009). The IOC validity score of each item of the study questionnaire was 1.

The satisfaction questionnaire was developed based on the information from Adams et al. (2010), and the questionnaire uses a 5-rating scale (1, "not at all satisfied" to 5, "very satisfied"). The researchers invited three experts, who rated the perceived validity of the questionnaire using the formula of the Index of Item-Objective Congruence (IOC). When the IOC was less than 0.5, the researchers would delete the questions and consider improving or changing the question

before finalizing the questionnaire for use with the sample. IOC resulted in 1 each of the items.

Reliability

The item content validity (I-CVI) of the questionnaire for experts about the blended learning curriculum application and satisfaction, the item content validity (I-CVI) was tested by three experts, who rated the nine-item satisfaction questionnaire covering learning content, learning activities, and knowledge evaluation. It uses a five-point rating scale, with a score ranging from “questions do not fit the operational definition” to “questions fit the operational definition”. The criteria for accepting the validity index was 1.00 (Polit & Beck, 2009), and the acceptable I-CVI was 1.00. When the index and I-CVI of the content met the criteria standards, the content was included in the blended learning curriculum. To measure reliability, we tried out six samples that characterized the similarity of the sample. Internal consistency was measured using Cronbach’s alpha coefficient, and the result of 0.72 indicate reliability.

Evaluation of the program

In this phase, expert and student feedback was sought in March 2022.

Appropriateness

The results of the development of the blended learning curriculum via digital notebooks were done by the three designated experts, who rated the content overview of the integrated learning curriculum via digital notebook as most appropriate for format and learning at the highest level (Mean = 4.33, SD = 0.57) using a 5-rating scale (1 “most inappropriate” to 5 most “appropriate”). However, more details of each item, including the results from different learning formats, blended learning, evidenced-based learning, learning via digital notebooks, types of learning formats, types of learning via videos, and types of blended learning in the big picture, are shown in [Table 1](#).

Table 1 Results of experts’ evaluation regarding blended learning curriculum via digital notebook ($n = 3$)

Types of learning management	Mean	SD	Level
Types of blended learning	4.33	0.57	Most
Types of learning management via evidence-based learning	4.33	0.57	Most
Types of learning management via digital notebook	4.00	0.10	Most
Types of designing learning platforms	4.33	0.57	Most
Types of learning via videos	5.00	0.00	Most
Types of learning via blended learning in a big picture	4.33	0.57	most

Satisfaction

A total of 90 students provided feedback. The results showed that the students’ total satisfaction level, using mean and standard deviation, was at the highest level of satisfaction (Mean = 4.88, SD = 0.31). The satisfaction for each category, content, learning activities, and knowledge were evaluated. The results are shown in [Table 2](#). The contents items pertaining to the contents’ clarity, the difficulty of the content, usefulness in a real setting, and applicability to oneself. The learning activities included hands-on practice, clinical

instructor suggestions, and student collaboration. Knowledge evaluation related to the appropriateness of the test before clinical practice and total satisfaction.

Table 2 Participant satisfaction levels for blended digital learning curriculum via notebooks ($n = 90$)

Evaluation	Mean	SD	Level
Learning content			
• Clarity of the content	4.63	0.58	Most
• Difficulty of the content	4.76	0.42	Most
• Useful in a real setting	4.88	0.31	Most
• Applicability to oneself	4.78	0.41	Most
Learning activities			
• Hands-on practice	4.68	0.46	Most
• Suggestions from clinical instructors	4.78	0.41	Most
• Collaboration among students	4.88	0.31	Most
Knowledge evaluation			
• Appropriateness of the test before clinical practice	4.56	0.54	Most
• Total satisfaction	4.32	0.51	Most
Overall satisfaction with blended digital learning curriculum via notebooks	4.88	0.31	Most

Ethical Considerations

This study was approved by the Ethics Committee, Faculty of Nursing, Chiang Mai University (EXP019-024). The researchers provided an explanation of the study objectives and participants’ rights, emphasizing voluntary participation. To ensure confidentiality, the subjects’ names were anonymized during the study, and the researchers were unaware of individuals’ responses. Prior to participating in the study, participants signed an informed consent form.

Discussion

During the COVID-19 pandemic, a blended learning curriculum program was developed using a digital notebook application to enable nursing students to learn while adhering to social distancing requirements. This program aimed to enhance the students’ knowledge of surgical nursing and clinical practice and prepare them to provide appropriate patient-nurse interaction when working with patients in natural settings. In addition, the compatibility of the platform with the learning format and the management of the surgical nursing course was ensured.

Blended learning has been found to improve learning outcomes, as demonstrated by [Tongnate \(2014\)](#)’s study, which examined blended learning via a computer network with content that blended seamlessly, resulting in improved students’ ability to expand their thinking at a deeper level. This type of learning can enhance learning in each topic and course and is particularly suitable for 21st-century learners. It is modern and effectively utilizes technology for learning, including pedagogically, to encourage learners to think, reason, or find solutions to problems while studying. As a result, learners can gain deeper insights into issues, become more willing to solve potential problems and apply new knowledge and skills in real-life situations.

Furthermore, this format maximizes students’ potential, as supported by a study by [Roekmongkol \(2017\)](#), which deployed blended learning in education courses and reported high

achievement of self-learning outcomes, student-instructor interactions, practical group projects, and convenience in conducting class activities. In addition, learners are free to research and seek information until they completely understand the material and can repeat the lessons as needed. Overall, the use of blended learning in nursing education during the pandemic has been a valuable tool for enhancing learning outcomes and providing a modern and effective means of utilizing technology for learning purposes.

On the other hand, in our study, the blended learning program received excellent satisfaction ratings, as evidenced by the overall average analysis results. The program allows students to solve problems autonomously and concentrate on learning more effectively, thereby increasing their motivation to acquire new knowledge and make self-inferences. These outcomes are attributable to blended learning management, which enables learners to recall and integrate previously acquired knowledge during their studies. The autonomous learning process involves analyzing and synthesizing information, resulting in a more enjoyable and satisfactory experience for the learners. This finding is consistent with a systematic review by [Kaewsang-on et al. \(2021\)](#), who reported that an online learning model, which emulated a real classroom, helped students acquire clinical practice skills similar to actual practice. The online format allowed students to learn from trial and error until they had mastered the necessary skills, thereby increasing their confidence in their abilities. In addition, the self-learning format promoted students' problem-solving skills and time management and reduced their study-related stress. The students expressed satisfaction with the course, indicating that the program helped them achieve their learning goals.

Implications for Nursing and Midwifery Practice

The emergence of advanced digital technology and e-learning solutions in recent years, coupled with the COVID-19 pandemic and lockdown experiences, has presented new opportunities and challenges for nursing education in the 21st century. As current and future learners are part of "generation Z," they require more extensive use of technology in education services. Therefore, advanced digital solutions are increasingly crucial for successful teaching and learning ([Prasetyo, 2022](#)). The development of teaching and learning with the digital notebook platform can be applied with a design approach compatible with the prevailing context, culture, and teaching and learning requirements of Thailand and international nursing education.

Limitations

This study identified some limitations. Firstly, the use of a blended program via a digital notebook application was a new experience for the instructors who applied it for student learning, and some of the features (e.g., animations) were not used effectively. This issue has been addressed in planning for the next orientation, with contingencies for problem-solving to enable and facilitate effective use on the ground. Secondly, learning online during the COVID-19 pandemic revealed that some of the procedures that are not actual practices students only practice with video demonstration. This issue could be attributable to failures in communication with the clients and a loss of hand skills once they finish the course. Finally, due to

the critical conditions of the COVID-19 pandemic, online learning and teaching were not supported by the full range of supporting equipment for use and video clip demonstrations. This was resolved on an ad hoc basis with education by doing, and the results were entirely satisfactory for both teachers and learners.

Recommendations for Future Studies

This blended learning curriculum via digital notebooks design can be implemented in teaching clinical practice for surgical nursing either in a 100% online format or hybrid form, alongside onsite instruction. It can also be applied during or even post-pandemic. Instructors can adjust the steps or improve them according to their ability and the progress and pace of the learners. Future research should explore students' total learning scores as key performance indicators for the curriculum and identify barriers related to the blended learning curriculum via digital notebooks by qualitative investigations of user experiences. Various studies providing insights into the curriculums' development and practical effectiveness from different angles can help identify diverse ways to optimize learning effectiveness. Instructors and researchers should explore other complementary or improved approaches, and blended learning curriculums themselves must be continually evaluated and revised in future studies that could compare different formats.

Conclusion

The findings of this study demonstrate that the blended learning curriculum utilizing digital notebooks in the surgical nursing practicum program elicited significant satisfaction among its users. In addition, the use of technology resources to enhance learning outcomes and the delivery of lectures with learning strategies were instrumental in supporting CMU learners in their educational endeavors. Specifically, the digital notebook application served as an innovative learning strategy that proved beneficial in providing effective learning experiences amidst the challenging circumstances posed by the pandemic or any conditions requiring online learning. However, further testing of the curriculum is needed for a better teaching and learning environment.

Declaration of Conflicting Interest

None declared.

Funding

This study was funded by a classroom research grant from the Faculty of Nursing, Chiang Mai University, Thailand.

Acknowledgment

We would like to express our appreciation to the third-year nursing students who participated in this study. Additionally, this research would not have been possible without the Nursing CMU Publication Support Center (PSC) to revise and provide information for manuscript writing.

Authors' Contributions

AK, KR, and LN drafted the article and conducted a review for this study. CM, RI, and SD performed the data collection and analysis. AK and KR contributed to the design and concept of the study. AK wrote the manuscript in coordination with other authors and discussed improving the final versions of the submitted and published manuscript. All authors were accountable for each study step and approved publishing the final article.

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Data Availability

Due to privacy and ethical concerns, neither the data nor the source of the data can be publicly made available from the corresponding author.

Declaration of use of AI in Scientific Writing

Nothing to declare.

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Cite this article as: Kardosod, A., Rattanakanlaya, K., Noppakun, L., Meechamnan, C., Indratula, R., & Deechairum, S. (2023). Developing a blended learning curriculum using a digital notebook application for a surgical nursing practicum: The ADDIE model. *Belitung Nursing Journal*, 9(2), 192-197. <https://doi.org/10.33546/bnj.2324>