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Effectiveness of KesPro-P Application on Knowledge and Learning Satisfaction of Nursing Faculty Students: A Post-Test Only Quasi-Experimental Study

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ABSTRACT

Background: Developing innovative, learner-centered resources based on nursing theory is essential for enhancing students' clinical nursing skills. However, there is limited evidence on the effectiveness of mobile-based applications, particularly in reproductive health practicums, in improving both knowledge and learning satisfaction among nursing students. **Objectives:** This study aimed to determine the effectiveness of the KesPro-P application for the Reproductive Health Nursing practicum on students' knowledge and learning satisfaction at the Faculty of Nursing, Universitas Andalas, Indonesia. **Methods:** This quantitative study used a post-test-only quasi-experimental study with a control group design. The study was preceded by an update of the KesPro-P application with the addition of several sections. A total of 100 nursing students were randomly divided into an intervention group (n=50) and a control group (n=50). The 7-week practicum learning will use the KesPro-P application in the intervention group and conventional methods in the control group. A post-test assessed knowledge and learning satisfaction in both groups. **Results:** The initial step in this study was to update the practicum topic on the KesPro-P application and update it on the Play Store. There were 4 additional topics in the application, namely, placental manual, postpartum depression, malignancy screening, and the "KIA" book (Kesehatan Ibu dan Anak). The mean knowledge score was 84 in the intervention group and 70.80 in the control group. While for the learning satisfaction variable, the mean value was 34.84 in the intervention group and 30.40 in the control group. It shows that the intervention group's mean knowledge and satisfaction score is higher than the control group score. There was a difference between the level of knowledge and learning satisfaction between these two groups ($p < 0.05$). **Conclusion:** The use of smartphone applications is one of the effective learning media in increasing students' knowledge and learning satisfaction in Reproductive Health Nursing practicums.

Keywords: Knowledge; Nursing Students; Satisfaction; Smartphone Application

INTRODUCTION

The integration of technology into nursing education has garnered considerable attention, particularly as it aligns with the evolving demands of healthcare and educational paradigms. Technology provides nurses with vast resources and up-to-date information, crucial for evidence-based practice (Olorunfemi & Akinyemi, 2024). Technology plays an important role in education, facilitating appropriate learning processes and environments, thus having a positive impact on student learning outcomes and attitudes. In addition, technology-based learning media increases students' motivation, inspires them to learn, and improves their understanding of classroom learning (Fikriyah *et al*., 2022; Qomariah *et al*., 2023). Recent studies underscore the effectiveness of mobile applications as innovative tools that enhance learning experiences, especially in practical and clinical settings. For instance, Alkhazali *et al*. (2024) demonstrated that mobile applications significantly improve nursing students' knowledge regarding pressure injury prevention, highlighting the potential of technology to facilitate learning in clinical contexts. Similarly, Coelho *et al*. (2021) found that the use of a therapeutic communication application led to enhanced knowledge among nursing students compared to traditional

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teaching methods, reinforcing the notion that mobile technology can effectively bridge theoretical knowledge and practical skills.

Smartphone applications hold significant potential for enhancing nursing education, yet their adoption remains limited due to several challenges. These challenges include technical barriers, lack of specialized content, and insufficient integration into educational curricula (Essfadi *et al.*, 2024). The absence of standardized applications across nursing schools leads to inconsistent educational experiences for students (Shin *et al*., 2018). Despite these challenges, smartphone applications are recognized for their potential to improve nursing education by providing flexible learning opportunities and supporting lifelong learning (Zhan, 2014). Involving nursing professionals in the development and implementation of digital technologies is crucial for effectively integrating digitalization into nursing education and ensuring future employability (Tischendorf *et al*., 2024). Despite the promising findings surrounding mobile applications in nursing education, significant gaps persist, particularly concerning their specific impacts on practical and clinical education within specialized fields such as reproductive health nursing. While existing literature has explored general theoretical learning and simulation tools, there remains a dearth of empirical evidence addressing how tailored applications, like KesPro-P (developed by researchers), influence both cognitive outcomes (knowledge) and affective outcomes (learning satisfaction) in structured practicum settings. An interactive nursing skills mobile application significantly improved nursing students' knowledge, self-efficacy, and clinical skills performance compared to a noninteractive application. This learner-centered approach demonstrates the potential of interactive mobile applications as effective tools for enhancing practical nursing education (Kim & Suh, 2018). While various digital and simulation tools have been explored in nursing education, few studies have specifically evaluated learner-centered mobile applications designed for reproductive health practicum. This study addresses that gap by assessing the effectiveness of KesPro-P in improving students' knowledge and learning satisfaction.

The KesPro-P application represents a significant advancement in reproductive health nursing education, particularly within nursing practicum contexts. This study aims to assess the effectiveness of the KesPro-P application in enhancing learning satisfaction and knowledge among nursing students at the Faculty of Nursing, Unand, thereby addressing a critical gap in literature. A previous study in the development of KesPro-P revealed that perceived usefulness, perceived ease of use, and behavioral intention were valued by students who were likely to utilize the KesPro-P application. Perceived usefulness, perceived ease of use, and behavioral intention are significantly correlated ($p = 0.000$) (Herien *et al*., 2024).

The importance of this research cannot be overstated, as reproductive health is a pivotal area of nursing that directly influences patient care and community health outcomes. By improving educational tools and methodologies, nursing programs can better prepare students to effectively address reproductive health issues. The integration of mobile applications like KesPro-P not only aligns with modern educational practices but also caters to the learning preferences of today's students, who are increasingly reliant on technology for their educational needs (Gause *et al.*, 2022). This study contributes to the ongoing discourse regarding effective pedagogical approaches in nursing education, particularly in specialized fields, and aims to provide valuable insights for educators and policymakers seeking to enhance nursing curricula and improve health education delivery.

Research Hypothesis

HA1: KesPro-P application is effective to improve student's knowledge in Reproductive Health Nursing practicum.

HA2: KesPro-P application is effective to improve student's learning satisfaction in Reproductive Health Nursing practicum

METHODOLOGY

Study Design

This study employs a quantitative research design utilizing a posttest-only control group design to determine the effectiveness of the KesPro-P application in enhancing knowledge and learning satisfaction

intention among nursing students. This methodology is well-established in educational research, particularly in assessing the impact of interventions on learning outcomes (Gronhoj *et al*., 2012). This quasi-experimental study was conducted in accordance with the TREND (Transparent Reporting of Evaluations with Nonrandomized Designs) checklist (Caetano, 2004). Below is a detailed outline of the research methodology, including the research design, data collection methods, and analysis techniques.

Sample

The study will involve two groups of nursing students from the Faculty of Nursing, Universitas Andalas, randomly assigned to use one of the websites for random sampling on the website to either the intervention group or the control group.

The sample size was determined through power analysis using G*Power software. The parameters for the power analysis included a significance level (α) of 0.05, power of 0.80, and an anticipated medium effect size (Cohen's d = 0.5), as recommended by Cohen. The analysis indicated that the minimum sample size required was 128 participants (64 in each group). However, due to the limited total population of only 150 students, a finite population correction was applied, reducing the minimum sample size to approximately 78 participants. To enhance the robustness of the study and account for potential dropouts or incomplete data, the final sample size was increased to 100 participants, with 50 allocated to the intervention group and 50 to the control group (Figure 1).

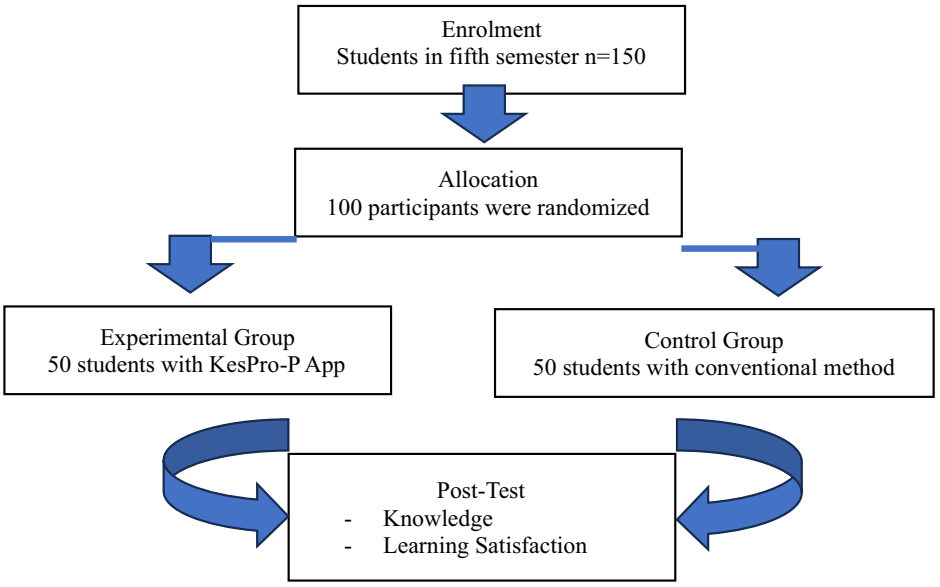


Figure 1: Flowchart of the Participants

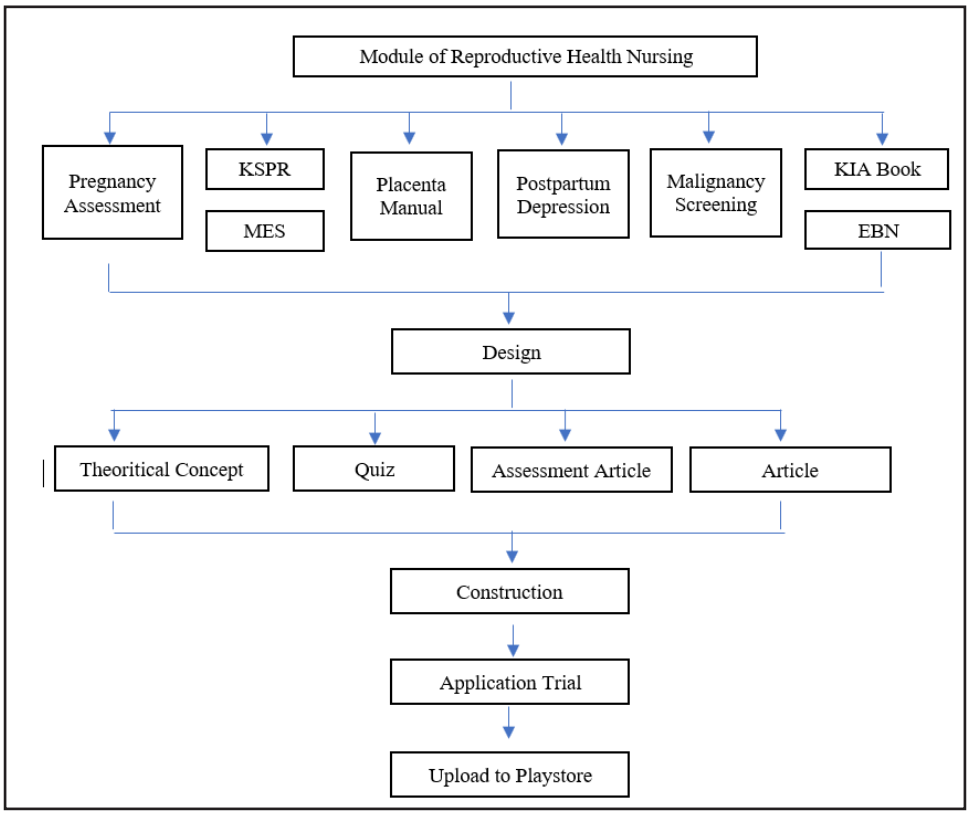
Procedure

The study conducted from January 2024 for developing the application and intervention starts from August until September 2024 with fifth-semester students who are studying reproductive health nursing this semester. Recruitment of the sample happened on August 3, 2024. The intervention group will consist of 50 students from the fifth semester, who will utilize the updated KesPro-P application during a 7-week practicum. In contrast, the control group will comprise 50 students, who will receive conventional teaching methods without the application. This design allows for a direct comparison of the outcomes between the two groups, which is crucial for establishing the effectiveness of the intervention (Mimi, 2024). The primary objective is to describe the outcomes of both groups after the intervention period, focusing on three key areas: learning satisfaction, knowledge, and behavioral intention, and then show the effectiveness of this application. Figure 1 depicts a flowchart of participants from enrollment to post-test. The research schedule can be seen in Table 1.

Table 1: Research Schedule

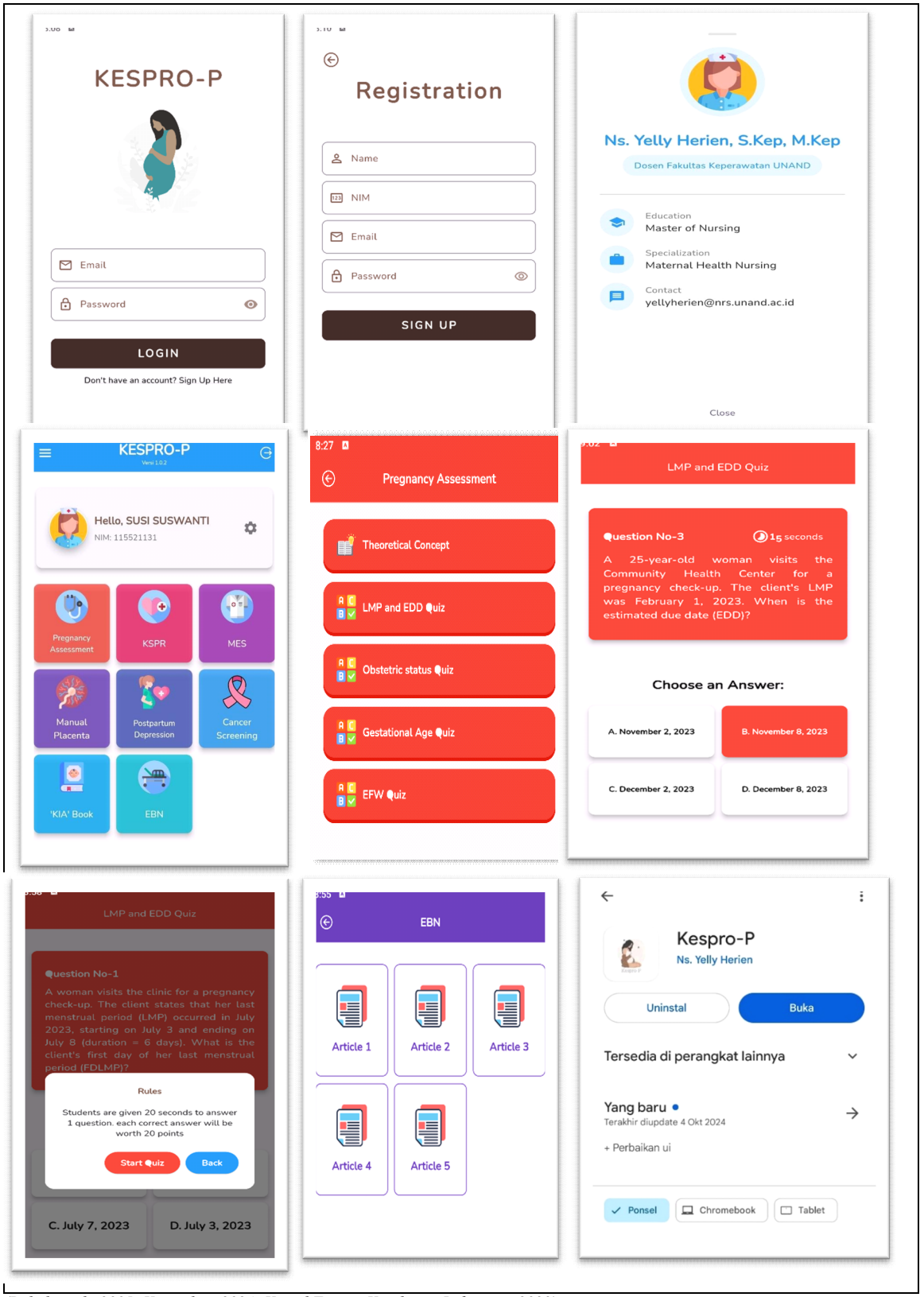
Date	Activity	Team involved
January-June 2024	Update KesPro -P App with 4 additional topics and uploaded to Play store	Researcher in field maternity nursing IT specialist
August 3, 2024	Sample recruitment, randomly 50 students in the control group and 50 students in the intervention group	Researcher
August 12 -September 28, 2024 (7 weeks)	Laboratory practice Control group: conventional modul; Intervention group: KesPro-P	Two researchers as facilitator for each group
	Intervention group open the App during practicum and work on the quiz One section of topic in the App will be finished once a week	IT specialist and researchers will check the database if the students doing all the tasks.
October 3, 2024	Post Test	Researchers

The first stage before going to the participants is the application update process, from KesPro-P2023 to KesPro-P 2024 and uploading it to the Play Store (Figure 2). There are 4 additional topics/sections in the application, namely Placental Manual, Postpartum Depression, Malignancy Screening, and the "KIA" Book (Figure 3). The application contains forms that students can fill in, case studies, and quizzes that students can work on anywhere and anytime (Herien *et al*., 2023). This application is used as a learning medium in the intervention group. The control group follows practical learning with conventional methods (using practical modules). The implementation of practical work in the intervention and control groups is carried out for 7 weeks. The next step is to measure the level of knowledge and satisfaction of students in the intervention and control groups regarding practical learning in reproductive health nursing.



Note: KSPR - Keperawatan Saluran Pernafasan Rehabilitasi (Respiratory Nursing Rehabilitation) ; MES -Maternity and Early Start; EBN - Evidence-Based Nursing

Figure 2: Development of KesPro-P 2024



(Bobak et al., 2005; Kemenkes, 2024; Konsil Tenaga Kesehatan Indonesia, 2023)

Figure 3: KesPro-P 2024 (English Version)

Instrument

The Learner's Satisfaction Survey Questionnaire for Hybrid Learning is used to measure the learning satisfaction of students. The learner's satisfaction survey set of questionnaires was adapted and modified from Ibrahim and Suhaimi (2022), which has been empirically validated. The questionnaire examined two different categories, which are the learner's learning process (4 questions) and the organization of the hybrid learning delivery system (4 questions). The questionnaire is measured through 5-point Likert scales (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree) scoring range 1-40.

Knowledge was measured by 50 questions created by the research team, based on the topics of the practicum taught. This instrument has been valid and reliable, filled out by students through the nursing faculty i-Learn. Scoring range 0-100. The instrument used in this study consisted of 50 multiple-choice items. To ensure the quality of the instrument, validity and reliability testing was conducted involving 30 students with similar characteristics to the study participants. Validity testing was performed using the Pearson product-moment correlation between each item score and the total score. The results of instrument validity testing for measuring students' knowledge showed that all 50 items had a correlation coefficient (r) greater than 0.30 and were statistically significant at the 5% level ($p < 0.05$), indicating that all items were valid. Reliability testing was conducted using the Kuder-Richardson Formula 20 (KR-20), as the items were dichotomous. The result showed a reliability coefficient of 0.85, which is considered high, indicating that the instrument is reliable and suitable for use in this study.

Data Analysis

The significance level was set at $p < 0.05$. The normality test was assessed using the Shapiro-Wilk test. The results of the normality test showed a p-value < 0.05, suggesting that the data did not follow a normal distribution. Hypothesis testing for knowledge and learning satisfaction variable from 2 groups post-intervention was performed using the Mann-Whitney Test. Data were analyzed using SPSS statistics software.

Ethical Consideration

The study got ethical approval from the Research Ethics Committee of the Faculty of Medicine, Universitas Andalas, Indonesia with reference number 508/UN16.12/KEP-FK/ 2024 on 23rd September, 2024.

RESULTS

Characteristics of the Participants

The participants' characteristics, consist of age, gender, and type of nursing education were collected .

Table 2: Characteristics of the Participants

Characteristic	Intervention Group	Control Group
Age		
- 17-24 years	46 (92%)	47 (94%)
- >24 years	4 (8%)	3 (6%)
Gender		
- Male	45 (90%)	45 (90%)
- Female	5 (10%)	5 (10%)
Type of Nursing Education		
- Regular student	46 (92%)	47 (94%)
- Transfer Student	4 (8%)	3 (6%)

Data on table 2 shows that most of the intervention group were aged 17-24 years and female. Three of them were over 40 years old. Of all the participants, 7 were transfer students, namely continuing education from diploma, and most were regular students. All of these characteristics were evenly distributed in both groups.

Homogeneity of baseline characteristics between the intervention and control groups was assessed using Chi-Square or Fisher's Exact Test, depending on the expected cell frequencies. The results showed no

significant differences between the two groups in terms of age ($p = 0.69$), gender ($p = 1.00$), and type of nursing education ($p = 0.69$). These findings indicate that the groups were homogeneous at baseline, and randomization was successful in balancing key demographic variables.

Knowledge of Nursing Students

Based on Table 3, the knowledge variable for the intervention group at the time of the post-test has a mean and SD of 84±10.498, while the control group at the time of the post-test had a mean and SD of 70.80±13.679±13.679. There was a significant difference between the groups ($p < 0.001$).

Table 3: Knowledge of Nursing Students between Intervention and Control Group

Variable	Intervention Group	Control Group	*P*-value
	Mean ± SD	Mean ± SD	
Knowledge (Post test)	84±10.498	70.80±13.679	$p < 0.001$

Learning satisfaction of nursing students

According to Table 4, the results showed that the learning satisfaction for the intervention group at the time of the post-test has a mean and SD of 34.84±3.260, while the control group at the time of the post-test had a mean and SD of 30.40±4.199. There was a significant difference between the groups ($p < 0.001$).

Table 4: Learning Satisfaction of Nursing Students between Intervention and Control Group

Variable	Intervention Group	Control Group	*P*-value
	Mean ± SD	Mean ± SD	
Learning Satisfaction (Post test)	34.84±3.260	30.40±4.199	$p < 0.001$

DISCUSSION

The integration of technology into nursing education has gained significant attention due to its ability to enhance learning outcomes and adapt to the evolving demands of healthcare. Advanced digital technologies, such as podcasts, e-learning, and virtual reality, have become essential tools, especially during the COVID-19 pandemic. These technologies facilitate flexible learning, reduce visual fatigue, and allow for repeated content access, thereby improving students' mastery of clinical knowledge and skills, which is crucial in meeting contemporary healthcare challenges (Wang *et al*., 2023).

The findings of this study underscore the effectiveness of the KesPro-P application in enhancing knowledge and learning satisfaction among nursing students. From an educational perspective, this outcome aligns with learner-centered learning theories that emphasize active participation as a key factor in knowledge development. This suggests that the use of the KesPro-P application, particularly with the inclusion of additional relevant topics such as manual placenta, postpartum depression, malignancy screening, and the KIA book, has positively impacted students' understanding of practicum topics. The enhanced comprehensiveness and relevance of the application likely facilitated better knowledge retention, aligning with findings from Bayram *et al*. (2024), who demonstrated that digital storytelling can significantly improve nursing students' compliance with clinical guidelines and knowledge levels (Bayram *et al.*, 2024). Furthermore, the interactive nature of digital learning tools, as highlighted by Erdoğan and Turan, supports the notion that such applications can provide engaging and effective learning experiences for nursing students (Erdogan & Turan, 2023). Mobile applications can improve nursing students' knowledge by providing structured content in easily digestible formats, facilitate teamwork and collaboration during clinical placements, and promote peer learning and a sense of community (Ryan *et al*., 2024). Digital learning platforms can support improvements in health outcomes and expand access by providing information that is clear, engaging, and appropriately tailored to learners' needs. A study also demonstrated that such tools hold strong potential to strengthen sexual and reproductive health education among adolescents (Hajia *et al*., 2025). Smartphone applications have been

shown to be effective in nursing education. The use of smartphone technology and applications in the medical and nursing fields is increasing (Sheikhtaheri & Moghadam, 2022). Nurses and nursing students have positive attitudes toward the use of smartphone applications for patient care and education (Saab *et al*., 2021). It is important to identify smartphone usage patterns and address the consequences of addiction and health problems associated with smartphone use (Machado *et al*., 2023). The need for research focusing on real-life clinical scenarios is critical, as highlighted by Nikpeyma *et al.* (2021), who identified barriers and facilitators in the use of mobile devices as educational tools, emphasizing the necessity for targeted studies that explore the intersection of technology and practical nursing education.

Regarding learning satisfaction, participants in the intervention group reported a higher mean score. Although the difference in satisfaction scores is less pronounced than that observed in knowledge scores, it remains significant. This increase in satisfaction may be attributed to the user-friendly interface and updated content of the KesPro-P application, which aligns with the findings of Moreau *et al*. (2018) that emphasize the importance of engaging digital tools in health professions education. The interactive features of the application likely fostered a more motivating and engaging learning environment, which is critical for student satisfaction and overall learning outcomes. This is further supported by the work of Nabolsi *et al*. (2021), who noted that the transition to online education during the COVID-19 pandemic highlighted the necessity for effective digital tools to maintain student engagement and satisfaction. The integration of such technology is increasingly vital as nursing education evolves to meet the needs of contemporary learners, who are often more engaged with digital tools. Research indicates that mobile applications can enhance knowledge retention and learning satisfaction among nursing students, as evidenced by studies that show improved self-efficacy and skills performance through the use of interactive applications. The smartphone application enhances nursing students' learning satisfaction by providing realistic physical assessment scenarios, quick access to instructional videos, and promoting active learning, reflection, and timely guidance from teachers, ultimately facilitating knowledge transfer and improving clinical skills (Hsu *et al*., 2018). The implications of these findings are substantial, suggesting that the integration of technology-based resources into nursing education could be a vital strategy for improving student outcomes. The study reinforces the value of digital applications in nursing education, particularly for complex subjects that require a nuanced understanding. As evidenced by the research of Kim, the provision of evidence-based knowledge through various educational programs is crucial for enhancing nursing practice (Kim & Yang, 2024). Therefore, the incorporation of applications like KesPro-P not only enhances knowledge acquisition but also contributes to a more satisfying learning experience, ultimately preparing nursing students for their future clinical roles.

From this study it can be seen that there are transfer students who may have an influence on the results of knowledge and satisfaction. Several references explain the differences between regular students and transfer students in the involvement of technology in learning. Regular nursing students often favor interactive and audiovisual media, such as videos, which enhance engagement and understanding of complex concepts (Pay & Sundari, 2023). Another study found that transfer students may prefer traditional methods, such as lectures and practical demonstrations, reflecting their prior educational experiences (Cheung *et al*., 2014). Smartphone applications have shown significant potential in enhancing learning satisfaction among nursing students. Studies have highlighted the positive impact of mobile applications on learning outcomes and satisfaction levels. For example, the use of mobile applications in pediatric clinical education has resulted in high levels of satisfaction among students, with increased achievement of learning objectives (Lee *et al*., 2023). Additionally, mobile video-based learning has been shown to increase motivation, satisfaction, and competency skills in nursing students, particularly in clinical procedures such as IV access and infusion (Sobhy *et al*., 2022). Furthermore, game-based mobile applications focused on nursing skills have shown substantial improvements in student knowledge, efficiency, satisfaction, and comfort, indicating positive learning effects and the potential to complement traditional clinical education strategies (Suh *et al.*, 2022).

Key findings from this study indicate that the KesPro-P application effectively supports learning through improved knowledge acquisition and enhanced satisfaction levels. The addition of clinically relevant topics has proven beneficial, and the positive user experience underscores the importance of integrating technology into nursing education. These results align with the broader literature that advocates for the use of digital tools

in educational settings, emphasizing their role in fostering engagement and improving learning outcomes.

Limitations

This study has several limitations. First, it employed a post-test-only quasi-experimental design, which restricted the ability to measure students' improvement over time and establish a causal relationship with full certainty. Second, the study involved participants from a single nursing faculty, thereby limiting the generalizability of the findings to other educational settings or student populations. Third, self-reported learning satisfaction data may have been influenced by students' subjective perceptions and external factors unrelated to the intervention. Finally, the study did not evaluate long-term retention of knowledge or the impact of the KesPro-P application on students' clinical performance in real practicum situations. Future studies are recommended to adopt a pre- and post-test design with a larger and more diverse sample, as well as longitudinal follow-up to strengthen the evidence of effectiveness.

CONCLUSION

This quasi-experimental study with a randomized control trial provides evidence of the effectiveness of the KesPro-P 2024 application in improving the learning experience for nursing students during reproductive health nursing practicum. The findings revealed that after seven weeks of intervention, the intervention group demonstrated significantly higher levels of knowledge and learning satisfaction compared to the control group. These results underscore the potential of interactive, learner-centered mobile applications in enhancing educational outcomes, particularly in practical nursing education. The study highlights the importance of integrating innovative digital tools like KesPro-P into nursing curricula to better equip students with the knowledge and skills required for clinical practice.

Future studies are recommended to investigate the long-term impact of the KesPro-P application on knowledge retention, clinical competence, and professional performance among nursing students. Research involving larger and more diverse populations across different educational institutions is also needed to improve the generalizability of the findings. Additionally, further studies could explore the effectiveness of similar digital learning applications in other nursing specialties and clinical settings. Comparative studies examining different types of digital learning platforms may also provide deeper insights into the most effective technological approaches for nursing education and long-term professional development.

Conflict of Interest

The authors declare that they have no competing interests.

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