Effective Technology-Enhanced Learning Methods of Increasing Knowledge and Practical Skills among Nursing Students

Martin Červený
Pavol Jozef Šafárik University in Košice, Slovak republic
martin.cerveny@upjs.sk

Kemal Elyeli
Near East University, Turkey
kemal.elyeli@neu.edu.tr

The utilisation of Technology-Enhanced Learning (TEL) methods in the field of nursing education provides students with the opportunity to engage in risk-free practice of clinical skills through the utilisation of interactive simulations and virtual laboratories. The incorporation of digital tools, such as e-learning modules and online assessments, facilitates enhanced knowledge retention and offers flexible learning opportunities that are tailored to the individual learning pace of the student. This literature review aims to summarize, analyze, and evaluate the effectiveness of TEL methods for developing knowledge and practical skills among nursing students. This literature review will assess methods utilized to enhance TEL skills among nursing students. Scientific publications in English languages published between 2013 and 2023 will be analyzed. Searches will be conducted in electronic databases including PubMed, Wiley library, SCOPUS, and Web of Science. The findings of seven studies were subjected to analysis. The findings of the review suggest that the utilisation of TEL learning methodologies has a beneficial impact on the skills and knowledge acquisition of nursing students. The integration of TEL educational interventions into nursing education has been demonstrated to be an effective approach for developing the knowledge and competencies of nursing students. The incorporation of digital educational interventions in nursing education has been demonstrated to result in higher knowledge scores and a reduction in cognitive load, thereby enabling students to engage more fully with the learning material.

Keywords: digital methods, nursing, students, skills, knowledge

https://doi.org/10.26493/978-961-293-467-5.11

Introduction

The landscape of nursing education is undergoing a transformative shift, driven by the increasing complexity of healthcare demands and the necessity for nurses to possess a diverse set of competencies (Tiago & Mitchell, 2024).

Klančar, A., Štemberger, T., Prosen, M., & Ličen, S. (Eds.). (2025). *International Perspectives on Effective Teaching and Learning in Digital Education*. University of Primorska Press.

Using TEL in nursing education helps students learn in a more engaging way and gives them the skills they need to meet the changing needs of patients in the digital age (Raman, 2015). It has been demonstrated that TEL, including simulation-based learning and virtual training programmes, can markedly enhance the competencies of nursing students (Elendu et al., 2024). For example, Rahimi et al. (2023) showed that a virtual training programme for nurse educators aimed at improving cultural competence led to increased self-efficacy and cultural competence across various dimensions after the intervention. Similarly, Salifu et al. (2022) emphasised that immersive, student-centred, and experiential teaching strategies, including simulation-based clinical education, are more effective in developing clinical competence among nursing students in Ghana. These approaches facilitate student engagement while accommodating diverse learning styles, thereby enhancing overall educational outcomes (El-Sabagh, 2021). Altmiller et al. (2024) and Philip (2015) highlighted the value of screen-based patient simulations in providing nursing students with multiple opportunities to demonstrate their competencies in diverse contexts, which is crucial for competency-based education. This is consistent with the findings of Gradellini et al. (2023) who observed that educators with the requisite pedagogical competence can employ experiential learning to facilitate the development of intercultural competence among nursing students. The global health landscape calls for nursing education that embraces a broad spectrum of competencies, such as cultural competence, informatics, digital and clinical skills. As stated by Satoh et al. (2020), the World Health Organization (WHO) places significant emphasis on the incorporation of global health competencies within nursing curricula, with the objective of preparing nurses for practice in diverse environments. This integration is considered to be of paramount importance in order to develop a workforce capable of addressing the complex health needs of populations worldwide. The literature indicates that digital or simulation-based learning, competency-based education and the integration of informatics are crucial for enhancing the skills of nursing students. As the nursing education sector evolves to align with the demands of modern healthcare, it is vital to prioritise innovative teaching methods that foster a competent and capable nursing workforce.

The Aim of This Review

To evaluate the effectiveness of various TEL interventions in achieving significant improvements across different learning styles and competencies in nursing education.

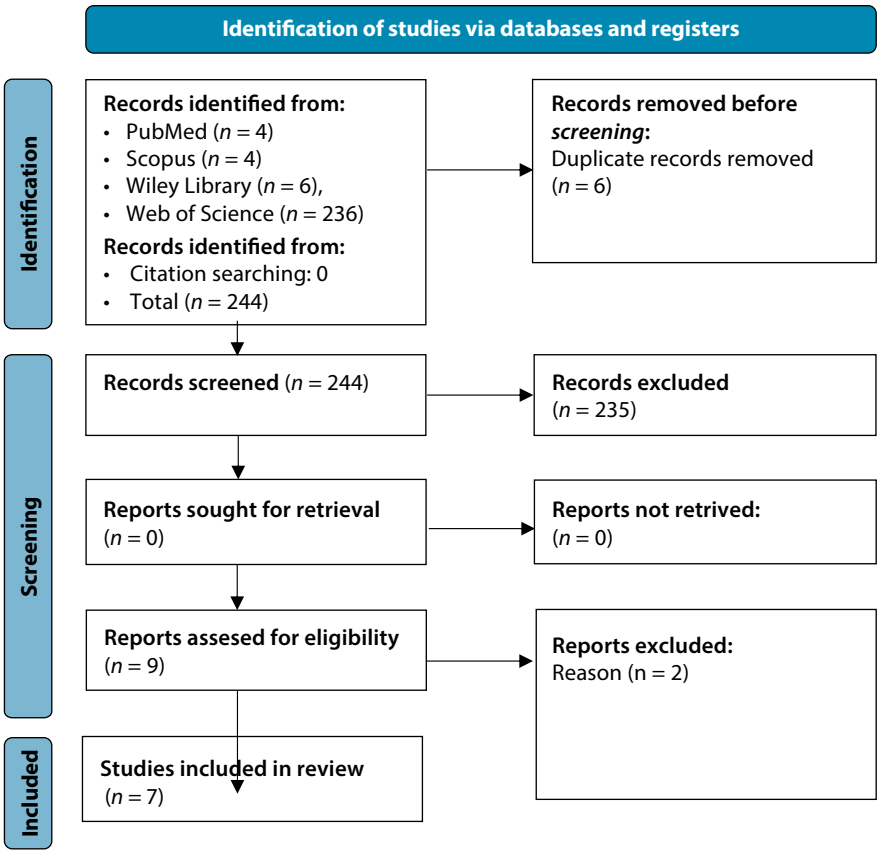

Figure 1 PRISMA Flow Diagram of this Scoping Review

Review Question

How effective are TEL interventions in enhancing learning outcomes across different learning styles and competencies in nursing education?

Materials and Methods

In this study, we conducted a literature review following the Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR (Triccco et al., 2018)) (Figure 1), and used the Participants, Interventions, Comparison, Outcomes (PICO) framework, as shown in Table 1.

Method of Searching for Evidence

The analyzed articles were collected from databases including PubMed, SCOPUS, Wiley Library, and Web of Science using specific keywords and

Table 1 Inclusion and Exclusion Criteria for the Review

Inclusion Criteria	Exclusion Criteria
Nursing students	Nurses
Published in English	Not original research: opinion, editorial, conference
Published from 2013–2023	abstract, systematic reviews,
Randmised controrold trials (RCTs)	articles not available in English

Boolean operators: Learning OR digital learning AND Digital skill* AND Nursing student* AND 'Randomized control trial.' All sources were academic publications featuring a randomized control trial research design and had undergone peer review. This review focused on the following elements:

- Population: nursing student(s)
- Intervention: TEL interventions in digital skills
- Comparison: nursing students without digital skills

Outcome: Effectivness of education interventions on digital skills

The source selection criteria are presented in Table 1. The search for sources was carried out from 01.08.2024 to 31.08.2024.

Data Charting and Extraction

A three-step screening process was used, with each step evaluated in MS Excel. In the first step, we reviewed the article titles and abstracts. In the second step, we identified and categorized articles that met the inclusion criteria and assessed their quality, with two co-authors independently applying the quality assessment method by Červený et al. (2022). The third step involved data extraction. The database search initially yielded 244 articles. After removing duplicates, we proceeded to analyze the titles and abstracts, resulting in the exclusion of 235 articles based on abstract analysis. Nine articles were selected for full-text review, but after further analysis, two more articles were excluded. We conducted the data analysis using MAXQDA Analytics Pro (version 24.5.1).

Qulity of Analysed Studies

The Jadad scale is a five-point tool used to assess the quality of randomised trials. A score of three or higher is indicative of high-quality studies (Jadad et al., 1996). The scale evaluates three key aspects: the description of random sequence generation (0 = no description, 1 = inadequate description, 2 = adequate description), the implementation of blinding (2 = properly described double-blinding, 1 = inadequately described double-blinding, 0 = incorrect

use of double-blinding), and the reporting of participant withdrawals (1 = reasons and numbers provided, 0 = not reported).The assessment was conducted independently by the authors. All the studies included get more than three scores, which means they're all high quality.

Results

In total, we identified seven articles that met the inclusion criteria. The studies varied in their stated aims, settings, descriptions of participants, interventions and outcomes measured. Data extraction included author(s), year, country of research, study aim, design and main findings (Table 2).

Effectiveness of TEL Interventions on Knowledge and Skills among Nursing Students

In the study by Chang et al. (2021) the mobile app integrated interactive elements such as audio, visual, and haptic stimuli, allowing nursing students to actively engage with the material. The app provided immediate feedback, allowing students to detect and correct mistakes, leading to improved skill performance. The authors found that using a virtual simulation-based mobile learning method had a positive impact on the experimental group. Specifically, the group that used the app achieved significantly higher scores in knowledge, medication administration, and nasotracheal suctioning compared to the control group. Additionally, the experimental group reported notably lower levels of intrinsic and extraneous cognitive load than the control group. Participants in the experimental group also expressed significantly greater satisfaction compared to those in the control group. The effect sizes for these differences were large, indicating substantial practical significance. Furthermore, the statistical power ($p < 0.001$) of these findings was very high, suggesting that the results are highly reliable and unlikely to be due to chance.

According by the study Amaniyan et al. (2020) teaching by the conceptual map method had statistically significant differences with the control groups in the visual learning style ($p < 0.036$). However, no statistically significant differences were reported among the groups participating in the conceptual map method compared with the traditional lecture method in the following three learning styles including reading/writing ($p < 0.414$), auditory ($p < 0.249$), and kinesthetic ($p < 0.078$). Conceptual mapping proved to be an effective digital intervention feature for visual learners by enhancing interactivity, structuring information visually, and improving knowledge retention. However, it had limited impact on students with auditory, reading/writing, or

Table 2 Comparison of Included Studies

Author(s), year, country	Aim	Methods and Setting	Intervention	Main Findings
Chang et al. (2022), Taiwan	This study aimed to examine the effectiveness of an educational board game in improving nursing students' medication knowledge	Randomized controlled trial desing 100 nursing students	Board game Medication memory	Both groups improved in immediate medication recall after the intervention, regardless of learning method. However, after one month, the experimental group scored higher and reported greater satisfaction with the learning method than the comparison group.
Amaniyan et al. (2020), Iran	The aim of this study was to compare the effects of the conceptual map and the traditional lecture methods on students' learning based on the VARK learning styles model.	Randomized controlled trial 160 nursing and midwifery students	Conceptual map method	The conceptual map teaching method influenced students' learning outcomes differently depending on their learning styles. For students with a visual learning style, this method had a statistically significant positive impact in the intervention group compared to the control group ($p = .036$). However, no significant differences were observed between the groups for the other three learning styles.
Lee et al. (2016), South Korea	The purpose of this study was to identify the effects of a mobile–based video clip on learning motivation, competence, and class satisfaction in nursing students	Randomized Controlled Trial 71 nursing students	Mobil based video clips	The intervention group demonstrated significantly greater learning motivation and class satisfaction compared to the control group. Among fundamental nursing skills, the intervention group also showed higher confidence in performing catheterization than their peers in the control group.
Elzeky et al. (2022)	This study was designed to assess the efects of using gamifed flipped classroomss on the Fundamentals of Nursing students' skills competency and learning motivation	Randomized Controlled study 128 nursing students	Flipped classrooms	A significant difference was found between the two groups in terms of students' self–confidence ($p = 0.021$), skills knowledge ($p < 0.001$), preparation intensity ($p < 0.001$), and motivation ($p < 0.001$) after using gamified flipped classrooms. However, no difference was observed in students' skills performance ($p = 0.163$) between the groups.

Continued on next page

Author(s), year, country	Aim	Methods and Setting	Intervention	Main Findings
Fernandes Pereira et al. (2016), Brazil	To evaluate the influence of the use of digital applications in medicament calculation education for nursing students	Experimental study – Randomized Controll study 100 nursing students	CalcMed application	The study group achieved a mean score of 8.14, compared to an average of 5.02 in the control group. Additionally, the study group completed the test more quickly, with an average time of 15.7 minutes versus 38.9 minutes in the control group.
Long et al. (2016), United States of America	The purpose of the EBR tool is to guide students through the basic steps needed to locate and critically appraise the online scientific literature while linking users to quality electronic resources to support evidence–based practice (EBP)	Mixed–methods research – randomized controll trials 72 nursing students in BSc program 63 nursing students in MSc program 159 pharmacy students	Web–based, evidence based research (EBR) tool	The quasi–experimental nursing student group and the RCT nutrition student group showed a statistically significant improvement in overall research skills when using the EBR tool. Additionally, a significant proportional difference was observed in the RCT nutrition and PharmD intervention groups, where participants were better able to assess the credibility of online sources compared to controls. Most participants were also able to accurately apply the PICOTS framework to a case study using the tool.
Chang et al. (2021), Taiwan	The study's aim was to test the hypothesis that nursing students who used a mobile learning app would have significantly (1) higher levels of knowledge about medication administration and nasotracheal suctioning, (2) better development of skill performances on medication administration and nasotracheal suctioning, (3) higher satisfaction, and (4) lower cognitive load than a control group	Randomized experimental study 69 nursing students	Virtual simulation–based mobile learning	The experimental group that used the mobile app achieved significantly higher knowledge scores, experienced lower intrinsic and extraneous cognitive load, demonstrated better skill performance, and reported greater satisfaction compared to the control group.

kinesthetic learning styles, suggesting that blended approaches incorporating multiple features (e.g., videos, simulations, interactive quizzes) might be more universally effective.

In Lee et al. (2016) study, participants in the intervention group who received mobile-based learning videos showed significantly higher levels of learning motivation, practice confidence, and class satisfaction compared to the control group. Although the intervention group also scored higher in knowledge and skill performance key indicators of fundamental nursing competency these differences were not statistically significant. Notably, there were strong positive correlations between learning motivation and class satisfaction ($r = 0.725$, $P < 0.001$) as well as between learning motivation and practice confidence ($r = 0.717$, $P < 0.001$). Additionally, a significant positive correlation was found between class satisfaction and confidence ($r = 0.772$, $P < 0.001$). However, no significant correlations emerged between knowledge or skill performance and any other variables. Mobile-based video clips allowed students to access instructional materials anytime and anywhere, leading to greater convenience and autonomy.

Elzeky et al. (2022) found, that the performance of skills did not demonstrate any significant differences over time, between the groups, or in the interaction between time and group. In contrast, confidence in skills showed a significant increase over time, accompanied by a significant time-group effect and a notable difference between the two groups. Similarly, knowledge of skills exhibited a significant increase over time, along with a significant time-group effect and a significant difference between the two groups. Additionally, the intensity of skills preparation showed a significant increase over time, with both a significant time-group effect and a marked difference between the two groups. Gamification combined with flipped learning effectively increased motivation, confidence, and preparation but did not significantly improve hands-on skill performance. The most impactful features were leaderboards, points, levels, badges, and immediate feedback mechanisms.

In the study Fernandes Pereira et al. (2016) the mean age of the intervention group was 22.4 years, while that of the control group was 19.9 years. Upon examination of variables such as mode hits, average errors, and average test runs, it became evident that individuals utilising the application achieved markedly superior results, with an approximate 80% success rate on the proposed items. The intervention group exhibited a mean score of 8.14 ± 1.67 points, in comparison to 5.02 ± 3.21 points for the control group. This illustrates a discernible enhancement in efficiency with the app's usage. The dis-

tribution of test successes indicated that the lower range of the intervention group and the upper range of the control group were quite close, suggesting that using the app improves the likelihood of correct responses in medication calculations. Furthermore, the app provides a notable improvement over using calculators or relying solely on prior mathematical skills, thereby supporting better technique and significantly reducing errors in practical applications. The use of the application led to a notable reduction in calculation errors, improving the overall technique and minimizing potential mistakes in practical nursing scenarios.

The study by Long et al. (2016) revealed a statistically significant enhancement in overall research proficiency across all three groups (United States/BSN, Middle East/BSN, United States/MSN) based on pre- and post-test scores. The EBR tool was designed to be interactive, allowing users to engage actively with the content. The interactive nature of the tool encourages users to explore various components at their own pace, which can enhance understanding and retention of research skills for EBP. Although specific feedback mechanisms were not detailed in the contexts, the qualitative data indicated that users found the tool helpful in improving their online research skills. However, the study did not reveal a statistically significant proportional difference in pre- and post-test scores for the ability to distinguish the credibility of online sources in any of the three groups. Moreover, the study revealed a statistically significant enhancement in research skills, particularly within the nutrition population intervention group in comparison to the control group. This is evidenced by the observed increase in mean pre- and post-test scores (2.85–2.44 vs. 2.60–2.21). Additionally, the study observed a statistically significant proportional difference in pre- and post-test scores for the ability to assess the credibility of online sources, with the nutrition population intervention group demonstrating superior performance compared to the control group.

The study by Chang et al. (2022) revealed a notable enhancement in the experimental group's medication knowledge scores (PKQ) between the pre-intervention and post-intervention phases. Furthermore, these scores remained at an elevated level one month following the intervention. Similarly, the comparison group's medication knowledge scores (PKQ) demonstrated a significant increase from the pre-intervention phase to the post-intervention phase, and remained higher than the pre-intervention scores one month later. No significant differences were observed in medication knowledge scores between the experimental and comparison groups immediately following the intervention. However, one month after the intervention, the experimen-

tal group, which used the board game, demonstrated significantly higher medication knowledge scores than the comparison group. Furthermore, the experimental group (board game) reported significantly higher satisfaction with the learning experience compared to the comparison group, which received a lecture. Students who engaged in board game play demonstrated better long-term retention of knowledge compared to those who attended traditional lectures. Students also reported favorable reactions to the board game learning method, indicating that they found it enjoyable and effective for increasing their medication knowledge.

Discussion

The incorporation of TEL interventions in nursing education has become a prominent area of interest in recent years, particularly in view of the evolving demands of healthcare and the necessity for nurses to acquire a diverse set of competencies. The findings from analysed of studies highlight the efficacy of these interventions in enhancing knowledge, skills and overall satisfaction among nursing students. The advent of new digital technologies has had a profound impact on the field of nursing education, with virtual simulations emerging as a highly effective pedagogical instrument. A systematic review conducted by Tolarba (2021) highlighted the growing use of digital virtual simulation in nursing education. The review emphasised the potential of such simulations to enhance learning outcomes by providing realistic clinical scenarios that students can engage with in a controlled environment. This is consistent with the findings of Kim et al. (2021), who reported that nursing students perceived virtual simulation as beneficial during the pandemic caused by the SARS-CoV-2 virus, particularly when traditional clinical placements were disrupted. The capacity of virtual simulations to replicate real-world clinical situations allows students to practise critical skills without the associated risks, thereby fostering a deeper understanding of nursing competencies. The positive impact of simulation-based education on nursing performance and satisfaction has been further corroborated by Ahmed et al. (2022), who found that simulation significantly improved nurses' performance regarding peripherally inserted central catheters in a neonatal intensive care unit. This study demonstrates how targeted simulation training can facilitate the acquisition of specific clinical skills, thereby enhancing overall patient care. Similarly, Walsh et al. (2021) emphasised that virtual simulation experiences offer invaluable opportunities for nursing students to enhance their learning, reinforcing the notion that such interventions can effectively bridge the gap between theoretical knowledge and

practical application. Furthermore, Lee et al. (2023) demonstrated that virtual reality programmes significantly enhanced nursing students' competencies during the pandemic caused by the SARS-CoV-2 virus. This was achieved by linking previously learned concepts through interactive learning. Aul et al. (2021) were unequivocal in their assertion that simulation-based education must be integrated into nursing curricula. They demonstrated that students who spend a significant portion of their clinical training in simulation environments demonstrate improved teamwork and clinical decision-making skills. This finding is of great significance, as it demonstrates the potential of digital interventions to not only enhance individual competencies but also foster collaborative skills, which are essential in modern healthcare settings. The use of digital educational interventions, particularly virtual simulations, in nursing education has been shown to significantly enhance the knowledge, skills and overall satisfaction of nursing students. In light of the ongoing evolution of the healthcare landscape, it is imperative that nursing education programmes adopt these innovative approaches in order to ensure that future nurses are adequately prepared to meet the challenges of modern healthcare. It is imperative that these digital interventions are subject to ongoing evaluation and refinement in order to ensure that they have the greatest possible impact on nursing education and, ultimately, on patient care outcomes.

Implication for Education

The integration of TEL in clinical training highlights the importance of leveraging technological advancements to optimise learning outcomes.Through the incorporation of mobile applications, gamification, and video-based learning methodologies, educators can facilitate interactive and engaging experiences that reinforce practical skills in students.This approach not only enhances knowledge retention but also fosters student confidence, ensuring they are better prepared for real-world clinical scenarios. The utilisation of digital tools in education has the potential to extend beyond nursing to various fields, thereby emphasising the role of technology in modernising learning environments. Future research should explore the long-term impact of gamification and mobile applications on clinical decision-making skills, assessing whether digital interventions improve not just knowledge retention but also critical thinking and adaptability in real-world healthcare settings. The investigation of personalised adaptive learning systems, which adapt content based on student progress, has the potential to further optimise nursing education outcomes.

Conclusion

The incorporation of TEL interventions in nursing education has been demonstrated to be an effective strategy for enhancing the knowledge and skills of nursing students. The studies analysed demonstrate that the utilisation of various digital tools, such as virtual simulations, mobile applications, and conceptual mapping, has been shown to significantly improve students' performance in critical areas such as medication administration and clinical competencies. These interventions have been shown to lead to higher knowledge scores and also contribute to reduced cognitive load, allowing students to engage more fully with the learning material.

References

Ahmed, S., Mohammed, H., Ayed, M., El-Ghadban, F., & Amin, F. (2022). Effect of simulation-based education on nurses' performance and satisfaction regarding peripherally inserted central catheters at neonatal intensive care unit. *Tanta Scientific Nursing Journal, 26*(3), 252–269.

Altmiller, G., Jimenez, F. A., & Wilson, C. (2024). Screen-based patient simulation: An exemplar for developing and assessing competency. *Nurse Educator, 49*(4), 179–183.

Amaniyan, S., Pouyesh, V., Bashiri, Y., Snelgrove, S., & Vaismoradi, M. (2020). Comparison of the conceptual map and traditional lecture methods on students' learning based on the VARK learning style model: A randomized controlled Trial. *SAGE Open Nursing, 6*, 2377960820940550.

Aul, K., Bagnall, L., Bumbach, M., Gannon, J., Shipman, S., McDaniel, A., & Keenan, G. (2021). A key to transforming a nursing curriculum: Integrating a continuous improvement simulation expansion strategy. *SAGE Open Nursing, 7,* 2377960821998524.

Červený, M., Siaki, L., Prosen, M., & Nagórska, M. (2022). Challenges experienced by nurses caring for patients from different cultures: a scoping review of the literature, 2010–2020. *Central European Journal of Nursing and Midwifery, 13*(4), 783–792.

Chang, H. Y., Wu, H. F., Chang, Y. C., Tseng, Y. S., & Wang, Y. C. (2021). The effects of a virtual simulation-based, mobile technology application on nursing students' learning achievement and cognitive load: Randomized controlled trial. *International Journal of Nursing Studies, 120,* 103948.

Chang, Y. S., Hu, S. H., Kuo, S. W., Chang, K. M., Kuo, C. L., Nguyen, T. V., & Chuang, Y. H. (2022). Effects of board game play on nursing students' medication knowledge: A randomized controlled trial. *Nurse Education in Practice, 63,* 103412.

Elendu, C., Amaechi, D. C., Okatta, A. U., Amaechi, E. C., Elendu, T. C., Ezeh, C. P., & Elendu, I. D. (2024). The impact of simulation-based training in medical education: A review. *Medicine, 103*(27), e38813.

El-Sabagh, H. A. (2021). Adaptive e-learning environment based on learning styles and its impact on development students' engagement. *International Journal of Educational Technology in Higher Education, 18,* 53.

Elzeky, M. E. H., Elhabashy, H. M. M., Ali, W. G. M., & Allam, S. M. E. (2022). Effect of gamified flipped classroom on improving nursing students' skills competency and learning motivation: A randomized controlled trial. *BMC Nursing, 21,* 316.

Fernandes Pereira, F. G., Afio Caetano, J., Marques Frota, N., & Gomes da Silva, M. (2016). Use of digital applications in the medicament calculation education for nursing. *Investigacion y educacion en enfermeria, 34*(2), 297–304.

Gradellini, C., Pretorius, M., Vermeiren, S., Schärli-Lim, S., Bønløkke, M., & Lorenzo, E. de (2024). The development and validation of an intercultural nursing educator profile using the Delphi Method. *Journal of Transcultural Nursing, 35*(1), 62–73.

Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J., Gavaghan, D. J., & McQuay, H. J. (1996). Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Controlled Clinical Trials, 17*(1), 1–12.

Kim, M., Kang, H., & Gagné, J. (2021). Nursing students' perceptions and experiences of using virtual simulation during the Covid-19 pandemic. *Clinical Simulation in Nursing, 60,* 11–17.

Lee, E., Baek, G., & Hwang, Y. (2023). Effectiveness of the patient's severity classification competency promotion virtual reality program of nursing students during the Covid-19 pandemic period. *Healthcare, 11*(8), 1122.

Lee, N. J., Chae, S. M., Kim, H., Lee, J. H., Min, H. J., & Park, D. E. (2016). Mobile-based video learning outcomes in clinical nursing skill education: A randomized controlled trial. *Computers, Informatics, Nursing, 34*(1), 8–16.

Long, J. D., Gannaway, P., Ford, C., Doumit, R., Zeeni, N., Sukkarieh-Haraty, O., Milane, A., Byers, B., Harrison, L., Hatch, D., Brown, J., Proper, S., White, P., & Song, H. (2016). Effectiveness of a technology-based intervention to teach evidence-based practice: The EBR tool. *Worldviews on Evidence-Based Nursing, 13*(1), 59–65.

Philip J. H. (2015). Using screen-based simulation of inhaled anaesthetic delivery to improve patient care. *British Journal of Anaesthesia, 115*(Suppl 2), ii89–ii94.

Rahimi, M., Shahraki, S., Fatehi, F., & Farokhzadian, J. (2023). A virtual training program for improving cultural competence among academic nurse educators. *BMC Medical Education, 23*(1), 445.

Raman J. (2015). Mobile technology in nursing education: Where do we go from here? A review of the literature. *Nurse Education Today, 35*(5), 663–672.

Salifu, D., Heymans, Y., & Christmals, C. (2022). Teaching and learning of clinical competence in ghana: experiences of students and post-registration nurses. *Healthcare, 10*(3), 538.

Satoh, M., Fujimura, A., & Sato, N. (2020). Competency of academic nurse educators. *SAGE open Nursing, 6,* 2377960820969389.

Tiago, R. d. S., & Mitchell, A. (2024). Integrating digital transformation in nursing education: Best practices and challenges in curriculum development. In M. D. Lytras, A. C. Serban, A. Alkhaldi, S. Malik, & T. Aldosemani (Eds.), *Digital transformation in higher education: Part B; Cases, examples and good practices* (Emerald Studies in Active and Transformative Learning in Higher Education, pp. 57–101). Emerald Publishing.

Tolarba, J. (2021). Virtual simulation in nursing education: A systematic review. *International Journal of Nursing Education, 13*(3), 48–54.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473.

Walsh, H., Brown, N., Nicholson, L., & King, S. (2021). Innovative hospital-based pediatric virtual learning for nursing students. *Nurse Educator, 47*(2), E30–E33.

Učinkovite metode učenja s pomočjo tehnologije za povečanje znanja in praktičnih veščin med študenti zdravstvene nege

Uporaba metod tehnološko podprtega učenja (angl. *technology-enhanced learning* – TEL) v izobraževanju na področju zdravstvene nege študentom omogoča varno razvijanje kliničnih veščin preko interaktivnih simulacij in virtualnih laboratorijev. Vključevanje digitalnih orodij, kot so e-učenje in spletna preverjanja znanja, izboljšuje dolgoročno pomnjenje informacij ter ponuja prilagodljive učne možnosti, ki so usklajene s posameznikovim učnim tempom. Namen pričujočega pregleda literature je povzeti, analizirati in ovrednotiti učinkovitost metod TEL pri razvijanju teoretičnega znanja in praktičnih veščin študentov zdravstvene nege. Pregled literature bo zajemal analizo metod, uporabljenih za izboljšanje TEL-spretnosti pri študentih zdravstvene nege. Analizirane bodo znanstvene publikacije v angleškem jeziku, objavljene med letoma 2013 in 2023. Iskanje virov bo potekalo v elektronskih bazah podatkov, vključno s PubMed, Wiley Library, SCOPUS in Web of Science. Analiza je zajela ugotovitve sedmih raziskav. Pregled literature nakazuje, da imajo metode TEL pozitiven vpliv na pridobivanje znanja in razvoj veščin pri študentih zdravstvene nege. Integracija izobraževalnih intervencij TEL v izobraževanje na področju

zdravstvene nege se je izkazala za učinkovito strategijo pri razvijanju znanja in kompetenc študentov. Uporaba digitalnih izobraževalnih pristopov vodi do boljših učnih rezultatov in zmanjšanja kognitivne obremenitve, kar študentom omogoča poglobljenejše učenje.

Ključne besede: digitalne metode, zdravstvena nega, študenti, veščine, znanje