

Smartphone Application “KesPro-P” for Reproductive Health Nursing Practicum: Design and Development

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ABSTRACT

Background: There is evidence that smartphone applications are useful for nursing education. The use of smartphone technologies and applications in the medical and nursing fields is increasing. Regarding the usage of smartphone applications for patient care and education, nurses and nursing students have good perspectives. This study aimed to describe the design and development process for the “KesPro-P” smartphone application, which is intended to instruct nursing students in laboratory practice reproductive health nursing.

Subjects and Method: This is applied-developmental study, conducted from April to October 2023, which has seven steps of technological tool creation, analysis, and development. After performing a thorough analysis of the relevant literature, we attempt to select parts, content, and an appealing design for the application. Potential application users, media specialists, and material experts participated in the study.

Results: Three Reproductive Health Nursing practicum topics—pregnancy assessment, Poedji Rochjati Scoring Card, and Maternal Emergency Screenin (MES)—are included in an application named “KesPro-P”. Students may download and use the program from the Playstore. The app offers quizzes, theoretical concepts and scientific articles to help users understand Evidence Based Nursing (EBN).

Conclusion: The application helps nursing students learn interactively. In order for the application to satisfy all practicum competencies, it is advised that practicum content be added.

Keywords: educational technology; nursing education; nursing student; smartphone application

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BACKGROUND

It is important to involve technology in learning as it has numerous benefits. Technology plays a crucial role in the educational system, collaborating with the school to ensure access to knowledge and democratize cultural heritage ([Silva and Oliveira, 2022](#)). The

development of information and communication technology has had a significant impact on education, providing interactive and flexible learning experiences ([Nurbayanni et al., 2023](#)). Throughout the entire educational system, digital technologies have brought about a fundamental change. Students' lives

are now easier because to advancements in educational technology ([Haleem et al., 2022](#)). Additionally, technology-based learning media improve students' motivation, inspire them to learn, and enhance their understanding of classroom learning ([Qomariah et al., 2023](#)). Overall, involving technology in learning enhances the teaching-learning process, improves students' knowledge, and develops their achievement.

Nursing education can involve technology in classroom learning and practice by utilizing portable digital assistant devices and cloud computing platforms such as YouTube, Google Apps, Dropbox, and Twitter ([Gause et al., 2022](#); [Yang et al., 2019](#)). The goal of employing augmented reality (AR) technology for self-learning is very high among nursing students. Additionally, it was shown that the primary motivation for this purpose is the belief that utilizing augmented reality technology will improve their academic achievement. They also believe that AR technology will likely have a lot to offer in the future ([Uymaz and Uymaz, 2022](#); [Rodríguez-Abad et al., 2022](#)). Online software platforms, such as Microsoft Teams and Stream, can be utilized to enhance the learning experience in online education. These technological innovations can complement classroom teaching, improve learning outcomes, and address challenges faced in traditional face-to-face education, such as the COVID-19 pandemic ([Pal and Vanijja, 2020](#)).

Smartphone applications have shown to be effective in nursing education. The use of smartphone technologies and applications in the medical and nursing fields is increasing ([Sheikhtaheri and Moghadam, 2022](#)). Nurses and nursing students have positive attitudes towards the use of smartphone applications for patient care and education ([Saab et al., 2021](#); [George et al., 2017](#)). However, the usage of smartphones among adolescents has raised concerns about health-related

problems. It is important to identify the pattern of smartphone usage and address the consequences of addiction and health problems associated with smartphone usage ([Machado et al., 2023](#)). Further research is needed to optimize smartphones and similar devices to enhance nursing workflow, increase efficiency, and improve patient outcomes.

Using smartphone applications for laboratory practice in nursing education has shown to be effective. Studies have showed that smartphone applications can be used as pedagogical tools for teaching vital signs, such as Clinic Vitals app ([Hester et al., 2021](#)). Additionally, combining smartphone applications with hands-on practice has been found to have a greater impact on knowledge, attitude, skill, and satisfaction in breast self-examination education. Furthermore, smartphones are commonly used by nurses during their work shifts, but they can also be a source of bacterial contamination. Implementing protocols for smartphone disinfection could help decrease the infection rate ([Kang et al., 2020](#)). Undergraduate nursing students also rely heavily on smartphones for educational purposes, using them to access information, participate in study groups, and engage in active learning techniques. Overall, the use of smartphone applications in nursing education has been found to be effective in improving knowledge, skills, and engagement among students ([Shin et al., 2018](#)).

Thus far, the Reproductive Health Nursing practicum has been administered through paper-based forms, case studies, practice questions, and quizzes that need to be completed within a set amount of time utilizing internet-based learning (LMS). This smartphone application will include all the practicum themes and techniques into a single app. It is specifically made for the practicum and strives to adapt technology in

nursing education. Students will find it easier to work on case studies, quizzes, and forms, and they may do it anytime, anywhere. Additionally, the newest research will be available for them to study, which will enhance their learning resources.

SUBJECTS AND METHOD

1. Study Design

This study is an applied-developmental research that focuses on the production of technology, specifically on the development and creation of new products, activities, or services. In this case, the practice involves developing a smartphone application for reproductive health nursing. The study was carried out from March to October 2023 at the Universitas Andalas, Faculty of Nursing, Padang, Indonesia.

2. Population and Sample

Ten nursing students served as the product users in this study, which included material experts-a group of lecturers from the Department of Child Maternity Nursing and media experts-Android app developers who created the application.

3. Study Variables

The dependent variable was the nursing student and practicum. The independent variable was a smartphone application.

4. Operational Definition of Variables

Smartphone Application was a smartphone application refers to an interactive mobile-based tool specifically designed to support nursing students in acquiring knowledge, enhancing skills, and improving performance during clinical practicum. It provides systematic content, such as videos, quizzes, and interactive modules, accessible via smartphones.

Nursing Student refers to an individual enrolled in a nursing education program who is in the process of gaining theoretical knowledge and practical skills to provide professional nursing care. In this study, it

specifically refers to senior nursing students participating in clinical practicum.

Practicum refers to the clinical training phase of nursing education, where students engage in hands-on practice to apply theoretical knowledge and develop essential nursing skills under supervision in a real healthcare setting.

5. Data Collection

The process of analysis and design involves creating and utilizing a virtual learning environment, as well as accurately identifying the true need or demand for techniques that support the subject. Goals, content, target audience, learning environment, and technological infrastructure are all examined even at this early level.

During the development stage, when the programs to be used were selected, the previously prepared design became a reality. The program, called "KesPro-P," is mobile device compatible. The interface's language was chosen with simplicity, objectivity, and clarity in mind. This made the content easier for users to acquire and learn from, allowing them to progress in their studies more quickly. The application is exclusively accessible on mobile devices, is free, simple to use, and indexes the greatest content from the internet in one place.

6. Research Ethic

Research ethical issues including informed consent, anonymity, and confidentiality, were addressed carefully during the study process. The research ethical clearance approval letter was obtained from the Research Ethics Committee at Faculty of Medicine, Universitas Andalas, Padang, Indonesia, No. 580/UN.16.2/KEP-FK/2023, on November 21, 2023.

RESULTS

The development process involved several stages of analysis, design, development, and

evaluation. The stages undertaken during the development of the KesPro-P applica-

tion are presented in Table 1.

Table 1. Step of Development and Analysis

Stages	Method	Outcome
Brainstorming with representatives of the students	Focus Group Discussion	Analyze the practicum's benefits and drawbacks by consulting the module guide and determine which application items students are interested in.
Brainstorming with lecturers from the Department of Child Maternity Nursing	Small Group Discussion	Identify application items and conduct a systematic review of the material that will be included in the application and the types of case studies/quizzes that will be included
Brainstorming with developer app	Small Group Discussion	Table, flowchart of items, the screen appeared (from sign-in to all desired stuff).
Development Stage 1	Development	Developing the home page, main menu design and sections for practical topics
Test App Part 1	Application tests by lecturers and students	Evaluation
Development Stage 2	Development	Development in the form of quizzes, topics and Evidence Based Nursing (EBN).
Test App Part 2	Application tests by lecturers and students	Resulting prototype of an application

The application may be downloaded for free from the GooglePlay virtual store, works with Android-compatible devices, and can be found using the KesPro-P search engine. The decision to include Android compatibility was taken since, in Indonesian reality, this kind of operating system works with the majority of smartphones and tablets, increasing the application's user base.

In order to use the application, the user or student must have Internet connectivity. Once the file is downloaded and saved to their tablet or phone, they can use it offline without having to set up accounts or profiles. Initially a systematic review was carried out. Computerized searches were conducted using the Science Direct, Pubmed and EBSCO hosted

databases for relevant primary studies and limited to those between 2013 and 2023. A total of 10 eligible studies were identified from 431 potentially relevant articles. All studies include concept of theory in the application, and quiz for evaluation. The results of the systematic review are used as a basis for developing the appearance of the app and sections in the app.

The application name (KesPro-P) appears on the first page. Students can then log in by providing their registered email address and password on the login page. In order to log in, students who do not currently have an account must first register by visiting this link and providing their name, email address, student identification number, and password (Figure 1).

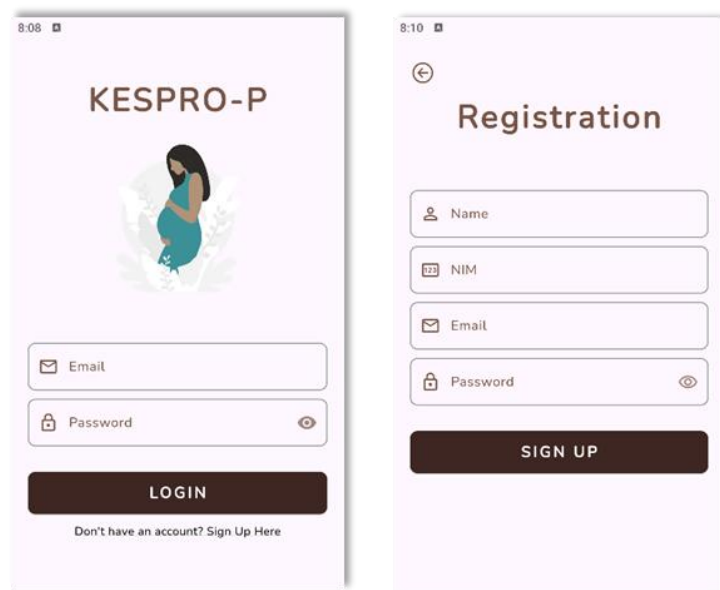


Figure 1. Front View of The Application and Student Registration Page

Students will navigate to the home page, as shown in the image below. This website is divided into 4 sections: 1 for EBN and 3 practical subjects (Figure 2).

An illustration of relevant topic matter for a prenatal assessment is shown below. comprises four different kinds of quizzes and theoretical ideas (Figure 3).

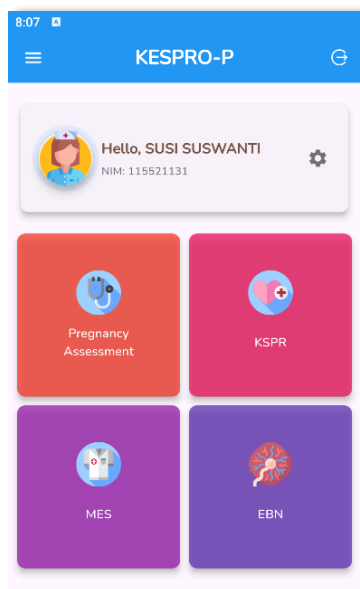


Figure 2. Main Page

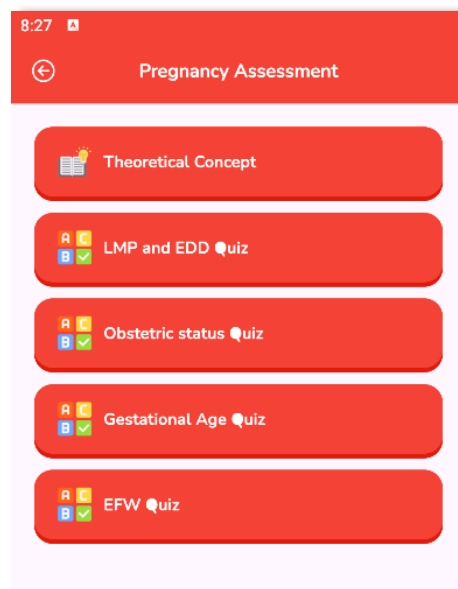


Figure 3. Example of Display in Pregnancy Assessment

Quizzes are designed with the best possible appearance and technique to make them attractive to students. Each question has a processing time according to the difficulty

level of the question and after answering the student will know the final score and which questions have the right and wrong answers (Figure 4).

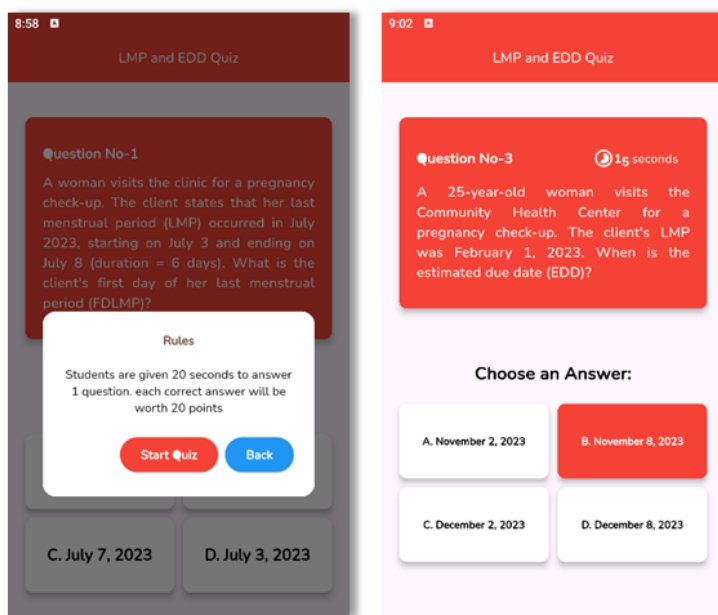


Figure 4. Example of Quiz Display

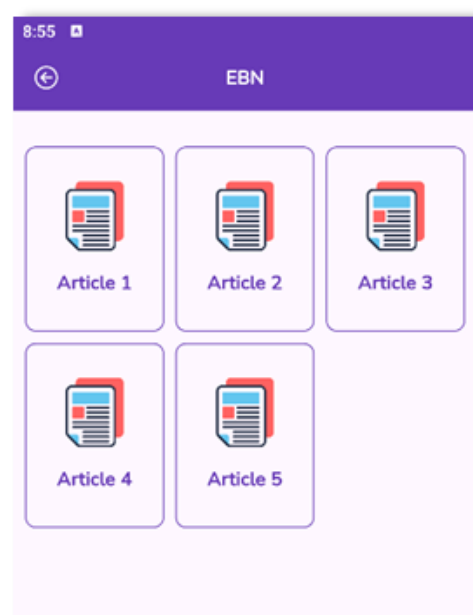


Figure 5. EBN Display Section

The final section is EBN which contains updated scientific articles related to pregnancy risk assessment (Figure 5). This article will be updated every 6 months. Students will read articles and conduct article research (Figure 5). This application was tested on 50 students and it was found that the results of perceived usefulness and perceived ease of use were at a good level.

DISCUSSION

Advancements can support innovative means to improve healthcare delivery based on the uniqueness of nursing (Weber et al., 2022). Technology is being used in various aspects of nursing, including diagnosis, monitoring, treatment, and record-keeping, to directly improve patient care and facilitate earlier discharges. The use of new technologies, such as artificial intelligence, the internet of medical things, virtual and augmented reality, and cloud computing, can transform how nurses deliver care and manage operations across the care continuum in the age of digital health (Krau, 2015). By staying updated on technological advancements, nurses can develop adaptive and scientific

skills regarding technologies and better utilize "smart" systems in care delivery. Additionally, nurses need to be involved in the design, development, implementation, and evaluation of technology products to ensure their effectiveness in improving healthcare. Following technological developments also helps nurses stay relevant in the ever-evolving digital health landscape and harness the opportunities emerging in various nursing specialties, including informatics (Weber et al., 2022; Carrol, 2022).

The focus of developing this application is on the process of integrating all topics and evaluation methods in the KesPro practicum in one application. Three topics were chosen as main topics in application development, and all topics contain material concepts with the aim of equipping students with the basic concepts of these topics. The development of sections, displays and quizzes in the application is based on the results of journal analysis obtained in a systematic review process on several reputable journal databases. The application is made as attractive as possible with clear fonts. The use of image media attracts students' attention and helps them

better understand the material being taught. Interesting learning media in writing, images, and colors are important for students as they actively involve students in the learning process and increase their self-confidence ([Matje, 2022](#)).

Case study quizzes are designed to encourage students' use of critical thinking skills. The learning method with quizzes using scenarios for case studies has been shown to improve nursing students' critical thinking skills. This method involves presenting students with real-life scenarios and asking them to analyze and solve the problems presented. By engaging in these case studies, students are able to apply their knowledge and critical thinking skills to practical situations, enhancing their ability to think critically and make informed decisions in complex healthcare settings. Several studies have highlighted the effectiveness of this approach in nursing education, with students reporting increased confidence and preparedness to think critically and intervene in high-acuity situations ([Ho et al., 2023](#)). Nursing students' motivation and clinical reasoning skills are enhanced by the use of learning games, digital simulations, and smartphone apps. Nursing students' thinking abilities can also be improved by integrating new technology into problem-solving-based learning and decision-making processes ([Pérez-Perdomo and Zabalegui, 2024](#)).

The advent of Information and Communication Technologies (ICT) has ushered in a new era in teaching and learning, enhancing the acquisition of knowledge and manual skills across various educational domains, including nursing. Smartphone applications, social networks, forums, and Virtual Learning Environments (VLE) provide platforms for acquiring information and developing cognitive skills essential for performing nursing procedures ([Pereira, et al., 2016a](#); [Cruz-Barrientos et al., 2023](#)).

The usage of smartphones by nursing students has been shown in numerous studies to improve their knowledge and abilities. A randomized trial conducted at a Korean university demonstrated the effectiveness of a smartphone-based app in enhancing nursing students' skills and confidence when addressing infant airway obstruction. The experimental group, exposed to the app's video-based learning, exhibited significantly higher scores in skills and performance confidence compared to the control group. While the differences in knowledge scores and satisfaction with the learning method were not statistically significant, these findings collectively underscore the potential of smartphone-based education as an impactful approach in nursing education, particularly for teaching critical skills such as infant airway obstruction management ([Kim et al., 2017](#)). The research that follows is about impact of digital applications on medication calculation education for nursing students. The results, based on a sample of 100 students, revealed a significant difference between the study group utilizing the Calculation Medicines app and the control group employing conventional methods. The study group exhibited higher mean scores and faster test execution times, highlighting the positive influence of the app-based teaching strategy in enhancing learning outcomes and fostering greater confidence in medication calculations ([Pereira et al., 2016b](#)).

AUTHOR CONTRIBUTION

Yelly Herien was the main researcher, responsible for research planning, application design, trial implementation, and manuscript preparation. Lili Fajria, Wedya Wahyu, and Arif Rohman Mansur were co-authors who assisted the principal investigator in filling application content,

conducting application trials with students, and final manuscript editing.

CONFLICT OF INTEREST

The authors report no actual or potential conflicts of interests.

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