



Digitally-Enhanced Communication Competencies: Preparing the Next Generation of Healthcare Professionals: A Systematic Review

Anis Novitasari^{1,2(*)}, Ari Indra Susanti³, Dewi Marhaeni Diah Herawati⁴, Nita Arisanti⁴, Hadi Susiarno⁵, Vita Murniati Tarawan⁶

¹Master of Midwifery, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

²Midwifery Department, Poltekkes Kemenkes Manado, Manado, Indonesia

³School of Vocational Studies, Universitas Padjadjaran, Sumedang, Indonesia

⁴Department of Public Health, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

⁵Department Obstetrics and Gynecology, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

⁶Department of Biomedical Science, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia

Abstract

Received : June 21, 2026
Revised : July 9, 2026
Accepted : August 15, 2026

The adoption of digital technologies such as telehealth in health education requires the development of digital communication competencies among future healthcare professionals. Although health students generally demonstrate positive attitudes toward digital health, their readiness and practical communication skills remain limited. This systematic review aimed to identify the role of digital interventions in improving communication competencies (knowledge, skills, and attitudes) and to describe the characteristics of their implementation. A systematic search was conducted in five databases (PubMed, EBSCOhost, ScienceDirect, Scopus, and Sage Journals) for primary studies published between October 2020 and October 2025 following the PRISMA 2020 guidelines. Twelve studies met the inclusion criteria, with most conducted in the United States (41.7%) and Germany (25.0%), and the majority using quantitative designs (58.3%). Digital interventions—including telehealth modules, telemedicine simulations, telenursing training, virtual OSCEs, and video-based learning—consistently improved communication competencies. Knowledge scores increased significantly, with post-test scores reaching 57.1% in digital module interventions and telenursing knowledge scores increasing from 6.84 to 8.42 (Cohen's $d = 0.76$). Communication skills also improved, with 100% of participants applying the Ask-Tell-Ask strategy after training and 98% recommending telemedicine simulation courses. Attitude outcomes showed increased confidence and readiness, with preparedness for telehealth rising from 37% to 78% and telenursing training demonstrating a large effect size (Cohen's $d = 1.04$). However, ethical competencies, particularly informed consent, patient privacy, and virtual physical examination, remained relatively weak across studies. These findings suggest that digital interventions are effective in strengthening communication competencies among health students, but sustainable competency development requires structured integration of telehealth curricula with simulation-based learning, supervised practice, and explicit training in ethical and patient-centered communication.

Keywords:

Communication Competence, Digital Interventions, Telehealth, Health Students, Systematic Review

(*) Corresponding Author: anisnovitasariunpad@gmail.com

How to Cite: Novitasari, A., Susanti, A. I., Herawati, D. M. D., Arisanti, N., Susiarno, H., & Tarawan, V. M. (2026). Digitally-Enhanced Communication Competencies: Preparing the Next Generation of Healthcare Professionals: A Systematic Review. *JTP - Jurnal Teknologi Pendidikan*, 28(2), 576–591. <https://doi.org/10.21009/jtp.v28i2.69594>



INTRODUCTION

The presence of digital technology has changed the way prospective healthcare workers interact and learn. The COVID-19 pandemic accelerated the adoption of telemedicine globally. Through telemedicine, students/healthcare workers can still be involved in patient care remotely, maintaining the continuity of education and healthcare services (Shawwa, 2023). In addition to medical students, the telehealth trend is also experienced by other health students, such as in nursing education, which shows the need for telehealth integration post-COVID (Eckhoff et al., 2022). Midwifery students experience the impact of distance learning and telehealth; midwives' experiences with telehealth (including during the pandemic) indicate that telehealth is changing midwifery practice and education (Golden et al., 2024; Kleib et al., 2024). However, some studies state that students tend to have high interest and positive attitudes toward telehealth, but their practical readiness/knowledge and experience are still limited (Alshammari et al., 2024; Rettinger et al., 2024). Health students need to develop professional communication skills not only face-to-face but also through digital media. Teaching awareness, proper social media use practices, information literacy, and the boundaries between professional and personal roles online are important aspects that are beginning to be taught (O'Connor et al., 2021). Most students support the integration of digital technology into the health education curriculum (Kaya Kaçar et al., 2024). Previous research also supports that digital professional communication is not just a supplement but part of the competencies that must be developed (O'Connor et al., 2022). Communication competencies that need to be developed include knowledge, skills, and attitudes domains (Abou Hashish & Alnajjar, 2024).

Developing digital communication competencies remains challenging because telehealth communication requires adaptation to limited nonverbal cues and greater attention to ethical issues such as informed consent, privacy, and professionalism (Wright et al., 2022; Shafizadeh et al., 2022). Nevertheless, digital interventions, including virtual patient simulations and gamified online role-play, have been shown to improve communication skills, confidence, and empathy among health students (Jadoon et al., 2025; Teerawongpaibroj et al., 2024). Although previous studies have highlighted the value of telehealth simulation, virtual patients, and e-learning in communication training (Fernández-Alcántara et al., 2025), few reviews have comprehensively synthesized their implementation characteristics and competency outcomes. Therefore, this systematic review aims to identify the role of digital interventions in developing communication competencies among future healthcare professionals and to describe their implementation characteristics in the current literature.

Although previous reviews have examined telehealth education and digital health training, they have mainly focused on specific professions or technologies rather than communication competencies across the domains of knowledge, skills, and attitudes. In addition, few reviews have comprehensively mapped the characteristics of digital interventions, including learning design, implementation, and competency outcomes across healthcare professions (Chike-Harris et al., 2021; Kleib et al., 2024; Fernández-Alcántara et al., 2025). Therefore, this systematic review provides an integrated synthesis of digital communication interventions and

their implementation characteristics to support evidence-based curriculum development in healthcare education.

METHODS

This research is a systematic review. A systematic review is a research method aimed at answering specific research questions through a systematic, structured, and minimally biased process. This process includes searching, selecting, critically appraising, and synthesizing scientific evidence from relevant and high-quality studies (Norlita et al., 2023). This review follows the formal PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards. Relevant studies were obtained through searches in the PubMed, EBSCOhost, ScienceDirect, Scopus, and Sage Journals databases for the period from October 2020 to October 2025, using institutional access provided by Universitas Padjadjaran.

A literature review was conducted on research articles published in English-language journals. The search process was carried out from September 13 to October 10, 2025. Search keywords were formulated based on the PICO framework. (Table 1)

The unit of analysis in this systematic review was primary research articles rather than individual participants. A purposive sampling approach was used to select eligible studies following the PRISMA 2020 guidelines. Original quantitative, mixed-methods, and cohort studies involving undergraduate or postgraduate healthcare students and evaluating digital interventions to improve communication competencies, published in English between October 2020 and October 2025, were included, while reviews, protocols, conference abstracts, editorials, and ineligible studies were excluded. The final sample comprised 12 studies that met all eligibility criteria after title and abstract screening, full-text assessment, and methodological quality appraisal, providing sufficient evidence to address the review objectives.

Table 1. PICO Framework

PICO Format	
Population	Students
Intervention	Communication Digital; Telehealth; Telemedicine, Training, Course
Comparison	(not applicable)
Outcomes	Knowledge; Skill; Attitude; competency

This table illustrates the PICO framework (Population, Intervention, Comparison, Outcomes) used to formulate the focus of the research question and determine keywords in the article search process using Boolean operators.

Data were extracted using a standardized form that captured study characteristics, participant information, intervention type, communication competency domains, measurement instruments, statistical analysis, and key findings. To ensure data validity, one reviewer extracted the data and all authors independently verified the results, resolving disagreements by consensus. Study

quality was assessed using the JBI Critical Appraisal Checklist for quantitative and cohort studies and the MMAT 2018 for mixed-methods studies. Only studies with acceptable methodological quality were included in the final synthesis.

Critical appraisal was conducted using appropriate assessment tools based on the research design to evaluate the quality of each publication. Quantitative and cohort studies were assessed using the JBI checklist, while mixed methods studies were evaluated using the 2018 version of the Mixed Methods Appraisal Tool (MMAT). The quality assessment documents can be accessed in Appendix Document 1.

Data were extracted using a standardized form developed according to the review objectives, including study characteristics, participant information, intervention type, communication competency domains, measurement instruments, statistical analysis, and key findings. To ensure data validity and consistency, one reviewer conducted the initial extraction and all authors independently verified the extracted data, with disagreements resolved through consensus.

For data extraction, one author performs data extraction from the selected articles, and then all authors verify the data. Any discrepancies in the data extraction process are resolved through mutual agreement. The data extracted from each study include: author name, year of publication, the journal in which the article was published, the country of origin of the research, research objectives, study design, and relevant findings. In the next stage of Data Synthesis, the lead author (AN) grouped data from each article based on the communication competency domain being studied, including knowledge, skills, and attitudes. Each category was then elaborated according to four main aspects: the form of digital intervention or implementation, the media or platform used, and the outcomes on communication competency. After the initial grouping process was completed, all authors reviewed the classification results to ensure the consistency and completeness of the data obtained from each study.

RESULTS & DISCUSSION

RESULTS

The identification process began with a search in several databases (Figure 1), namely PubMed (114 articles), EBSCOhost (2 articles), Science Direct (639 articles), Scopus (1,224 articles), and Sage Journals (785 articles), totaling 2,764 articles. After the removal of 50 duplicates electronically prior to the screening process, articles remained for further assessment based on title and abstract. Of these, 2,701 articles were eliminated for being irrelevant to the study topic. A total of 63 abstracts were then selected, and 46 of them were excluded for being outside the scope of the research. Subsequently, 17 full-text articles were evaluated for eligibility, and 6 articles were excluded at this stage. Ultimately, 11 studies met the inclusion criteria and were included in the systematic review. Additionally, through manual identification using citation searching, 78 additional articles were found. After the title screening process (30 articles) and abstract screening (5 articles), an evaluation was conducted on 3 full-text articles, all of which met the inclusion criteria. Overall, there were 12 studies included in this systematic review (Figure 1).

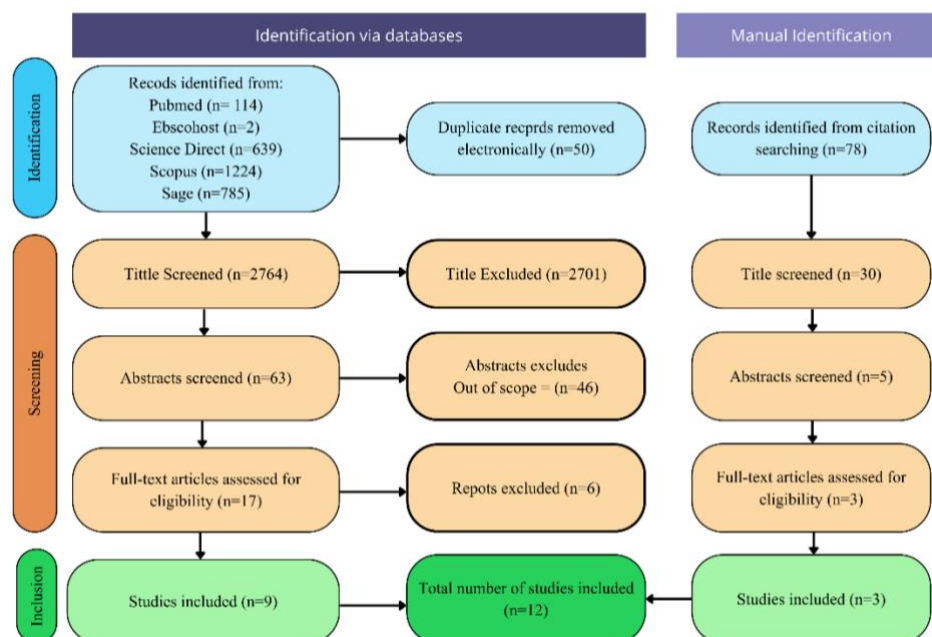


Figure 1. PRISMA flow diagram

This analysis covers 12 articles that examine the use of digital communication on the competencies of health students.

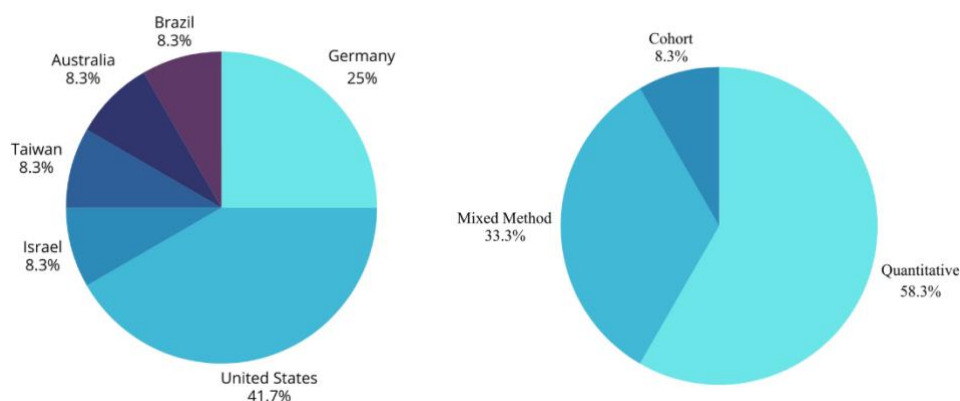


Figure 2. Circular Diagram of Article Characteristics

Figure 2 shows the distribution of regions or countries of origin of the studies analyzed in the research. According to the diagram, there are a total of 12 studies from six different countries. Most of the studies come from the United States, with 5 studies (41.67%), followed by Germany with 3 studies (25%). Meanwhile, Israel, Taiwan, Australia, and Brazil each contributed 1 study (8.3%). Most of the studies used a quantitative design with 7 studies, while the rest used mixed methods with 4 studies and a cohort design with 1 study, indicating a dominant data-driven approach in evaluating communication competence among health students.



Author/ Year	Country	Methodology	Sample	Instrument	Data Analysis	Type of Implementati on / Duration of Intervention	Communication Competence		
							K	S	A
Harendza et al., 2023 (Harendza et al., 2023)	Germany	Mixed method	62 medical students	ComCare Questionnaire	Descriptive quantitative	Telemedicine (training)/ 2 days	–	✓	–
Vogt et al., 2022 (Vogt et al., 2022)	Germany	Quantitative	41 medical students	Self-assessment questionnaire to measure confidence	Descriptive quantitative, Wilcoxon test	Telemedicine (training)/ not mentioned	–	✓	–
Ali-Saleh et al., 2025 (Ali-Saleh et al., 2025)	Israel	Cohort	114 nursing students	Questionnaire on awareness, knowledge, skills, attitudes, barriers, and self-efficacy	Descriptive, paired t-test, Pearson correlation, multiple linear regression	Telenursing (training)/ not mentioned	✓	✓	✓
Wittenberg et al., 2021 (Wittenberg et al., 2021)	United States	Mixed method	197 nursing students	Attitude questionnaire (PONS-RN), knowledge questionnaire, communication skills questionnaire	Paired samples t-test and coding	COMFORT COVID-19 Communication Modules/ not mentioned	✓	✓	✓
Hoffert et al., 2024 (Hoffert et al., 2024)	United States	Quantitative	27 medical residents	Physician Communication Standardized Patient Encounter Assessment Checklist	Fisher Exact test or Chi-Square test	Communication via Webex (training)/ 3 months, with 6-month follow-up	–	✓	–
Seemann et al., 2023 (Seemann et al., 2023)	Germany	Quantitative	34 medical students	Questionnaire on communication attitudes and knowledge	Descriptive, Mann-Whitney U test, Wilcoxon Signed Ranks test	Digital Health Module (3 weeks)	✓	–	✓
Boardman et al., 2021 (Boardman et al., 2021)	United States	Quantitative	23 internal medicine residents	Behaviorally-Anchored Checklist	Paired Wilcoxon signed-rank test	Virtual patient visits on a video platform (VOSCE)/ not mentioned	–	✓	–
Chao et al., 2025 (Chao et al., 2025)	Taiwan	Mixed method	14 pharmacy students	15-item questionnaire from previous	One-way ANOVA and thematic analysis	Communication using telephone/ not mentioned	–	✓	✓



Author/ Year	Country	Methodology	Sample	Instrument	Data Analysis	Type of Implementati on / Duration of Intervention	Communication Competence		
							K	S	A
				research					
Bajra et al., 2023 (Bajra et al., 2023)	United States	Quantitative	133 medical students	Modified Kalamazoo Essential Elements Communications Checklist-Adapted (KEEC-A)	Univariate and bivariate (t-test)	Telehealth/ July 2020–August 2021	–	✓	✓
Thomas et al., 2025 (Thomas et al., 2025)	Australia	Mixed method	73 speech therapy students	Online questionnaire	Descriptive and thematic analysis	Telehealth in clinical practice/ 6 weeks	–	✓	–
Jones et al., 2023 (Jones et al., 2023)	United States	Quantitative	68 nursing students	Online questionnaire	Descriptive and Wilcoxon's signed-rank	Telehealth in online learning/ 2 weeks	–	–	✓
Coelho et al., 2021 (Coelho et al., 2021)	Brazil	Quantitative	60 undergraduate nursing students	Learning Verification Test (TVA)	Kolmogorov-Smirnov test, t-test, Fisher's exact test, one-way ANOVA	Telehealth in learning/ 30 days	✓	–	–

Table 3. Study Characteristics

*Note: K : Knowledge, S : Skill, A: Attitude

Table 3 presents a summary of 12 studies on digital interventions aimed at improving communication competencies among health students across various countries. These studies employed diverse methodologies, instruments, and intervention durations. The findings show that most digital interventions were effective in enhancing communication skills and attitudes, while improvements in knowledge were observed in certain types of interventions

Synthesis of Results

Table 4. Synthesis Communication Competencies

Communication Competence	Digital Intervention / Implementation	Media / Platform	Outcomes on Communication Competence
Knowledge	Digital Health Module (3 weeks) (Seemann et al., 2023)	Interactive digital module	Significant increase in knowledge; post-test 57.1% correct compared to pre-test ($p<0.05$); higher than reference group ($p=0.022$).
	Telehealth-based learning (30 days) (Coelho et al., 2021)	Telehealth application	More effective than traditional methods. IG: 13 hits (Test 1) vs CG: 11 ($p=0.036$); IG remained superior in Test 2 ($p<0.01$). IG decline smaller than CG; results remained significant ($p=0.028$). ANOVA: $p<0.001$.
	COMFORT COVID-19 Communication Modules (Wittenberg et al., 2021)	Interactive online module	Significant improvement in communication knowledge: PPE from 3.79 to 4.48; Video/Phone from 4.47 to 4.84.
	Telenursing training (Ali-Saleh et al., 2025)	Telehealth platform	Average score before Telenursing training: 6.84 (out of 10). After training: 8.42 (out of 10). Telenursing

Communication Competence	Digital Intervention / Implementation	Media / Platform	Outcomes on Communication Competence
			training effect (Cohen's d): 0.76, indicating moderate to high effect size.
Skills	Telemedicine training (2 days) (Harendza et al., 2023)	Telemedicine simulation platform	Average communication score 4.15/5; highest “clear language” (4.71), lowest “personal empathy” (3.45). Students confident in patient interaction (4.08); satisfied (1.2±0.41, best scale=1); 98% recommended the course.
	Telecommunication via Webex training (Hoffert et al., 2024)	Webex application	Significant improvement in all skill domains; effects lasted 6 months. 100% used Ask-Tell-Ask strategy, 92% NURSE, 79% frequently applied skills. 96% rated it beneficial.
	Video Visit OSCE (VOSCE) (Boardman et al., 2021)	Virtual video platform	Confidence increased: 25%→80%. Nonverbal communication 100%, virtual physical exam low (13%), patient education lower (p=0.008).
	Standardized telephone simulation (Chao et al., 2025)	Telephone communication	Improvement in communication skills; call duration, data confirmation, and follow-up improved. Students improved through practice and feedback.
	Telehealth clinical placement (6 weeks) (Thomas et al., 2025)	Online clinical practice	81% of students gained new communication skills; 79% of educators reported students developed different skills in telehealth.
	COMFORT COVID-19 Modules (Wittenberg et al., 2021)	Interactive online module	68% of student responses reached competent/advanced (simple language & nonverbal communication ≥2).
	Telehealth curriculum (workshops, practice, online OSCE) (Bajra et al., 2023)	Telehealth modules & platform	Basic communication skills good (webside manner: eye contact 95%, tone of voice 98%); ethical aspects low (patient privacy 21%, informed consent 35%). Confidence increased significantly (p<0.001).
	Telenursing training (Ali-Saleh et al., 2025)	Telehealth platform	Average score before training: 4.60 (scale 1-5). After training: 4.77 (scale 1-5). Training effect (Cohen's d): 0.36, indicating small to moderate effect size.
Attitude	Telemedicine training (pre-post) (Vogt et al., 2022)	Online telemedicine training	Significant increase in self-confidence; 31% rated course “very good”, 54.2% “good”; significant improvement (p<0.001).
	COMFORT Modules (Wittenberg et al., 2021)	Online module	Attitudes improved significantly: PPE from 4.23 to 4.54; Video/Phone from 3.86 to 4.24.
	Telenursing training (Ali-Saleh et al., 2025)	Telehealth platform	Average score before telenursing training: 3.41 (scale 1-5). After: 4.06 (scale 1-5). Training effect (Cohen's d): 1.04, indicating very large effect size.
	Standardized telephone simulation (Chao et al., 2025)	Telephone communication	Increased professionalism and structured communication; reduced anxiety, increased confidence.
	Digital Health Module (Seemann et al., 2023)	Interactive digital module	>90% increased awareness of importance of digital health; >85% believed digital health topics were underrepresented in curriculum.
	Telehealth in online learning (2 weeks) (Jones et al., 2023)	Online learning	Confidence increased significantly: readiness 37%→78% (p<0.0001); discomfort decreased 56%→22%; scores increased 9.7→12.1 (p<0.0001). Positive attitude toward telehealth.
	Telehealth curriculum (workshops, practice, online OSCE) (Bajra et al., 2023)	Telehealth modules & platform	Perceived quality of telehealth services improved: disagreement with (face-to-face visit is always better) increased from 17% to 31%.



Table 4 summarizes the impact of various digital interventions on the communication competence of health students, covering knowledge, skills, and attitudes. Most interventions, such as telehealth modules, telemedicine simulations, and telenursing training, demonstrated significant improvements across these domains, with several studies showing strong effect sizes and sustained outcomes. Overall, digital learning platforms were found to be effective, especially in enhancing communication skills and building confidence in virtual patient interactions.

Knowledge Competence in Communication

Digital Modules and Online Communication

The use of interactive digital modules for 3 weeks successfully increased knowledge significantly, where the post-test score reached 57.1% correct answers, higher than the pre-test ($p < 0.05$) and the reference group ($p = 0.022$) (Seemann et al., 2023). The COMFORT COVID-19 module also successfully improved specific knowledge about communication, such as the use of personal protective equipment (score increased from 3.79 to 4.48) and communication via video/phone (score increased from 4.47 to 4.84) (Wittenberg et al., 2021).

Telehealth Application

The implementation of the Telehealth Application over 30 days in the form of learning through the telehealth app proved to be more effective than traditional methods. The intervention group showed significantly better results on the first test ($p = 0.036$) and the second test ($p < 0.01$) (Coelho et al., 2021). In addition, the use of the Telenursing platform in training implementation showed an increase in the average knowledge score from 6.84 to 8.42 (out of 10), with a training effect (Cohen's d) of 0.76, indicating a moderate to high impact (Ali-Saleh et al., 2025).

Communication Skills Competence

Video-Based Communication Platform

In the intervention, the Webex application provided a significant improvement in skills that lasted up to 6 months. Participants actively applied communication strategies such as Ask-Tell-Ask (100%) and NURSE (92%) (Hoffert et al., 2024). Meanwhile, in the Virtual Objective Structured Clinical Examination (VOSCE), nonverbal communication skills were rated high (100%), but virtual physical examination skills remained low (13%) (Boardman et al., 2021).

Telehealth and Telemedicine Platform

A simulation via the Telemedicine Platform over 2 days showed that participants achieved an average communication score of 4.15 out of 5, with the highest score in the aspect of clear language (4.71) and the lowest in personal empathy (3.45). The majority (98%) recommended this program (Harendza et al., 2023). Online Clinical Practice conducted over 6 weeks resulted in 81% of students feeling they gained new communication skills, and 79% of educators agreed that students developed different types of skills through telehealth practice (Thomas et al., 2025). In addition, the structured integration of the curriculum with telehealth ensures basic skills such as eye contact (95%) and tone of voice (98%) are excellent, but ethical aspects like maintaining patient privacy (21%) and obtaining informed consent (35%) are still low. Telenursing in the training program resulted in an improvement in perceived skills from 4.60 to 4.77 (on a 5-point scale), with an effect size (Cohen's d) of 0.36, indicating a small to medium impact (Ali-Saleh et al., 2025).



Audio-Based Communication (Telephone)

Simulating communication via telephone in the form of practice with feedback has been shown to improve communication skills, especially in terms of call duration, data confirmation, and follow-up planning (Chao et al., 2025).

Interactive Online Learning Module

The implementation of the COMFORT Module shows that the majority (68%) of student responses are at a competent to proficient level, especially in the use of simple language and nonverbal communication (Wittenberg et al., 2021).

Attitude Competence in Communication

Online Learning and Interactive Modules

COMFORT Online Module: Attitudes towards communication improved significantly, both in the context of PPE use (scores increased from 4.23 to 4.54) and communication via video/phone (scores increased from 3.86 to 4.24). Besides the COMFORT module, another module called Digital Health showed that more than 90% of participants experienced increased awareness of the importance of digital health, and more than 85% felt this topic was underrepresented in the curriculum (Wittenberg et al., 2021).

Integrated Telehealth Platform

Training using the Telenursing platform makes participants' attitudes much more positive, with the average score increasing from 3.41 to 4.06 (on a 5-point scale). The effect size (Cohen's *d*) of 1.04 indicates a very high impact (Ali-Saleh et al., 2025). Training with the Telemedicine Platform can also significantly boost self-confidence ($p < 0.001$), with 31% of participants rating it as very good and 54.2% as good (Vogt et al., 2022). Additionally, communication learning with Telehealth over 2 weeks can sharply increase participants' confidence, with those feeling prepared rising from 37% to 78% and those feeling uncomfortable decreasing from 56% to 22%. Furthermore, a Telehealth Platform-Based curriculum improves the perception of telehealth service quality, seen in the increase in participants who disagreed with the statement face-to-face visits are always better (from 17% to 31%) (Jones et al., 2023).

Audio-Based Communication

Telephone simulations have shown an increase in professionalism, reduced anxiety, and increased confidence after participating in the simulation (Chao et al., 2025).

Discussion

The use of interactive digital modules over three weeks was proven to significantly increase participants' post-test scores. Similar results were also seen in the COMFORT COVID-19 module, which showed improvements in knowledge, particularly related to the use of personal protective equipment (PPE) as well as communication via video and telephone. In addition, learning using a telehealth application for 30 days was found to be more effective than traditional methods in two consecutive assessments (Coelho et al., 2021). In line with these findings, the implementation of telenursing-based training also showed an increase in knowledge scores with moderate to high effect sizes (Ali-Saleh et al., 2025). In practice, knowledge transfer is indeed more likely to increase compared to the transfer of communicative skills into clinical practice (Rettinger et al., 2024). This can be strengthened if the integration of telehealth into the curriculum is structured and includes observed practice in the form of mentoring (Rettinger et al., 2024). Another study emphasized that although there is an improvement in knowledge scores, the long-term

effects and transfer to real clinical practice remain inconsistent, meaning that increased test scores do not always translate into sustained changes in clinical behavior (Muntz et al., 2021). Therefore, a combination of interactive digital modules with observed practice (simulation, VOSCE, telehealth clinic) can enhance knowledge retention and readiness for application (Rettinger et al., 2024).

The results of improved communication skills through Webex showed a significant increase in skill competencies that lasted up to 6 months, and in the VOSCE where nonverbal communication was rated highly. However, there are still limitations in assessing physical examination abilities due to the absence of direct contact. To address this gap, a study recommended “touchless” stations or standardized examination instructions as well as the use of supportive tools (patient guides, video demonstrations) in the vOSCE (Karkache et al., 2024). In addition, include training on patient instructions for self-examination, and conduct follow-up/booster sessions to maintain the effect up to 6 months. Validation of the vOSCE assessment rubric is also important (Chan et al., 2023). Telehealth simulation for 2 days showed improvements in communication skills in the aspects of clear language and empathy, and follow-up practice after 6 weeks showed that educators agreed different skills developed, but ethical aspects and informed consent still need improvement (Harendza et al., 2023). These results align with other studies showing that simulation can improve communication, but outcomes in informed consent require a specialized training approach (McCarrick et al., 2025). Furthermore, a literature review also showed that many telehealth programs improve technical and communication skills but often lack emphasis on legal/ethical aspects (privacy and informed consent) (Chike-Harris et al., 2021). A similar program on a telenursing platform increased perceived skills (Ali-Saleh et al., 2025). The effect sizes reported in the studies indicate real improvement but not major transformation. Factors influencing the magnitude of the effect include duration of training, practice intensity, and direct clinical exposure (Khraisat et al., 2023; Mun et al., 2024).

Improvements in digital communication competence can also be achieved through telephone simulations with feedback, which increase call duration, data verification, and follow-up planning (Chao et al., 2025). Another study stated that some studies more frequently reported process outcomes (duration, verification) than patient outcomes (Barksdale et al., 2023; Yang & Kim, 2022). This can be addressed by incorporating triage scripts, call duration & content rubrics, and telephone-specific teach-back training, as well as developing metrics to evaluate the impact on patient outcomes (Barksdale et al., 2023). The implementation of modules in the use of digital communication among students can also achieve competent-advanced levels, particularly in the use of simple language and nonverbal communication (Wittenberg et al., 2021). These findings align with other studies that also show clear improvements in communication skills, but long-term effectiveness and transfer of behavior to real clinical settings require further evaluation (pre/post and follow-up) (Yang & Kim, 2022). In practice, modules can be used as pre-training (pre-work) before simulation, including application assignments, and follow-up assessments to measure retention. In addition, ensure that interactive modules are accompanied by practical sessions so that competence reaches an advanced level (Yang & Kim, 2022).

The improvement of attitude competence in the use of digital communication via telemedicine can increase self-confidence (Vogt et al., 2022). The use of digital communication in the form of simulation and education is indeed closely related to improved attitudes and self-confidence (Mun et al., 2024), but if implemented as telehealth training, it must be structured to improve ability, confidence, and communication readiness (Perle et al., 2024). Training using a telenursing platform showed a very large improvement in attitude effect (Ali-Saleh et al., 2025). These findings are consistent with other research showing that the use of telenursing is positively associated with attitudes toward communication in patient care (Mun et al., 2024). Telehealth training with a duration of

two weeks can increase participants' confidence in telehealth and change their attitudes. This shows that short but intensive telehealth training can provide changes in attitude and readiness, but long-term effects still require further research (Perle et al., 2024). Although attitudes/perceptions increase, the literature still shows few studies demonstrating the transfer of results to patient outcomes (Ali-Saleh et al., 2025). In addition to the use of telemedicine and similar methods, the use of communication exercises by telephone has also been shown to reduce anxiety and increase self-confidence (Chao et al., 2025). Furthermore, findings from other studies show that the use of telephones can also improve student readiness (Elendu et al., 2024). To support training and education, the use of interactive digital modules needs to be considered because most participants recognize the importance of telehealth education and feel that the topic is underrepresented in the curriculum (Hussien et al., 2025; Seemann et al., 2023). The use of online modules has also been shown to improve attitude competence in communication via video/telephone (Wittenberg et al., 2021). Therefore, integration is needed to address curriculum gaps related to incomplete technology implementation (Perle et al., 2024). Integrating telehealth into formal education is considered important to develop positive attitudes (Hussien et al., 2025).

The findings indicate that the integration of digital communication in education and training has significant implications for improving knowledge, skills, and communication attitudes among future healthcare professionals. For future healthcare professionals, these results emphasize the importance of mastering cross-media communication skills (video, telephone, and online applications) because modern healthcare practice increasingly relies on virtual interactions. For health education, these results highlight the need for systematic and tiered integration of telehealth and digital communication curricula. Digital modules should not only function as theoretical media but also as pre-training before simulations (pre-briefing), followed by observed practice (simulation, VOSCE, or virtual) and follow-up evaluation (follow-up assessment) to ensure the transfer of learning to actual clinical practice.



Figure. 3 Phases of Digital Communication Education and Training to Enhance Communication Competencies

CONCLUSION

This review shows that digitally-enhanced learning, including telehealth, telenursing, virtual simulations and moduls, effectively builds communication

competencies in future healthcare professionals. These tools improve knowledge and attitude, but skill mastery in ethical and patient-centered communication still needs structured and guided practice. Integrating digital communication and telehealth training into curricula is essential to prepare students for technology-based healthcare. A blended and competency-focused approach that combines digital learning, simulation, and telepractice can strengthen both cognitive and behavioral communication skills. Continuous evaluation and ethical guidance are needed to maintain long-term application in real practice.

LIMITATION

This study has several limitations. First, this systematic review does not include all categories of healthcare professionals due to the limited number of available studies, so the results cannot yet be generalized to all professions in the health field. Most studies were conducted in high-income countries; adaptation to educational contexts in developing countries (including Indonesia) requires further research.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to Universitas Padjadjaran for the support and academic guidance that made this work possible. Thank you for the learning opportunities and resources provided throughout this study.

REFERENCES

- Abou Hashish, E. A., & Alnajjar, H. (2024). Digital proficiency: assessing knowledge, attitudes, and skills in digital transformation, health literacy, and artificial intelligence among university nursing students. *BMC Medical Education*, 24(1), 508. <https://doi.org/10.1186/s12909-024-05482-3>
- Ali-Saleh, O., Massalha, L., & Halperin, O. (2025). Evaluation of a Simulation Program for Providing Telenursing Training to Nursing Students: Cohort Study. *JMIR Medical Education*, 11, e67804–e67804. <https://doi.org/10.2196/67804>
- Alshammari, A., Alanazi, M. F., & Bahari, G. (2024). Nursing students' awareness, knowledge, and attitudes regarding telehealth and telenursing use for high-quality healthcare: A cross-sectional study. *Nurse Education Today*, 142, 106359. <https://doi.org/10.1016/j.nedt.2024.106359>
- Bajra, R., Srinivasan, M., Torres, E. C., Rydel, T., & Schillinger, E. (2023). Training future clinicians in telehealth competencies: outcomes of a telehealth curriculum and teleOSCEs at an academic medical center. *Frontiers in Medicine*, 10. <https://doi.org/10.3389/fmed.2023.1222181>
- Barksdale, S., Stark Taylor, S., Criss, S., Kemper, K., Friedman, D. B., Thompson, W., Donelle, L., MacGilvray, P., & Natafqi, N. (2023). Improving Patient Health Literacy During Telehealth Visits Through Remote Teach-Back Methods Training for Family Medicine Residents: Pilot 2-Arm Cluster, Nonrandomized Controlled Trial. *JMIR Formative Research*, 7, e51541. <https://doi.org/10.2196/51541>
- Boardman, D., Wilhite, J. A., Adams, J., Sartori, D., Greene, R., Hanley, K., & Zabar, S. (2021). Telemedicine Training in the COVID Era: Revamping a Routine OSCE to Prepare Medicine Residents for Virtual Care. *Journal of Medical Education and Curricular Development*, 8. <https://doi.org/10.1177/23821205211024076>

- Chan, S. C. C., Choa, G., Kelly, J., Maru, D., & Rashid, M. A. (2023). Implementation of virtual OSCE in health professions education: A systematic review. *Medical Education*, 57(9), 833–843. <https://doi.org/10.1111/medu.15089>
- Chao, C.-Y., Lin, T.-K., Hung, N.-Y., Hsu, C.-L., & Kao, L.-T. (2025). Advancing Pharmacy Students' Communication Skills through Real-Time Feedback in Innovative Simulations. *American Journal of Pharmaceutical Education*, 89(6), 101414. <https://doi.org/10.1016/j.ajpe.2025.101414>
- Chike-Harris, K. E., Garber, K., & Derouin, A. (2021). Telehealth Educational Resources for Graduate Nurse Faculty. *Nurse Educator*, 46(5), 295–299. <https://doi.org/10.1097/NNE.0000000000001055>
- Coelho, M. de M. F., Miranda, K. C. L., Melo, R. C. de O., Gomes, L. F. de S., Monteiro, A. R. M., & Moreira, T. M. M. (2021). Use of a therapeutic communication application in the nursing undergraduate program: Randomized clinical trial. *Revista Latino-Americana de Enfermagem*, 29. <https://doi.org/10.1590/1518-8345.4461.3456>
- Eckhoff, D. O., Guido-Sanz, F., & Anderson, M. (2022). Telehealth across nursing education: Findings from a national study. *Journal of Professional Nursing*, 42, 308–314. <https://doi.org/10.1016/j.profnurs.2022.07.013>
- 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. <https://doi.org/10.1097/MD.00000000000038813>
- Fernández-Alcántara, M., Escribano, S., Juliá-Sanchis, R., Castillo-López, A., Pérez-Manzano, A., Macur, M., Kalender-Smajlović, S., García-Sanjuán, S., & Cabañero-Martínez, M. J. (2025). Virtual Simulation Tools for Communication Skills Training in Health Care Professionals: Literature Review. *JMIR Medical Education*, 11, e63082–e63082. <https://doi.org/10.2196/63082>
- Golden, B. N., Elrefaay, S., McLemore, M. R., Alspaugh, A., Baltzell, K., & Franck, L. S. (2024). Midwives' experience of telehealth and remote care: a systematic mixed methods review. *BMJ Open*, 14(3), e082060. <https://doi.org/10.1136/bmjopen-2023-082060>
- Harendza, S., Bußenius, L., Gärtner, J., Heuser, M., Ahles, J., & Prediger, S. (2023). “Fit for the finals” - project report on a telemedical training with simulated patients, peers, and assessors for the licensing exam. *GMS Journal for Medical Education*, 40(2), Doc17. <https://doi.org/10.3205/zma001599>
- Hoffert, M. M., Newman, J., Mortimore, A., Passalacqua, K. D., & Abreu Lanfranco, O. (2024). Explicit Training in Systematic Communication Strategies: A Pilot Study Exploring the Incorporation of Communication Tools by First-Year Residents in Simulation and in Clinical Practice. *Journal of Medical Education and Curricular Development*, 11. <https://doi.org/10.1177/23821205241256042>
- Hussien, R. H., Ahmed, G. K., & Abdullah, S. O. (2025). Knowledge, attitude and readiness toward telehealth among nursing staff: a cross-sectional study. *BMC Medical Education*, 25(1), 1448. <https://doi.org/10.1186/s12909-025-07921-1>
- Jadoon, M., Naushad, K., Aman, F., Khan, Y., Durrani, M., & Ali, S. (2025). Virtual Patients for Communication Skills Training: A Mixed Methods Evaluation. *Cureus*. <https://doi.org/10.7759/cureus.91005>
- Jones, H. M., Ammerman, B. A., Joiner, K. L., Lee, D. R., Bigelow, A., & Kuzma, E. K. (2023). Evaluating an intervention of telehealth education and simulation for advanced practice registered nurse students: A single group comparison study. *Nursing Open*, 10(6), 4137–4143. <https://doi.org/10.1002/nop2.1620>

- Karkache, W., Halman, S., Tran, C., Nie, R., & Pugh, D. (2024). Designing a touchless physical examination for a virtual Objective Structured Clinical Examination. *Canadian Medical Education Journal*. <https://doi.org/10.36834/cmej.74261>
- Kaya Kaçar, H., Kaçar, Ö. F., & McCullough, F. (2024). Nutrition Messaging by Healthcare Students: A Mixed-Methods Study Exploring Social Media Usage and Digital Competence. *Nutrients*, 16(10), 1440. <https://doi.org/10.3390/nu16101440>
- Khraisat, O. M. A., Al-Bashaireh, A. M., & Alnazly, E. (2023). Telenursing implications for future education and practice: Nursing students' perspectives and knowledge from a course on child health. *PLOS ONE*, 18(11), e0294711. <https://doi.org/10.1371/journal.pone.0294711>
- Kleib, M., Arnaert, A., Nagle, L. M., Ali, S., Idrees, S., Costa, D. da, Kennedy, M., & Darko, E. M. (2024). Digital Health Education and Training for Undergraduate and Graduate Nursing Students: Scoping Review. *JMIR Nursing*, 7, e58170. <https://doi.org/10.2196/58170>
- Lee, J., Kim, H., Kim, K. H., Jung, D., Jowsey, T., & Webster, C. S. (2020). Effective virtual patient simulators for medical communication training: A systematic review. *Medical Education*, 54(9), 786–795. <https://doi.org/10.1111/medu.14152>
- McCarrick, C. A., Moynihan, A., McEntee, P. D., Boland, P. A., Donnelly, S., Heneghan, H., & Cahill, R. A. (2025). Impact of simulation training on communication skills and informed consent practices in medical students- a randomised controlled trial. *BMC Medical Education*, 25(1), 1078. <https://doi.org/10.1186/s12909-025-07671-0>
- Mulcare, M., Naik, N., Greenwald, P., Schullstrom, K., Gogia, K., Clark, S., Kang, Y., & Sharma, R. (2020). Advanced Communication and Examination Skills in Telemedicine: A Structured Simulation-Based Course for Medical Students. *MedEdPORTAL*. https://doi.org/10.15766/mep_2374-8265.11047
- Mun, M., Choi, S., & Woo, K. (2024). Investigating perceptions and attitude toward telenursing among undergraduate nursing students for the future of nursing education: a cross-sectional study. *BMC Nursing*, 23(1), 236. <https://doi.org/10.1186/s12912-024-01903-2>
- Muntz, M. D., Franco, J., Ferguson, C. C., Ark, T. K., & Kalet, A. (2021). Telehealth and Medical Student Education in the Time of COVID-19—and Beyond. *Academic Medicine*, 96(12), 1655–1659. <https://doi.org/10.1097/ACM.00000000000004014>
- Norlita, D., Nageta, P. W., Faradhila, S. A., Aryanti, M. P., Fakhriyah, F., & Ismayam. A. E. A. (2023). SYSTEMATIC LITERATURE REVIEW (SLR): PENDIDIKAN KARAKTER DI SEKOLAH DASAR. *JISPENDIORA Jurnal Ilmu Sosial Pendidikan Dan Humaniora*, 2(1), 209–219. <https://doi.org/10.56910/jispendiora.v2i1.743>
- O'Connor, S., Odewusi, T., Smith, P. M., & Booth, R. G. (2022). Digital professionalism on social media: The opinions of undergraduate nursing students. *Nurse Education Today*, 111, 105322. <https://doi.org/10.1016/j.nedt.2022.105322>
- O'Connor, S., Zhang, M., Honey, M., & Lee, J. J. (2021). Digital professionalism on social media: A narrative review of the medical, nursing, and allied health education literature. *International Journal of Medical Informatics*, 153, 104514. <https://doi.org/10.1016/j.ijmedinf.2021.104514>
- Perle, J. G., Zheng, W., Gardner, L., & Law, K.-B. (2024). Editorial: Education, training, and competency development for mental health-focused telehealth providers. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1443750>
- Rettinger, L., Putz, P., Aichinger, L., Javorszky, S. M., Widhalm, K., Ertelt-Bach, V., Huber, A., Sargis, S., Maul, L., Radinger, O., Werner, F., & Kuhn, S. (2024). Telehealth Education in Allied Health Care and Nursing: Web-Based Cross-Sectional

- Survey of Students' Perceived Knowledge, Skills, Attitudes, and Experience. *JMIR Medical Education*, 10, e51112. <https://doi.org/10.2196/51112>
- Seemann, R. J., Mielke, A. M., Glauert, D. L., Gehlen, T., Poncette, A. S., Mosch, L. K., & Back, D. A. (2023). Implementation of a digital health module for undergraduate medical students: A comparative study on knowledge and attitudes. *Technology and Health Care*, 31(1), 157–164. <https://doi.org/10.3233/THC-220138>
- Shafizadeh, H., Larijani, B., Mojtahedzadeh, R., Shamsi Gooshki, E., & Nedjat, S. (2022). Initial drafting of telemedicine's code of ethics through a stakeholders' participatory process. *Journal of Medical Ethics and History of Medicine*. <https://doi.org/10.18502/jmehm.v14i24.8184>
- Shawwa, L. (2023). The Use of Telemedicine in Medical Education and Patient Care. *Cureus*. <https://doi.org/10.7759/cureus.37766>
- Teerawongpairaj, C., Tantipoj, C., & Sipiyaruk, K. (2024). The design and evaluation of gamified online role-play as a telehealth training strategy in dental education: an explanatory sequential mixed-methods study. *Scientific Reports*, 14(1), 9216. <https://doi.org/10.1038/s41598-024-58425-9>
- Thomas, D. C., Sutherland, R., Munro, N., Ibric, M., Pacey, F., Purcell, A., & Bourne, E. (2025). Telehealth and in-person placements: Same, same, but different. A mixed methods investigation of speech and language therapy students' and practice educators' experiences and perceptions. *International Journal of Language & Communication Disorders*, 60(2). <https://doi.org/10.1111/1460-6984.70009>
- Vogt, L., Schmidt, M., Follmann, A., Lenes, A., Klasen, M., & Sopka, S. (2022). Telemedicine in medical education: An example of a digital preparatory course for the clinical traineeship - a pre-post comparison. *GMS Journal for Medical Education*, 39(4), Doc46. <https://doi.org/10.3205/zma001567>
- Wittenberg, E., Goldsmith, J. V., Chen, C., Prince-Paul, M., & Capper, B. (2021). COVID 19-transformed nursing education and communication competency: Testing COMFORT educational resources. *Nurse Education Today*, 107, 105105. <https://doi.org/10.1016/j.nedt.2021.105105>
- Wright, H. H., O'Shea, M.-C., Sekula, J., & Mitchell, L. J. (2022). Assessment of communication skills using telehealth: considerations for educators. *Frontiers in Medicine*, 9, 841309. <https://doi.org/10.3389/fmed.2022.841309>
- Yang, J., & Kim, S. (2022). An online communication skills training program for nursing students: A quasi-experimental study. *PLOS ONE*, 17(5), e0268016. <https://doi.org/10.1371/journal.pone.0268016>