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From Traditional to Digital: A Study on the Transition Of Teaching Modalities in Nursing Programs

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Abstract. This integrative literature review synthesizes empirical research published between January 2020 and June 2026 to examine the transition from traditional classroom instruction to digital teaching modalities in nursing programs. Following the five-stage integrative review framework of Whittemore and Knafl (2005) and PRISMA screening guidelines, a systematic search was conducted across six academic databases—EBSCO, ScienceDirect, Google Scholar, PubMed, MEDLINE, and CINAHL—for full-text, English-language studies authored by at least one nurse. From 827 initially identified records, 578 remained after deduplication and initial filtering, and 10 qualitative, quantitative, and mixed-methods studies met all eligibility criteria and were appraised using the Mixed Methods Appraisal Tool (MMAT).Thematic synthesis identified three major trends: rapid adoption of online and blended learning, expanded use of learning management systems and virtual classrooms, and integration of digital simulation for preparatory instruction. Reported benefits included enhanced scheduling flexibility, broader resource access, and improved theoretical knowledge acquisition. However, recurring challenges included diminished social interaction, difficulties teaching and assessing psychomotor clinical skills remotely, uneven faculty readiness, technological barriers, student stress, and academic integrity concerns. Notably, the evidence base is limited by a small final sample and a predominance of short-term, emergency pandemic-era adaptations rather than longitudinal evaluations of mature curricula. Accordingly, findings suggest that intentionally designed blended learning models may help preserve hands-on clinical and relational formation while leveraging digital strengths, provided institutions invest in curriculum alignment, faculty development, and equitable technical infrastructure. Future longitudinal research is warranted to evaluate long-term clinical competence in hybrid environments.

Keywords: Blended Learning; Digital Competence; Nursing Education; Online Learning; Technology Integration

Introduction

Technology integration has transformed nursing education beyond traditional face-to-face lectures, printed materials, and physical clinical placements. Contemporary nursing curricula increasingly incorporate learning management systems (LMS), virtual classrooms, mobile applications, and simulation-based platforms. This pedagogical shift parallels broader digital transformations across healthcare systems—including electronic health records (EHR), telehealth, clinical decision-support systems, and emerging artificial intelligence applications—requiring nursing graduates to develop both clinical proficiency and digital competence.

The COVID-19 pandemic accelerated this transition, forcing nursing programs worldwide into rapid distance learning. While this abrupt shift demonstrated that digital platforms can sustain educational continuity and offer scheduling flexibility, it also exposed critical distinctions between emergency remote teaching—reactive, temporary online delivery designed for crisis continuity—and planned blended learning, which intentionally aligns online cognitive instruction with structured, in-person or high-fidelity simulation experiences. Research indicates that contemporary cohorts, particularly Generation Z learners, value flexible, interactive, media-rich environments that support self-paced knowledge consolidation (Sadat & Vasilica, 2026). However, empirical findings also show that unguided distance learning can diminish peer socialization, student motivation, and role adjustment (Jallad & Işık, 2021; Langegård et al., 2021).

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Because nursing is a practice-based profession rooted in psychomotor skill mastery, ethical judgment, and therapeutic interpersonal communication, technology cannot replace embodied clinical and relational formation. Studies examining pandemic-era online instruction identified substantial barriers in teaching and assessing hands-on clinical competencies virtually, alongside heightened student stress, digital access inequities, and academic integrity concerns (Albloushi et al., 2024; Biggs et al., 2025). Furthermore, effective digital integration depends heavily on faculty readiness; nurse educators require structured training and institutional support to redesign courses, facilitate virtual engagement, and validate clinical outcomes (Albloushi et al., 2024; Martinsen et al., 2025).

In contrast to reactive virtual delivery, intentionally designed blended learning integrates asynchronous or synchronous online theory with hands-on clinical and simulation practice, preserving social presence and psychomotor skill acquisition while leveraging digital flexibility (Langegård et al., 2021; Posey & Pintz, 2016). Yet, despite growing literature on digital tools in nursing education, existing scholarship remains fragmented between crisis-driven emergency remote teaching evaluations and longer-term curricular innovations. Specifically, there is a clear synthesis gap in isolating empirical evidence authored by nurses across qualitative, quantitative, and mixed-methods designs to clarify how planned digital and blended modalities support—or constrain—students' clinical competence, relational socialization, and faculty capacity. Addressing this gap is essential to guide evidence-informed curricular redesign that strengthens, rather than dilutes, the human-centered foundations of nursing preparation.

Research Questions

To address this synthesis gap and establish evidence-based directions for curricular integration, this integrative literature review critically examines empirical studies on the transition from traditional to digital teaching modalities in nursing programs. Specifically, it seeks to answer the following questions:

1. What key developments and innovations in technology integration are evident in nursing education across online, blended, virtual, and simulation-based modalities?
2. What pedagogical, clinical, and relational benefits and challenges are experienced by nursing students and nurse educators during the transition from conventional to technology-enhanced learning environments?
3. What methodological and curricular gaps persist in the current literature, and what strategic directions can strengthen faculty readiness, equitable digital access, and clinical competence outcomes?

Scope and Delimitation of the Study

This integrative literature review examines the transition from traditional classroom instruction to digital, online, blended, and technology-enhanced teaching modalities within nursing education programs. Guided by Whittemore and Knafl's (2005) five-stage framework and PRISMA 2020 reporting standards, the scope encompasses full-text, English-language empirical studies—spanning qualitative, quantitative, mixed-methods, and theory-guided empirical case-report designs—published between January 1, 2020, and June 30, 2026. The review synthesizes findings across six major scholarly databases (EBSCOhost, ScienceDirect, Google Scholar, PubMed, MEDLINE, and CINAHL) to examine pedagogical innovations, cognitive and psychomotor learning outcomes, psychological and relational impacts on nursing students, and instructional and infrastructural challenges experienced by nurse educators. To preserve methodological focus and disciplinary alignment, the study is delimited to primary empirical articles authored or co-authored by at least one nurse and centered on nursing students, nurse educators, clinical nursing instructors, or nursing academic settings. Secondary literature reviews, scoping protocols, editorials, commentaries, and grey literature lacking primary empirical data were excluded from the formal synthesis. Additionally, studies focusing exclusively on clinical informatics, electronic health records, telemedicine, or hospital care delivery without evaluating nursing pedagogy were excluded, as were investigations involving non-nursing healthcare populations such as medical, pharmacy, or allied health students and faculty.

Literature Review

Evolution from Traditional Instruction to Digital Nursing Modalities

Contemporary nursing education operates at the intersection of pedagogical modernization and healthcare digitalization. While traditional nursing curricula relied on campus-based lectures, printed textbooks, and direct clinical placements, modern programs increasingly incorporate learning management systems (LMS), virtual classrooms, mobile resources, and simulation-based platforms. Contextual scholarship demonstrates that this shift mirrors broader clinical transformations—including electronic health records

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(EHR), telehealth, and clinical decision-support systems—requiring nursing graduates to attain digital competence alongside clinical proficiency. Furthermore, contextual analyses of learner demographics indicate that Generation Z nursing students favor flexible, media-rich, self-paced digital environments that support visual and interactive knowledge consolidation (Sadat & Vasilica, 2026). Pre-pandemic curricular transitions also established that intentionally structured blended learning can enhance computer literacy, self-directed study, and active engagement without sacrificing foundational clinical exposure (Posey & Pintz, 2017).

Comparison of Existing Reviews and Secondary Syntheses

Recent review literature has examined specific dimensions of technology-enhanced nursing education, yet these syntheses differ substantially in scope, methodological boundaries, and analytical focus:

Modality-Specific Effectiveness Reviews: Wang and Raman (2024) conducted a systematic literature review of 54 quantitative trials (14 randomized controlled trials and 40 quasi-experiments) comparing blended learning against traditional or fully online instruction. While their synthesis demonstrated generally positive effects on academic performance and skill development, they noted substantial heterogeneity in how blended learning was defined and limited theoretical grounding across primary studies. Similarly, Chatzea et al. (2024) reviewed emerging digital educational tools—specifically serious games, gamified applications, and virtual reality simulations—highlighting their value for interactive cognitive engagement, while leaving broader curricular transitions and faculty readiness unexamined.

Pandemic-Era and Scoping Syntheses: Tischendorf et al. (2024) synthesized lessons from COVID-19 digital learning in nursing education, identifying infrastructural barriers, social isolation, and clinical training deficits during crisis-driven remote delivery. More recently, Barthel et al. (2025) outlined a scoping review protocol to map the breadth of digital technologies and teaching methods used in nursing education, prioritizing descriptive categorization over quality-appraised empirical synthesis.

Comparative Positioning of Contextual Literature Versus the Synthesized Empirical Corpus

To establish methodological rigor and avoid conflating broad background commentary with primary evidence, this review explicitly distinguishes between contextual sources—which frame technological trends, generational preferences, and secondary review patterns (e.g., Barthel et al., 2025; Chatzea et al., 2024; Posey & Pintz, 2017; Sadat & Vasilica, 2026; Tischendorf et al., 2024; Wang & Raman, 2024)—and the 10 primary empirical studies formally screened, appraised via the Mixed Methods Appraisal Tool (MMAT), and synthesized in this review. Within the 10-study empirical corpus, distinct convergences and divergences emerge across participant perspectives and research designs:

Student Experiences Across Quantitative and Qualitative Designs: Cross-sectional and correlational studies in the corpus consistently documented heightened psychological burden and infrastructural barriers during rapid online transitions. Diab and Elgahsh (2020) and Masha'al et al. (2020) found that inadequate technological infrastructure, limited institutional support, and remote learning conditions significantly elevated student stress and negative attitudes toward e-learning. Oducado and Estoque (2021) further established a statistically significant inverse relationship between online learning stress, student satisfaction, and academic performance. Similarly, Moreno-Sánchez et al. (2022) reported widespread dissatisfaction among final-year nursing students regarding virtual practical activities and professional readiness. Conversely, a quasi-experimental pre-test/post-test study by Kim et al. (2021) demonstrated that systematically structured online instruction significantly improved nursing students' theoretical knowledge and learning flow, indicating that instructional design mediates cognitive outcomes. Qualitative and mixed-methods studies within the corpus explained these quantitative patterns: Langegård et al. (2021), Alshahrani (2022), and Jallad and Işık (2021) revealed that reduced social interaction, diminished peer connection, instructor unavailability, and role adjustment anxiety undermined motivation, leading learners to favor campus-based or blended formats over purely virtual delivery.

Educator Experiences in Qualitative Studies: Qualitative investigations of nurse educators—specifically Albloushi et al. (2024) and Martinsen et al. (2025)—corroborated student-reported challenges from an instructional standpoint. Both studies documented emotional strain, unstable connectivity, academic integrity concerns, and fundamental barriers to teaching and assessing psychomotor clinical skills remotely. However, Martinsen et al. (2025) also noted that navigating these constraints accelerated educators' digital literacy and pedagogical adaptability when institutional support was accessible.

Identified Research Gaps and Contribution of the Present Review

Synthesizing prior reviews alongside the 10 primary studies exposes three interrelated gaps in existing knowledge: Conflation of Emergency Remote Teaching with Planned Blended Curricula: Existing reviews frequently aggregate crisis-era emergency remote teaching with intentionally designed hybrid programs, obscuring which outcomes stem from rapid crisis implementation versus mature pedagogical integration.

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Methodological Siloing Across Reviews: Prior quantitative systematic reviews (e.g., Wang & Raman, 2024) largely excluded qualitative and mixed-methods inquiries into student socialization and educator emotional labor, whereas narrative and scoping syntheses often omitted formal multi-design quality appraisal.

Lack of Nurse-Authored, Multi-Design Integrative Synthesis: Few reviews explicitly restrict inclusion to empirical studies authored by nurses across qualitative, quantitative, and mixed-methods paradigms to ensure disciplinary alignment with nursing's clinical, relational, and ethical standards.

Contribution of This Review: By applying Whittemore and Knafl's (2005) integrative review framework and MMAT quality appraisal exclusively to nurse-authored empirical studies published between January 2020 and June 2026, this study bridges quantitative outcome metrics with qualitative student and faculty lived experiences. Specifically, it disentangles cognitive gains in online theory from persistent deficits in psychomotor skill formation and social presence, offering an evidence-grounded rationale for competency-mapped blended learning curricula.

Methodology

Research Design

This study employed an integrative literature review design following the established five-stage methodological framework of Whittemore and Knafl (2005): problem identification, literature search, data evaluation, data analysis, and presentation. An integrative review was selected because it permits the rigorous synthesis of diverse empirical methodologies—specifically qualitative, quantitative, and mixed-methods primary studies—to generate a comprehensive understanding of the transition from traditional classroom instruction to digital teaching modalities in nursing programs. Reporting of the identification, screening, eligibility, and inclusion process adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021).

Research Instrument

Two structured instruments were utilized to standardize data extraction and methodological quality evaluation: Literature Review Extraction Matrix: A researcher-developed extraction form capturing bibliographic details (author, publication year, country/setting), study purpose, research design, sample characteristics, digital modality evaluated, primary findings, reported benefits, implementation challenges, and pedagogical recommendations. Mixed Methods Appraisal Tool (MMAT), Version 2018: An established critical appraisal instrument validated for concurrent evaluation of qualitative, quantitative randomized, quantitative non-randomized, quantitative descriptive, and mixed-methods empirical studies (Hong et al., 2018). Each study is evaluated against two universal screening questions followed by five design-specific methodological criteria rated as Yes, No, or Can't tell.

Data Gathering Procedure

Systematic searches were executed across all six databases between July 1 and July 15, 2026, covering publications indexed from January 1, 2020, through June 30, 2026. Database-specific Boolean search strings combined controlled vocabulary and free-text terms: CINAHL / MEDLINE / PubMed: ("nursing education" OR "nursing students" OR "nurse educators") AND ("traditional teaching" OR "conventional teaching") AND ("digital learning" OR "online learning" OR "blended learning" OR "distance learning" OR "technology integration") EBSCOhost / ScienceDirect: ("nursing education" AND "digital learning" AND "teaching modalities") OR ("nurse educators" AND "technology integration" AND "nursing programs") Google Scholar: "nursing education" "traditional" "digital" ("online learning" OR "blended learning") "transition" (screened across the first 200 relevance-ranked results). *PRISMA Screening and Count Reconciliation:* As illustrated in the PRISMA flow process,the initial search yielded 827 records across the six databases. Records were exported into reference management software, where automated and manual deduplication removed 249 duplicate and non-scholarly records, leaving 578 unique records for title and abstract screening. Two independent reviewers screened all 578 titles and abstracts against the eligibility criteria, excluding 346 irrelevant records. Full-text retrieval was sought for the remaining 232 reports; however, 184 reports could not be retrieved in full text or were immediately identified during retrieval checks as non-empirical abstracts, conference proceedings, or grey literature without full data, leaving 48 full-text reports formally assessed for eligibility. Independent full-text evaluation by two reviewers resulted in the exclusion of 38 reports with documented reasons: (a) clinical informatics or healthcare delivery focus without nursing education outcomes ($n = 14$); (b) secondary review papers, protocols, or commentary articles ($n = 11$); (c) mixed or non-nursing allied health populations ($n = 8$); and (d) absence of a nurse author ($n = 5$). Disagreements at either the title/abstract or full-text screening stages were resolved through structured

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consensus discussion, with a third senior reviewer consulted when consensus was not immediately achieved. Ultimately, 10 primary empirical studies met all inclusion criteria and formed the final corpus. *Data Extraction and Study-Level MMAT Appraisal:* Two reviewers independently extracted data from the 10 included studies into the Literature Review Extraction Matrix and cross-checked entries for accuracy. Both reviewers independently appraised each study using the MMAT (Hong et al., 2018), resolving scoring discrepancies via consensus. All 10 studies passed the two initial MMAT screening criteria (clear research questions and appropriate data collection to address them) and demonstrated acceptable-to-high methodological quality across their respective design categories: Qualitative Studies (n = 4): Albloushi et al. (2024), Alshahrani (2022), and Martinsen et al. (2025) satisfied 5/5 qualitative criteria (coherent data sources, collection, thematic analysis, and interpretation). Jallad and Işık (2021) satisfied 4/5 criteria, showing strong theoretical alignment with Meleis' transition theory but limited transferability due to its single-case design. Quantitative Descriptive Studies (n = 4): Diab and Elgahsh (2020), Masha'al et al. (2020), Moreno-Sánchez et al. (2022), and Oducado and Estoque (2021) each satisfied 4/5 quantitative descriptive criteria, demonstrating validated instruments and appropriate statistical analyses while noting limitations in convenience sampling or nonresponse bias risk. Quantitative Non-Randomized Study (n = 1): Kim et al. (2021) satisfied 4/5 non-randomized criteria, employing validated pre-/post-test measures and complete outcome data, limited only by the absence of a parallel control group. Mixed-Methods Study (n = 1): Langegård et al. (2021) satisfied 5/5 mixed-methods criteria, effectively integrating web-based survey metrics with focus-group qualitative themes and addressing divergences across modalities.

Results and Discussions

Research Question 1: What key developments and innovations in technology integration are evident in nursing education across online, blended, virtual, and simulation-based modalities?

The systematic literature search yielded 827 initial records, from which N = 10 primary empirical studies published between January 2020 and June 2026 met all inclusion criteria and passed Mixed Methods Appraisal Tool (MMAT) quality evaluation. Across this corpus, methodological designs comprised qualitative descriptive or interview studies (n = 3; Albloushi et al., 2024; Alshahrani, 2022; Martinsen et al., 2025), a theory-guided qualitative case report (n = 1; Jallad & Işık, 2021), cross-sectional descriptive or correlational surveys (n = 4; Diab & Elgahsh, 2020; Masha'al et al., 2020; Moreno-Sánchez et al., 2022; Oducado & Estoque, 2021), a one-group quasi-experimental pre-/post-test study (n = 1; Kim et al., 2021), and a mixed-methods evaluation (n = 1; Langegård et al., 2021).

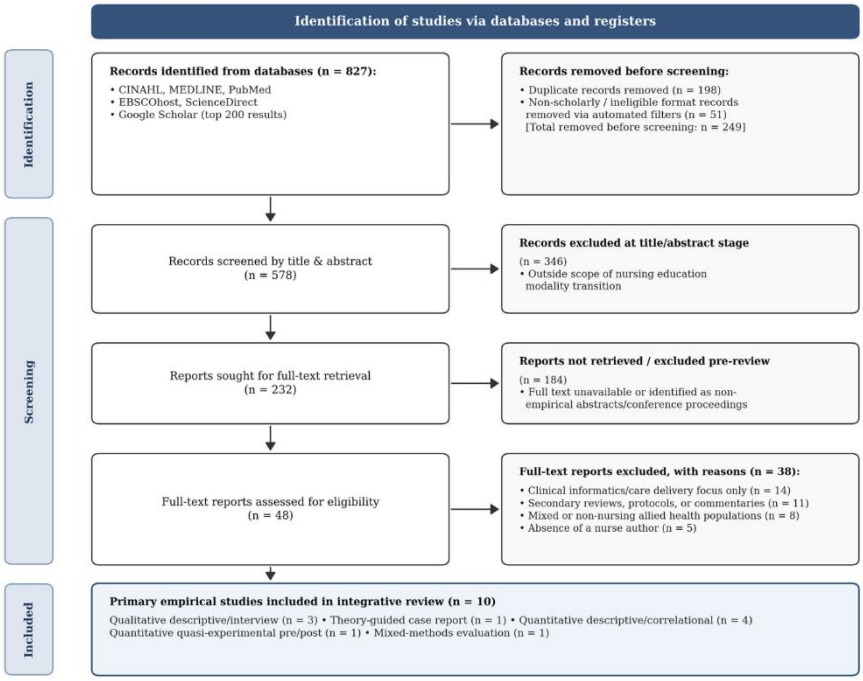

Figure 1: *PRISMA Flow Diagram for Integrative Literature Review*

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To avoid redundant narrative summaries of individual study characteristics, Table 1 synthesizes the designs, participant samples, digital modalities, key empirical findings, and MMAT ratings of the 10 included studies. Following integrative review conventions, thematic results are presented below in alignment with the research questions, with each empirical finding immediately interpreted alongside contextual background literature.

Table 1. Data Analysis of Eligible Studies

1. Langegård, Kiani, Nielsen, and Svensson (2021)	To describe and evaluate nursing students' experiences of the pedagogical transition from campus-based learning to distance learning using digital tools.	Mixed-methods evaluation using focus group interviews and a web-based questionnaire.	The study identified didactic aspects of digital teaching, study environment, and students' own resources as major dimensions. Social interaction emerged as an overall theme, and many students preferred campus-based education.	Distance learning can support nursing education, but reduced social interaction may affect motivation and learning. A blended learning approach may offer better balance.
2. Albloushi, Aldawsari, Alghamdi, Alenazy, Alanazi, and Almutairi (2024)	To explore nurse educators' experiences and challenges with online-only teaching during the COVID-19 pandemic.	Qualitative descriptive study using semi-structured interviews.	Nurse educators experienced emotional, technical, and educational challenges, including difficulty using platforms, connectivity issues, academic integrity concerns, and limitations in teaching clinical practice online.	Online teaching requires faculty training, technical support, and strategies that address clinical learning needs in nursing education.
3. Martinsen, Aiyub, Baharuddin, Gressia, Burenlind, and Helgesen (2025)	To explore how the COVID-19 pandemic affected nurse educators' teaching in Indonesian nursing education contexts.	Qualitative descriptive study using open-ended questionnaire responses.	Educators reported challenges in teaching practical skills, assessing outcomes, interacting with students, and managing unstable internet access. They also developed digital literacy and new teaching approaches.	Online teaching represents a major paradigm shift, but not all components of nursing education can be fully delivered online.
4. Alshahrani (2022)	To understand nursing students' experiences and expectations after shifting from traditional learning to distance learning due to COVID-19.	Qualitative study using semi-structured interviews.	Students experienced concerns related to time management, instructor availability, distance from friends, and adjustment to online learning systems.	Online learning helped continue education during the pandemic, but face-to-face learning remained essential for clinical learning and peer support.
5. Jallad and Işık (2021)	To discuss a nursing student's transition from traditional classroom learning to online education during COVID-19 using Meleis' transition theory.	Case report guided by Meleis' transition theory.	The case showed uncertainty, anxiety, limited technical readiness, difficulty adapting to online learning, and concern over reduced interaction with educators and peers.	Transition theory helps explain student adjustment to online education and highlights the need for structured support and guidance.
6. Diab and Elgahsh (2020)	To investigate obstacles faced by nursing students during e-learning and their effect on students' attitudes toward e-learning during COVID-19.	Descriptive correlational study using questionnaires among nursing students.	The most common obstacles were infrastructure and technology, technical and management support, and instructor-related factors. Many students showed negative attitudes toward e-learning.	Reducing technological and institutional obstacles is necessary to improve students' attitudes and the quality of e-learning in nursing education.
7. Masha'al, Rababa, and Shahrour (2020)	To examine distance learning-related stress levels, stressors, and associated sociodemographic variables among undergraduate nursing students during COVID-19.	Cross-sectional study among undergraduate nursing students.	Distance learning-related stress and stressors varied among nursing students and were influenced by sociodemographic factors and remote learning conditions.	Student support systems are needed to reduce stress and improve the distance learning experience in nursing education.
8. Oducado and Estoque (2021)	To determine undergraduate nursing students' stress, satisfaction, and academic performance during online learning in the COVID-19 pandemic.	Cross-sectional descriptive-correlational study using a web-based survey questionnaire.	Many students experienced online learning as stressful or very stressful and reported low to moderate satisfaction. Online learning stress had a significant inverse relationship with satisfaction and academic performance.	Online learning stress negatively affects student satisfaction and academic performance; support measures are needed to improve online nursing education.
9. Kim, Kim, and Lee (2021)	To examine the effects of online learning on nursing students'	One-group pre-test and post-test quasi-	Knowledge and learning flow significantly increased after online learning, while self-	Online learning can improve knowledge and learning flow when

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	knowledge, self-regulation, and learning flow during COVID-19.	experimental design.	regulation increased but was not statistically significant.	systematically planned and implemented in nursing education.
10. Moreno-Sánchez et al. (2022)	To evaluate the impact of e-learning on final-year nursing students' satisfaction during the SARS-CoV-2 pandemic.	Quantitative, non-experimental, cross-sectional descriptive study using a satisfaction questionnaire.	The study found that many nursing students had negative experiences with virtual teaching, particularly regarding practical activities and professional preparation.	E-learning allowed educational continuity but did not fully meet final-year nursing students' needs for clinical and professional preparation.

Key Developments and Modalities in Technology Integration

Across the 10 synthesized empirical studies, technology integration predominantly centered on institutional learning management systems (LMS), synchronous virtual classrooms, asynchronous recorded lectures, and web-based e-learning portals deployed rapidly during the COVID-19 pandemic. Notably, within this primary corpus, digital platforms functioned largely as emergency replacements for campus lectures rather than mature, longitudinal curricular redesigns. While Kim et al. (2021) evaluated systematically structured online coursework designed to foster cognitive engagement, the remaining nine primary studies examined rapid transitions from face-to-face instruction to remote delivery.

Discussion

Comparing these primary findings with broader contextual literature reveals an important developmental gap between emergency adoption and emerging pedagogical innovation. Contextual reviews highlight rapid advancements in serious games, virtual reality (VR) simulations, and media-rich environments tailored for Generation Z learners (Chatzea et al., 2024; Sadat & Vasilica, 2026). However, the 10 nurse-authored primary studies demonstrate that in everyday institutional practice between 2020 and 2026, foundational LMS and video-conferencing tools remained the dominant vehicles of transition, with uneven integration of high-fidelity simulation. This divergence underscores that technological availability in the broader literature does not automatically translate into routine, pedagogically mature implementation across diverse nursing programs.

Research Question 2: What pedagogical, clinical, and relational benefits and challenges are experienced by nursing students and nurse educators during the transition from conventional to technology-enhanced learning environments?

Benefits and Challenges for Nursing Students and Nurse Educators

The synthesized studies reveal sharply differentiated outcomes across cognitive, relational, psychological, and psychomotor domains rather than uniform effects across research designs: Cognitive Gains Versus Psychomotor and Readiness Deficits: Quantitative quasi-experimental evidence from Kim et al. (2021) demonstrated statistically significant improvements in nursing students' theoretical knowledge and learning flow when online modules were systematically structured. Similarly, students in Langegård et al. (2021) and Alshahrani (2022) recognized that digital platforms maintained educational continuity and offered scheduling flexibility for theoretical review. Conversely, across cross-sectional and qualitative designs, both students and faculty reported severe limitations in practical skill formation. Moreno-Sánchez et al. (2022) found marked dissatisfaction among final-year students regarding virtual practical preparation, while qualitative educator studies by Albloushi et al. (2024) and Martinsen et al. (2025) documented persistent barriers in teaching and validly assessing hands-on psychomotor competencies online.

Psychological Burden, Infrastructural Inequity, and Relational Loss: Quantitative surveys consistently identified elevated student stress, low-to-moderate satisfaction, and negative attitudes linked to unreliable internet connectivity, device constraints, and weak institutional support (Diab & Elgahsh, 2020; Masha'al et al., 2020; Oducado & Estoque, 2021). Mixed-methods and qualitative findings contextualized these metrics, showing that diminished peer and faculty interaction eroded student motivation and triggered role-transition anxiety (Alshahrani, 2022; Jallad & Işık, 2021; Langegård et al., 2021). On the instructional side, nurse educators experienced parallel emotional strain, heavy course-redesign workloads, and academic integrity concerns during unproctored virtual assessments, though Martinsen et al. (2025) noted concurrent growth in faculty digital literacy.

Discussion

These empirical findings align with contextual scholarship emphasizing that nursing education requires embodied, relational, and practice-based socialization that purely virtual environments cannot replicate (Grech, 2022; Tischendorf et al., 2024). Crucially, the variation across designs in our corpus—where

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structured quasi-experimental online instruction improved theoretical knowledge (Kim et al., 2021) while cross-sectional and qualitative studies exposed clinical dissatisfaction and stress (Moreno-Sánchez et al., 2022; Oducado & Estoque, 2021)—demonstrates that instructional quality and modality-competency alignment mediate student outcomes. Furthermore, educator experiences in Albloushi et al. (2024) and Martinsen et al. (2025) corroborate broader contextual findings that faculty readiness and institutional technical support are decisive determinants of implementation success (Torres, 2024).

Research Question 3: What methodological and curricular gaps persist in the current literature, and what strategic directions can strengthen faculty readiness, equitable digital access, and clinical competence outcomes?

Curricular Gaps and Cautious Interpretation of Blended Learning

A critical synthesis across the 10 primary studies indicates widespread stakeholder preference for combining digital flexibility with in-person clinical instruction—most explicitly articulated in Langegård et al.'s (2021) mixed-methods evaluation and echoed in faculty recommendations by Albloushi et al. (2024) and Martinsen et al. (2025). However, examining the methodological boundaries of the included corpus reveals substantial evidence limitations. None of the 10 primary studies employed longitudinal designs tracking graduates into clinical practice, nor did they conduct randomized controlled comparisons directly testing whether blended models achieve equivalent or superior clinical competence relative to traditional curricula. Instead, stakeholder support for blended learning within this corpus derives largely from student and faculty perceptions of what was lost during emergency online-only delivery.

Discussion

While external secondary reviews suggest that intentionally structured blended learning can enhance academic performance and engagement (Posey & Pintz, 2017; Wang & Raman, 2024), claims that blended learning preserves hands-on clinical competence must be stated cautiously within the bounds of the present synthesis. Because the primary studies analyzed here predominantly reflect short-term, pandemic-driven transitions rather than mature, competency-mapped hybrid curricula, the current corpus positions blended learning as a *promising, conceptually supported pedagogical direction* rather than a longitudinally proven clinical equivalent. Consequently, bridging this gap requires longitudinal comparative trials, explicit curriculum mapping that matches cognitive objectives to digital tools and psychomotor competencies to in-person or high-fidelity simulation, and sustained institutional investment in faculty development and equitable digital infrastructure.

Ethical Considerations

Formal institutional review board (IRB) or research ethics committee approval and informed consent were not required for this study because it is an integrative literature review relying exclusively on the secondary analysis of publicly available, peer-reviewed published empirical articles. No direct recruitment of human participants, clinical interventions, or access to identifiable private or patient data occurred during the conduct of this review. In accordance with journal-specific ethical publishing standards and secondary synthesis guidelines, all included primary sources were properly attributed, evaluated objectively for methodological rigor without data fabrication or selective reporting, and synthesized transparently.

Conclusion

The transition from traditional classroom instruction to digital teaching modalities in nursing education represents a complex pedagogical shift that extends beyond technological adoption to encompass instructional design, student well-being, and clinical socialization. Across the 10 nurse-authored primary studies synthesized in this review, digital platforms demonstrably sustained educational continuity, broadened access to curricular resources, and—when systematically structured—supported theoretical knowledge acquisition and cognitive engagement. At the same time, the reviewed evidence consistently indicates that purely virtual environments cannot substitute for the supervised, hands-on clinical and interpersonal learning experiences essential to psychomotor skill mastery, clinical judgment, and professional role formation. Because the synthesized corpus consists predominantly of pandemic-era cross-sectional surveys, qualitative interviews, and a single-group pre-/post-test study rather than longitudinal or randomized controlled trials, conclusions regarding optimal curriculum models must be framed cautiously. While both nursing students and nurse educators frequently identified blended learning—combining online theoretical delivery with in-person or high-fidelity simulation training—as a promising balance between digital flexibility and clinical practice, the current evidence base does not yet establish long-term clinical

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competence preservation or comparative efficacy as proven outcomes. Rather, blended learning emerges from this synthesis as a conceptually supported, pragmatic direction whose effectiveness depends heavily on intentional curriculum alignment, structured faculty development, reliable technological infrastructure, and equitable student support. To move beyond emergency remote adaptations toward mature, evidence-informed nursing curricula, program leaders and researchers should prioritize rigorous longitudinal and comparative evaluations that measure actual clinical competence and practice readiness across diverse hybrid models. Integrating digital tools judiciously—guided by explicit competency mapping and sustained institutional commitment—will help ensure that technological innovation strengthens rather than compromises the clinical, ethical, and relational foundations of nursing education.

Recommendations

To translate these findings into practice transparently, the recommendations below separate evidence-informed actions directly supported by the 10 included studies from proposed institutional strategies not empirically tested within the primary corpus. Evidence-Informed Recommendations, Curriculum and Modality Alignment: Retain supervised in-person clinical practicums and laboratory instruction for psychomotor and interpersonal skills, while using systematically structured digital modules to support theoretical knowledge delivery and cognitive flow (Albloushi et al., 2024; Kim et al., 2021; Langegård et al., 2021; Martinsen et al., 2025; Moreno-Sánchez et al., 2022). Faculty Preparation: Provide structured training in digital platform management, online instructional design, and remote assessment, backed by dedicated technical assistance to reduce educator strain and strengthen digital literacy (Albloushi et al., 2024; Martinsen et al., 2025). Infrastructure and Access: Establish reliable learning management systems (LMS), stable campus connectivity, and responsive technical support before scaling digital coursework to prevent student stress and negative attitudes (Diab & Elgahsh, 2020; Masha'al et al., 2020). Student Support and Social Presence: Embed structured transition orientations, timely faculty feedback, and peer-interaction activities to mitigate isolation, role-transition anxiety, and academic stress (Alshahrani, 2022; Jallad & Işık, 2021; Langegård et al., 2021; Oducado & Estoque, 2021). Proposed Institutional Strategies (Not Directly Evaluated in the Included Studies) The operational mechanisms below were not empirically tested in the 10 synthesized studies and are proposed for institutional piloting and internal evaluation: Competency-Mapped Blended Blueprints: Pilot formal curriculum-mapping frameworks specifying ratios and sequences of online theory, high-fidelity simulation, and clinical placements (extending Langegård et al., 2021). Protected Redesign Time and Peer Networks: Establish protected workload release time for course redesign and formal faculty communities of practice (extending Albloushi et al., 2024; Martinsen et al., 2025). Equity Subsidies and Proctored Hybrid Assessments: Implement device-loan programs, connectivity subsidies, and multi-modal proctored Objective Structured Clinical Examinations (OSCEs) to address socioeconomic disparities and academic integrity concerns (extending Albloushi et al., 2024; Masha'al et al., 2020). Future Research Priorities, Prospective Clinical Competency Studies: Conduct multi-year longitudinal and controlled comparative studies tracking graduates into practice using objective psychomotor, clinical judgment, and patient-safety metrics rather than short-term satisfaction scores. Blended Sequence Comparisons: Compare specific ratios and sequences of asynchronous modules, simulation, and direct clinical hours to identify optimal competency pathways. Intervention Testing: Empirically evaluate whether digital-readiness orientations, connectivity subsidies, and structured faculty-development programs reduce student stress and narrow achievement gaps.

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