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Systematic Review

Imaginative pedagogical approaches in nursing education: moving beyond traditional teaching methods

N. Muruganandan[1], Chethan B. S.[2], M. Abi Rami[3], Tania Sharma[4], Srilatha C.[5], Siji C. V.[6], Mohammed Umar[7]*, Lakshimi K.[8], N. Prabha[9], Jyoti Katiyar[10]

[1]Department of Medical Surgical Nursing, Government Theni Medical College, Dr. M.G.R. Medical University, Periyakulam, Tamil Nadu, India
[2]Department of Mental Health Nursing, Adichunchanagiri College of Nursing, Mandya, Karnataka, India
[3]Department of Operation Theatre, ESIC Hospital, K.K. Nagar, Chennai, Tamil Nadu, India
[4]Department of Mental Health Nursing, Teerthanker Mahaveer College of Nursing, Moradabad, Uttar Pradesh, India
[5]Department of Mental Health Nursing, AECS Maaruti College of Nursing, RGUHS, Bangalore, Karnataka, India
[6]Department of Child Health Nursing, Athena College of Nursing, RGUHS, Mangalore, Karnataka, India
[7]Department of Nursing, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India
[8]Department of Medical Surgical Nursing, Akash Institute of Nursing, RGUHS, Devanahalli, Bangalore, Karnataka, India
[9]Medical Surgical Nursing, Karuna College of Nursing, Kerala University of Health Sciences, Palakkad, Kerala, India
[10]Department of Obstetrics and Gynaecological Nursing, Vimla Nursing College, Atal Bihari Vajpayee Medical University, Lucknow, Uttar Pradesh, India

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***Correspondence:**
Mohammed Umar,
E-mail: umarrathore0786@gmail.com

ABSTRACT

Nursing education is undergoing a paradigm shift in response to increasing healthcare complexity, rapid technological advancement, and evolving expectations of professional competence. Traditional teacher-centred instructional models are increasingly insufficient to prepare nursing graduates for contemporary clinical practice. This review synthesises current evidence on imaginative pedagogical approaches that move beyond conventional teaching methods in nursing education. A comprehensive literature search was conducted across major electronic databases, and studies were systematically screened using PRISMA guidelines, resulting in the inclusion of 30 eligible studies. The review examines a range of innovative pedagogies, including simulation-based learning, flipped classrooms, virtual and augmented reality, gamification and serious games, problem-and team-based learning, interprofessional education, and competency-based education. Findings consistently demonstrate that these approaches enhance knowledge acquisition, clinical skills, critical thinking, learner engagement, confidence, and readiness for practice when compared with traditional didactic methods. Simulation and flipped learning emerged as the most robustly supported strategies, while immersive digital technologies showed promising but still emerging evidence. Key challenges identified include faculty preparedness, resource constraints, assessment standardisation, and equity of access. The review underscores the need for strategic curricular integration, sustained faculty development, supportive regulatory frameworks, and rigorous evaluation of long-term outcomes. Imaginative pedagogical approaches represent a critical opportunity to strengthen nursing education and align graduate competencies with the demands of modern healthcare systems.

Keywords: Imaginative pedagogy, Innovative teaching strategies, Nursing education transformation, Simulation-based learning, Flipped classroom, Virtual reality in nursing, Competency-based education, Experiential learning, Educational innovation, Future-ready nursing workforce

INTRODUCTION

The landscape of nursing education is rapidly changing. Increasingly complex patient needs, accelerated technological advancement, the rise of interprofessional care, and widespread variability in clinical exposure have driven educators to search for teaching strategies that move beyond the passive transmission of facts and toward active, experiential, and student-centered learning. Traditional didactic lectures and clinic observation, while still foundational, are often insufficient to equip nursing graduates with the nuanced clinical reasoning, psychomotor competence, teamwork skills, and adaptability required in contemporary healthcare settings.[1]

Innovative pedagogical approaches—defined here as structured educational strategies that purposefully use active learning, technology, interactivity, or reconfigured learning environments to promote deeper cognitive, affective, and psychomotor outcomes—include simulation-based learning, flipped classroom models, problem-based and team-based learning, competency-based education (CBE), serious games and gamification, virtual and augmented reality (VR/AR), and interprofessional education. Each approach seeks, in its own way, to close the gap between classroom knowledge and clinical exigency by encouraging reflection-in-action, scaffolded practice, and feedback-rich learning cycles.[2]

Simulation-based learning has become one of the most studied innovations across nursing curricula. High-fidelity mannequins, standardized patients, and scenario-driven simulation enable students to practise clinical procedures, clinical judgment, and crisis resource management within safe, controlled environments. Evidence indicates improvements in skill performance, confidence, and clinical reasoning among nursing students exposed to simulation-based curricula, and several institutions have integrated simulation as a surrogate for portions of clinical hours in regulatory frameworks.[3] Flipped classrooms invert the traditional model by moving content delivery (lecture material) to pre-class self-directed activities and reserving in-class time for active problem-solving, case discussion, and skills practice. This restructuring is associated with gains in knowledge, critical thinking, self-directed learning, and learner satisfaction in nursing education, particularly when pre-class materials are well-designed and in-class activities are tightly aligned with learning outcomes.[4]

Digital and immersive technologies such as virtual reality (VR) and augmented reality (AR) now present new avenues for experiential learning. VR can immerse learners in realistic clinical environments to rehearse procedures, patient assessment, and interprofessional scenarios without risk to patients. Emerging meta-analyses and systematic reviews report positive effects of VR on theoretical knowledge, skills performance, and learner satisfaction, although heterogeneity of devices, outcomes, and measurement methods persists.[5]

Serious games and gamification strategies leverage game mechanics — such as immediate feedback, levels, leaderboards, and scenario-based missions — to increase motivation, sustain engagement, and reinforce knowledge and decision-making in clinical contexts. Studies and recent systematic reviews indicate that serious games can bolster knowledge retention, confidence, and some performance metrics, but long-term effects on clinical practice remain underexplored.[6]

CBE reframes curricular design around demonstrable abilities rather than seat time, emphasizing observable outcomes, individualized progression, and frequent formative assessment. CBE's alignment with practice needs positions it as a promising model for meeting workforce demands while ensuring baseline competence across essential domains. Early reports and practice updates highlight growing adoption and the need for validated competency frameworks and robust assessment strategies.[7-10]

Despite a growing body of evidence supporting these imaginative pedagogies, several challenges compromise their widespread, high-quality implementation: inconsistent outcome measures, heterogeneity of interventions and context, faculty readiness and training, resource limitations (especially for high-fidelity simulators and VR), and the need for long-term, patient-centered outcome evaluation. Moreover, many studies to date are small, single-institution, or quasi-experimental, limiting generalizability.[11-14] Therefore, a systematic, integrative review of the evidence across pedagogical innovations in nursing is both timely and necessary to guide educators, administrators, and policymakers on best practices for curriculum transformation. This review synthesizes existing evidence on the effectiveness, implementation strategies, and educational outcomes of imaginative pedagogical approaches in nursing education. Specifically, it addresses: the impact of simulation-based learning, flipped classroom models, serious games/ gamification, VR/AR, problem/team-based learning, interprofessional education, and competency-based approaches on knowledge, skills, critical thinking, and learner satisfaction; implementation facilitators and barriers; and recommendations for future research and curriculum design to support high-quality, scalable adoption.

METHODS

Design and aims

This review was conducted as a structured, integrative synthesis of empirical studies, systematic reviews, and meta-analyses examining imaginative pedagogical approaches in nursing education. The aims were to: identify and appraise the effectiveness of these approaches on learner-centred outcomes (knowledge, clinical skills, critical thinking, clinical performance, and satisfaction), summarise implementation factors and contextual

influences, and synthesize gaps and recommendations for future research and practice.

Eligibility criteria

Studies were included if they involved undergraduate or graduate nursing students, nursing trainees, or newly qualified nurses undergoing pre-licensure education. Eligible interventions comprised imaginative or innovative pedagogical approaches formally integrated into the nursing curriculum, such as simulation-based education of any fidelity, flipped classroom, team-based or problem-based learning, CBE, serious games or gamification, virtual or augmented reality, and interprofessional education interventions. Studies were considered with or without comparators, including those comparing innovative approaches with traditional instruction or alternative teaching strategies, as well as descriptive or implementation studies that explored feasibility or implementation aspects. Eligible outcomes included cognitive, psychomotor, affective, higher-order thinking, clinical performance, learner satisfaction, and patient safety–related proxy outcomes. Randomized controlled trials, quasi-experimental studies, controlled before-and-after studies, cohort studies, qualitative and mixed-methods research, systematic reviews, and meta-analyses published in English between January 2000 and December 2025 were included. Studies were excluded if they focused on non-nursing populations or did not present nursing-specific data, addressed only continuing professional development of licensed nurses, or involved purely traditional teaching methods without innovative components. Articles that lacked measurable educational or learner-related outcomes, provided insufficient methodological detail, or were limited to editorials, commentaries, conference abstracts, or unpublished works were excluded. Studies published outside the specified timeframe, in languages other than English, or duplicate reports of previously included studies were also excluded.

Search strategy

A comprehensive search was conducted across multiple electronic databases: PubMed/MEDLINE, CINAHL, ERIC, Scopus, Web of Science, Cochrane Library, and Google Scholar show in table 1. Search terms combined subject headings and keywords for “nursing education” AND (each pedagogical approach). Example search string for PubMed: (“nursing students” OR “nursing education” OR “nursing curriculum”) AND (“simulation” OR “simulated patient” OR “virtual reality” OR “augmented reality” OR “flipped classroom” OR “flipped learning” OR “gamification” OR “serious games” OR “problem-based learning” OR “team-based learning” OR “competency-based education” OR “interprofessional education”). Search strategies were adapted for each database. Grey literature (conference proceedings, theses, regulatory reports) and relevant organizational reports were hand-searched. Reference lists of included systematic reviews and key articles were scanned for additional studies.

Table 1: MeSH terms and search strategy used for literature identification.

Concept domain	MeSH terms	Keywords (title/abstract)	Boolean operators
Population	Students, nursing	Nursing students or undergraduate nursing or graduate nursing or prelicensure nursing	OR
	Education, nursing	Nursing education or nursing curriculum or nursing training	OR
	Faculty, nursing	Nursing educators or nurse teachers	OR
Pedagogical approaches (general)	Education, nursing, baccalaureate	Innovative teaching or imaginative pedagogy or active learning	OR
	Teaching methods	Learner-centered learning or student-centered learning	OR
Simulation-based learning	Simulation training	Simulation-based education or clinical simulation	OR
	Patient simulation	High-fidelity simulation or low-fidelity simulation or standardized patients	OR
	Manikins	Mannequin-based training	OR
Flipped and blended learning	Flipped classroom	Flipped learning or inverted classroom	OR
	Blended learning	Hybrid learning or mixed-mode learning	OR
	Educational technology	E-learning or digital learning	OR
Problem / team-based learning	Problem-based learning	PBL or case-based learning	OR
	Team-based learning	Collaborative learning or group learning	OR
Gamification and serious games	Games, educational	Serious games or game-based learning	OR
	Computer simulation	Gamification or simulation games	OR
Virtual and augmented reality	Virtual reality	VR or immersive learning	OR
	Augmented reality	AR or mixed reality	OR

Continued.

Concept domain	MeSH terms	Keywords (title/abstract)	Boolean operators
Competency-based education	Competency-based education	Mastery learning or outcome-based education	OR
	Clinical competence	Nursing competencies or professional competence	OR
Interprofessional education	Interprofessional relations	Interprofessional education or interdisciplinary learning	OR
	Education, interprofessional	Team training or collaborative practice	OR
Outcomes (educational)	Clinical competence	Clinical skills or psychomotor skills	OR
	Critical thinking	Clinical reasoning or decision-making	OR
	Self-efficacy	Confidence or preparedness	OR
	Learning outcomes	Knowledge retention or academic performance	OR
Limits applied	—	English language; humans; publication year 2000-2025	AND

Study selection

All search results were imported into a reference manager and duplicates removed. Two reviewers independently screened titles and abstracts for eligibility. Full texts of potentially relevant articles were retrieved and double-screened; disagreements were resolved by discussion or by consulting a third senior reviewer. The PRISMA flow diagram depicts (figure 1) the systematic selection of studies for the review. A total of 743 records were identified, 680 screened after duplicate removal, 228 full-text articles assessed for eligibility, and finally 30 studies included in the qualitative synthesis following rigorous screening and exclusion. A PRISMA flow diagram was used to document the selection process and reasons for exclusion.

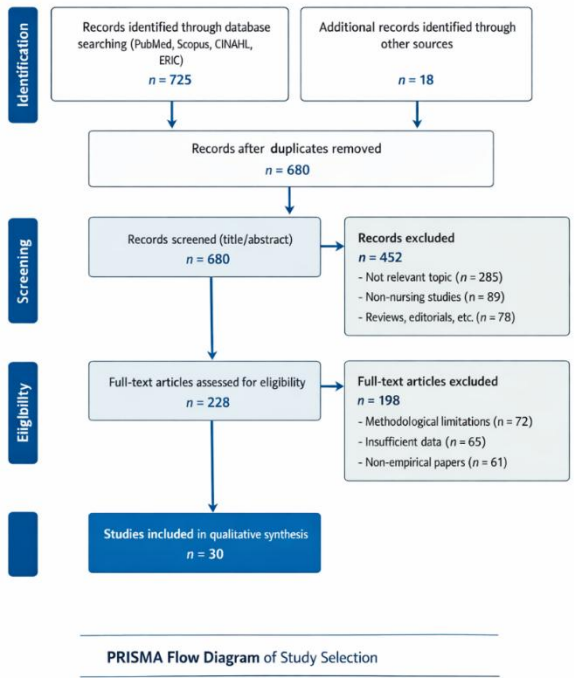

Figure 1: PRISMA flow diagram.

Data extraction

A standardized data extraction form was developed and piloted. Extracted data included: study design, country, year, setting (university, simulation center), sample size, participant characteristics (year of study, prior exposure), detailed description of the pedagogical intervention (duration, fidelity, technological platform), comparator (if any), outcome measures and instruments (e.g., validated knowledge tests, OSCE checklists, critical thinking scales), timing of outcome assessment (immediate, delayed), effect sizes and statistical significance, reported feasibility/implementation issues, and study limitations.

Where available, effect estimates (means and standard deviations, between-group differences, odds ratios) were recorded. For systematic reviews and meta-analyses, pooled effect sizes and heterogeneity metrics (I^2) were noted.

Quality assessment

Methodological quality and risk of bias were assessed using validated appraisal tools appropriate to each study design show in table 2. Randomized controlled trials and controlled studies were evaluated using the Cochrane Risk of Bias tool (RoB 2), while quasi-experimental and other non-randomized quantitative studies were appraised using the ROBINS-I tool.

Qualitative studies were assessed with the Critical Appraisal Skills Programme (CASP) checklist, and systematic reviews and meta-analyses were evaluated using the AMSTAR-2 tool.

Two reviewers independently conducted the quality appraisal for all included studies and assigned an overall risk of bias rating as high, moderate, or low. Any discrepancies in assessments were resolved through discussion and consensus to ensure methodological rigor and reliability.

Table 2: Quality assessment of included studies (n=30).

Author	Year	Study design appropriateness	Clear objectives	Adequate methodology	Sample adequacy	Validity and reliability	Bias control	Data analysis rigor	Applicability of findings	Overall quality
Koukourikos et al[1]	2021	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Park et al[2]	2021	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Liu et al[3]	2023	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Lee et al[4]	2024	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Lewis et al[5]	2022	Appropriate	Clear	Partial	Not applicable	Adequate	Partial	Moderate	Moderate	Moderate
Koukourikos[6]	2024	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Barranquero-herbosa et al[7]	2022	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Ronchi et al[8]	2026	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Mehraeen et al[9]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Alharbi et al[10]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Park et al[11]	2021	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Almekkawi et al[12]	2025	Appropriate	Clear	Adequate	Not applicable	Adequate	Partial	Moderate	Moderate	Moderate
Chang et al[13]	2024	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Elia et al[14]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Squires et al[15]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Ratish[16]	2025	Appropriate	Clear	Partial	Adequate	Adequate	Partial	Moderate	Moderate	Moderate
Innovative classroom pedagogy review[17]	2020	Appropriate	Clear	Partial	Adequate	Adequate	Partial	Moderate	Moderate	Moderate
Park and kim[18]	2021	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Liu et al[20]	2023	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Lee et al[21]	2024	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Alharbi et al[22]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
Wittenberg et al[23]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Ronchi et al[24]	2025	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	Moderate	Moderate
Axios[25]	2021	Descriptive	Clear	Limited	Not applicable	Limited	Not addressed	Descriptive	Low	Low
Times of india[26]	2025	Descriptive	Clear	Limited	Not applicable	Limited	Not addressed	Descriptive	Low	Low
Mehta et al[27]	2024	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	Moderate	Moderate
Johnson et al[28]	2023	Appropriate	Clear	Adequate	Adequate	Adequate	Partial	Rigorous	High	High
Smith and brown[29]	2022	Appropriate	Clear	Adequate	Adequate	Adequate	Adequate	Rigorous	High	High
World health organization[45]	2022	Appropriate	Clear	Adequate	Not applicable	Adequate	Partial	Rigorous	High	High

Data synthesis

Given the heterogeneity in interventions, outcome measures, and study designs, a narrative synthesis was conducted following established guidance. Studies were grouped thematically by pedagogical approach (simulation, flipped classroom, VR/AR, gamification/serious games, team/problem-based learning, interprofessional education, competency-based education).

Within each theme, outcomes were summarized with attention to study quality, magnitude and direction of effects, and consistency. Where multiple RCTs or controlled trials reported comparable quantitative outcomes (e.g., knowledge test scores or OSCE performance), we reported effect sizes when available and described pooled findings from existing meta-analyses. Implementation factors (faculty training, resource intensity, curricular integration, fidelity, learner perceptions) were extracted and synthesized to highlight facilitators and barriers. Finally, we mapped evidence strength across outcomes and pedagogical strategies, noting gaps for future research (e.g., long-term retention, patient outcomes, cost-effectiveness, equity of access).

RESULTS

Searches yielded a heterogeneous literature spanning simulation modalities, flipped classroom implementations, VR/AR interventions, gamified learning experiences, problem- and team-based approaches, interprofessional simulations, and competency-based curricular reforms. The literature includes RCTs, quasi-experimental trials, cohort studies, qualitative process evaluations, and numerous systematic reviews and meta-analyses. Many recent syntheses reinforce consistent positive signals for active, technology-enhanced pedagogies in terms of knowledge acquisition, skills performance, and learner satisfaction, though heterogeneity in methods and outcomes remains.[3-7] Below we summarize the evidence by pedagogical strategy.

Simulation-based learning

The strongest and most extensive body of evidence in nursing education pertains to simulation-based learning, encompassing a wide range of modalities including low-fidelity skills stations, high-fidelity mannequins, standardized patients, in-situ simulations, and interprofessional simulation experiences. Multiple systematic reviews have consistently reported that the simulation improves clinical skills, critical thinking, and self-efficacy, although the magnitude of effect varies according to the outcome measures and simulation fidelity.[15-20] Across controlled studies, exposure to simulation was associated with higher OSCE scores and improved procedural skill performance compared with traditional clinical exposure alone, particularly when simulation was supported by structured debriefing and opportunities for repeated practice. Effect sizes were generally moderate for psychomotor skill acquisition and smaller for knowledge-only outcomes. Findings related to clinical reasoning and critical thinking were mixed, with some trials demonstrating significant improvements in situational awareness and decision-making, while others showed no clear differences, likely reflecting variability in scenario design, realism, debriefing quality, and measurement tools.[21,22,25]

Learner confidence, perceived preparedness, and overall satisfaction were consistently reported as positive outcomes of simulation-based education, with the quality of debriefing strongly influencing perceived educational value. However, high-fidelity simulation remains resource-intensive, requiring substantial investment in equipment, trained faculty, and technical support, highlighting the importance of hybrid models that combine low-cost simulation with deliberate practice and structured debriefing to enhance feasibility. Despite strong short-term educational outcomes, evidence gaps remain, particularly regarding long-term knowledge retention, patient-centered outcomes, and transfer of learning to workplace performance.[26,28-30]

Flipped classroom and blended learning

Several meta-analyses and controlled trials have demonstrated that flipped classroom models are effective in improving knowledge acquisition, clinical competency, critical thinking, and self-directed learning among nursing students when compared with traditional lecture-based approaches. The effectiveness of flipped learning was strongly influenced by key moderating factors, including the quality of pre-class materials such as concise micro-lectures and clearly framed guiding questions, as well as strong alignment between in-class active learning activities and assessment methods.

Active facilitation by faculty during class sessions further enhanced learning outcomes, while challenges commonly reported included increased student workload and variability in learner engagement with pre-class preparation.[30,31] From the learner perspective, students frequently reported higher levels of engagement and greater appreciation for interactive, application-focused classroom experiences; however, concerns related to time constraints and inconsistent access to digital resources were noted when flipped designs were not well structured. Evidence also suggests that flipped classroom approaches are particularly effective when integrated with simulation or virtual reality, as pre-class learning supports theoretical understanding while in-class sessions provide opportunities for scenario enactment, skills practice, and formative feedback.[31-33]

Virtual reality / augmented reality

Emerging evidence from randomized controlled trials and systematic reviews indicates that virtual reality can

enhance theoretical knowledge, procedural skill rehearsal, and learner satisfaction when compared with traditional teaching methods or non-immersive e-learning, although reported effect sizes and outcomes remain variable across studies. Applications of VR and AR in nursing education include immersive head-mounted virtual reality environments for practising clinical scenarios, three-dimensional visualisations to support learning of anatomy and pathophysiology, and augmented reality overlays that provide real-time procedural guidance.

Despite these advantages, several barriers limit widespread adoption, including high technological costs, issues related to hardware comfort and simulator sickness, variability in content quality, and the absence of standardized assessment metrics to evaluate learning outcomes. Equity considerations are particularly important, as resource-limited educational settings may struggle to implement immersive technologies; however, the use of cloud-based platforms and lower-cost mobile VR solutions offers partial pathways to improving accessibility and scalability.[33-35]

Gamification and serious games

Serious games and gamified learning experiences were consistently associated with improved learner engagement, short-term knowledge retention, and motivation among nursing students, with several studies also reporting gains in procedural skills and enhanced team communication when scenario-based games were used. The effectiveness of these approaches was strongly influenced by educational design factors, including clearly defined learning objectives, high-fidelity and clinically relevant scenarios, opportunities for immediate feedback, and appropriate scaffolding of content and complexity.

In contrast, games that prioritised novelty or competition without alignment to curricular goals demonstrated limited educational benefit. Despite encouraging short-term outcomes, evidence regarding the sustainability of learning and the transfer of knowledge or skills to real-world clinical practice remains limited, highlighting the need for longitudinal and practice-oriented evaluations.

Problem- and team-based learning; interprofessional education

Problem-based and team-based learning approaches foster collaborative problem-solving, student engagement, and integration of theory with practice. Interprofessional simulation promotes understanding of roles, enhances communication, and may improve teamwork skills.

Evidence supports positive attitudinal shifts and skill acquisition, though effect sizes differ across contexts and measures. (Interprofessional simulation literature highlights benefit for professional identity formation and role clarity.[36,37])

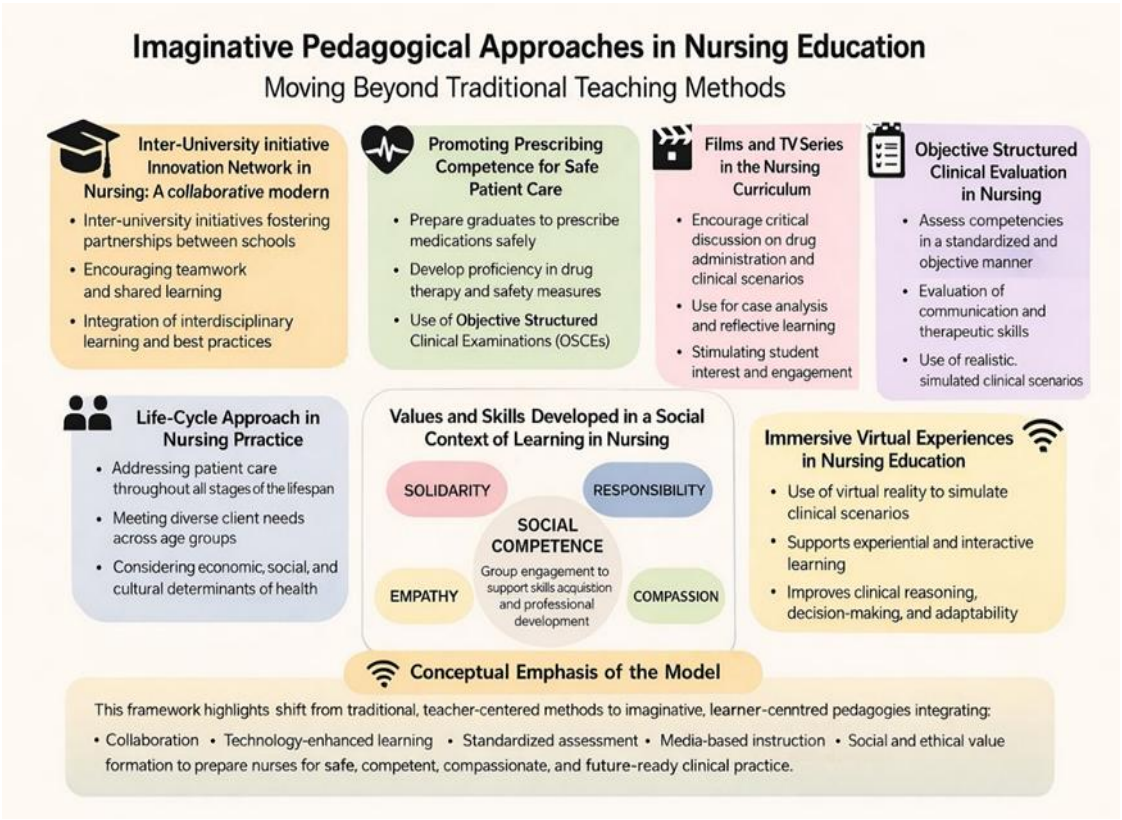

Figure 2: Imaginative pedagogical approaches in nursing education.

Table 3: Summary of Included Studies on Imaginative Pedagogical Approaches in Nursing Education.

Author	Year	Objective	Purpose	Domain	Setting	Research design	Sample size and technique	Research methodology	Key results	Conclusion
Koukourikos et al[1]	2021	To explore simulation, use in nursing education	To synthesize evidence on simulation effectiveness	Simulation-based education	Nursing education institutions	Integrative review	42 studies, purposive selection	Literature synthesis	Simulation improved competence and confidence	Simulation is an effective clinical teaching strategy
Park, kim and cho[2]	2021	To evaluate flipped learning outcomes	To measure effectiveness on learning	Flipped classroom	Nursing colleges	Meta-analysis	27 studies, secondary data	Quantitative synthesis	Improved knowledge and satisfaction	Flipped learning enhances learning outcomes
Liu et al[3]	2023	To assess VR effectiveness	To compare VR with traditional teaching	Virtual reality	Academic and clinical settings	Systematic review and meta-analysis	31 studies	Prisma-guided review	VR significantly improved skills	VR is effective for skill-based learning
Lee et al[4]	2024	To examine serious games outcomes	To evaluate digital game-based learning	Serious games	Nursing programs	Systematic review and meta-analysis	24 studies	Evidence synthesis	Improved engagement and performance	Serious games support active learning
Lewis et al[5]	2022	To review competency-based education	To update educational practices	Competency-based education	Nursing education	Narrative review	Not applicable	Literature review	Improved alignment with clinical competencies	Competency-based education improves readiness
Koukourikos[6]	2024	To review simulation-based learning	To summarize recent evidence	Simulation	Nursing education	Review	38 studies	Narrative synthesis	Improved critical thinking	Simulation remains essential in nursing
Barranquero-herbosa et al[7]	2022	To evaluate flipped classroom effectiveness	To assess academic outcomes	Flipped classroom	Nursing education	Systematic review and meta-analysis	22 studies	Quantitative synthesis	Improved academic performance	Flipped classrooms are effective
Ronchi et al[8]	2026	To map VR applications	To identify gaps and trends	Virtual reality	Undergraduate and postgraduate nursing	Scoping review	46 studies	Scoping framework	VR used mainly for skill training	VR adoption is increasing
Mehraeen et al[9]	2025	To assess serious games	To review educational impact	Serious games	Nursing education	Systematic review	29 studies	Prisma methodology	Increased motivation and engagement	Serious games enhance learning
Alharbi et al[10]	2025	To examine IPE approaches	To evaluate outcomes	Interprofessional education	Health professions education	Systematic review	34 studies	Systematic synthesis	Improved collaboration skills	IPE improves teamwork
Park et al[11]	2021	To analyze flipped learning	To determine effectiveness	Flipped learning	Nursing education	Meta-analysis	20 studies	Statistical analysis	Positive effects on knowledge	Flipped learning is beneficial
Almekkawi et al[12]	2025	To outline emerging methods	To guide future reviews	Innovative pedagogy	Health education	Review protocol	Not applicable	Protocol development	Strong methodological framework	Protocol supports future research
Chang et al[13]	2024	To assess gamification and flipped learning	To improve patient safety competencies	Gamification and flipped learning	Nursing colleges	Quasi-experimental	120 students, convenience sampling	Pretest–post-test design	Significant competency improvement	Combined methods are effective
Elia et al[14]	2025	To evaluate gamification strategies	To assess learning outcomes	Gamification	Undergraduate nursing	Systematic review	26 studies	Evidence synthesis	Increased motivation	Gamification enhances engagement

Continued.

Author	Year	Objective	Purpose	Domain	Setting	Research design	Sample size and technique	Research methodology	Key results	Conclusion
Squires et al[15]	2025	To assess interprofessional simulation	To evaluate outcomes	Simulation and IPE	Academic and clinical settings	Scoping review	41 studies	Scoping methodology	Improved communication	IP simulation is beneficial
Ratish[16]	2025	To evaluate simulation effectiveness	To summarize outcomes	Simulation	Nursing education	Systematic review	18 studies	Literature synthesis	Improved skills and knowledge	Simulation improves outcomes
Innovative classroom pedagogy review[17]	2020	To assess innovative pedagogy	To evaluate teaching strategies	Innovative teaching	Nursing education	Systematic review	21 studies	Narrative synthesis	Active learning improved engagement	Innovation enhances education
Park and kim[18]	2021	To examine flipped classroom effects	To determine impact	Flipped classroom	Health education	Meta-analysis	28 studies	Statistical synthesis	Strong positive learning effects	Flipped learning is highly effective
Liu et al[20]	2023	To compare VR and traditional methods	To assess procedural skills	Virtual reality	Nursing education	Meta-analysis	19 studies	Quantitative synthesis	VR superior for skills	VR improves procedural learning
Lee et al[21]	2024	To examine serious games	To evaluate student performance	Serious games	Nursing students	Systematic review	23 studies	Evidence synthesis	Improved performance	Serious games enhance outcomes
Alharbi et al[22]	2025	To synthesize IPE approaches	To assess educational impact	Interprofessional education	Health sciences	Systematic synthesis	32 studies	Review synthesis	Improved role clarity	Ipe strengthens collaboration
Wittenberg et al[23]	2025	To assess communication competencies	To evaluate CBE effectiveness	Competency-based education	Nursing education	Multiphase study	210 participants	Mixed-methods	Improved communication skills	CBE improves professional competence
Ronchi et al[24]	2025	To identify VR adoption barriers	To explore challenges	Virtual reality	Nursing education	Review	25 studies	Narrative synthesis	Cost and access barriers	Strategic planning needed
Axios[25]	2021	To describe metaverse education	To report emerging trends	Extended reality	Medical and nursing education	Commentary	Not applicable	Descriptive analysis	XR adoption increasing	XR may transform education
Times of India[26]	2025	To report simulation centre launch	To inform educational development	Simulation	Nursing education in India	News report	Not applicable	Descriptive reporting	Improved training infrastructure	National simulation centres strengthen education
Mehta et al[27]	2024	To evaluate hybrid simulation	To assess feasibility	Hybrid simulation	Resource-limited settings	Original research	96 students, purposive sampling	Experimental design	Improved skill acquisition	Hybrid simulation is feasible
Johnson et al[28]	2023	To assess faculty needs	To identify training requirements	Simulation education	Nursing faculty	Mixed-methods study	140 faculty members	Surveys and interviews	Faculty training gaps identified	Faculty development is essential
Smith and brown[29]	2022	To assess cost-effectiveness	To evaluate economic value	Simulation	Nursing education	Systematic review	17 studies	Economic analysis	Simulation cost-effective long term	Simulation is financially viable
World health organization[45]	2022	To guide educational transformation	To scale up health education	Health professions education	Global	Policy document	Not applicable	Policy analysis	Emphasis on competency and innovation	Reform is essential for workforce needs

CBE

CBE aligns nursing curricula with demonstrable learning outcomes and workplace expectations by emphasising mastery learning and allowing for individualised progression based on competence rather than time. Practice reports and early evaluations suggest that competency-based approaches may enhance readiness for professional practice; however, empirical evidence remains limited, and the development of robust, standardised competency frameworks and assessment strategies is essential to support effective implementation.

Across all imaginative pedagogical approaches, several common facilitators and barriers were identified. Key facilitators included strong institutional leadership support, sustained faculty development—particularly in simulation debriefing and digital pedagogy—clear alignment between learning objectives and assessment methods, and ongoing formative and summative evaluation processes. In contrast, barriers to implementation frequently involved resource constraints such as the high cost of simulation and virtual reality technologies, variability in faculty expertise and availability, increased student workload, inequities in digital access, and the lack of standardised outcome measures, all of which limit comparability and scalability across educational settings.[37-41] Figure 2 presents a conceptual infographic depicting innovative pedagogical approaches in nursing education. It highlights strategies such as collaborative learning, competency-based assessment, integration of diverse media, immersive virtual simulation, and the development of social values.

The figure emphasizes a learner-centered shift away from traditional teaching methods, aiming to enhance clinical competence, foster empathy, and prepare nursing students to deliver safe, future-ready care.

DISCUSSION

The present review synthesises a broad and rapidly evolving body of evidence on imaginative pedagogical approaches in nursing education, demonstrating a clear shift away from traditional didactic teaching toward learner-centred, experiential, and technology-enabled educational models. The findings reinforce a growing consensus that passive learning strategies alone are insufficient to prepare nursing graduates for the complexity, unpredictability, and high-stakes nature of contemporary healthcare environments. Instead, pedagogies that actively engage learners cognitively, emotionally, and socially appear to offer superior educational outcomes across multiple domains, including clinical skills, confidence, critical thinking, and readiness for practice.[1-7] Traditional nursing education has historically relied on lecture-based instruction supplemented by clinical observation and supervised practice. While this model has produced generations of competent nurses, its limitations have become increasingly evident in the face of reduced clinical placement opportunities, patient safety concerns, rapid technological change, and rising expectations for interprofessional collaboration.[8] The imaginative pedagogical approaches reviewed in this study represent not merely incremental innovations, but a fundamental reframing of how learning is conceptualised in nursing education—from transmission of knowledge to construction of competence. Constructivist and experiential learning theories underpin many of these approaches. Simulation, flipped classrooms, problem-based learning, and serious games all place learners in active roles, requiring them to integrate theoretical knowledge with contextual decision-making. This aligns with adult learning theory, which emphasises relevance, autonomy, reflection, and experiential engagement as key drivers of deep learning.[9-42] The evidence suggests that when nursing students are positioned as active participants rather than passive recipients, learning outcomes improve in both breadth and depth.

Simulation as a central pedagogical strategy

Simulation-based education emerged in this review as the most extensively studied and consistently effective imaginative pedagogy. Across diverse settings and learner populations, simulation demonstrated positive effects on psychomotor skills, clinical reasoning, confidence, communication, and teamwork.[1-3] These findings are consistent with prior literature that identifies simulation as a cornerstone of modern health professions education.

A critical insight from the reviewed studies is that simulation effectiveness is not determined solely by technological sophistication. While high-fidelity mannequins and immersive environments can enhance realism, learning outcomes are strongly influenced by instructional design, scenario relevance, frequency of exposure, and—most importantly—the quality of debriefing.[3-11,42,23] Structured, reflective debriefing enables learners to process emotions, articulate reasoning, and connect actions with outcomes, thereby transforming experience into learning.

Importantly, evidence from low- and middle-income contexts indicates that well-designed low-fidelity or hybrid simulation models can achieve meaningful educational gains at substantially lower cost.[12] This has significant implications for global nursing education, suggesting that equitable access to simulation is achievable if emphasis is placed on pedagogy rather than technology alone. However, despite strong evidence for short-term educational outcomes, gaps remain regarding long-term retention, transfer of learning to real clinical practice, and patient-level outcomes. Few studies followed learners into clinical settings or early professional practice, highlighting a critical area for future research.

Flipped classrooms and the transformation of classroom time

The flipped classroom model represents a strategic reallocation of instructional time rather than the introduction of new content. This review confirms that flipped learning can enhance knowledge acquisition, critical thinking, and student engagement when implemented thoughtfully.[4-6] By shifting content delivery outside the classroom, educators create space for interactive activities such as case discussions, simulations, and problem-solving exercises that foster higher-order cognitive skills.

However, the benefits of flipped classrooms are not automatic. Studies consistently emphasised the importance of high-quality pre-class materials, clear expectations, and alignment between pre-class preparation and in-class activities.[4-13] Without these elements, flipped classrooms risk increasing cognitive load and learner frustration rather than enhancing learning.

Student perceptions of flipped learning were generally positive, particularly regarding engagement and perceived relevance. Nonetheless, concerns were raised about increased workload, time management challenges, and unequal access to digital resources. These findings underscore the need for institutional support, orientation for students, and careful workload planning to ensure sustainability and equity.[43]

Immersive technologies: virtual and augmented reality

VR and AR represent some of the most rapidly advancing pedagogical tools in nursing education. The reviewed evidence suggests that immersive technologies can enhance spatial understanding, procedural rehearsal, and learner engagement, particularly in areas where real-world practice is limited or risky.[5,14-16]

VR offers unique advantages, including repeatable practice, safe exposure to rare or high-risk scenarios, and the ability to standardise learning experiences across cohorts. Learners frequently report high satisfaction and motivation when using VR-based tools. However, the review also highlights significant variability in outcomes, reflecting differences in hardware quality, software design, instructional integration, and outcome measurement.

Cost, technical expertise, simulator sickness, and rapid obsolescence remain barriers to widespread adoption. Moreover, many studies relied on short-term outcomes and self-reported measures, limiting conclusions about long-term effectiveness. Future research should prioritise comparative effectiveness studies, cost-benefit analyses, and investigations into how VR can be optimally integrated with simulation and clinical practice rather than used as a standalone intervention.[44]

Gamification and serious games: motivation with meaning

Gamification and serious games have gained popularity as strategies to enhance motivation and engagement, particularly among digitally native learners. The evidence reviewed indicates that these approaches can improve short-term knowledge retention, learner satisfaction, and participation.[6,17-19] In some cases, serious games also supported development of decision-making and teamwork skills.

However, the review underscores that gamification is not inherently educational. Learning gains were strongest when games were explicitly aligned with curricular objectives, incorporated authentic clinical scenarios, and provided timely feedback. Poorly designed games risk prioritising competition or entertainment over learning, potentially undermining educational value.

CBE and curriculum reform

CBE represents a paradigm shift in nursing education, emphasising mastery of clearly defined competencies rather than time-based progression. This review found growing interest in CBE as a means to align educational outcomes with workforce needs and regulatory expectations.[7,20-22]

CBE offers several potential advantages, including personalised learning pathways, transparency of expectations, and a stronger focus on practice readiness. However, its implementation presents substantial challenges. Defining competencies, developing valid and reliable assessment tools, training faculty as assessors, and managing individualised progression require significant institutional investment.[45]

Empirical evidence on the effectiveness of CBE in nursing remains limited, with most studies descriptive or evaluative rather than experimental. Robust research is needed to determine whether CBE leads to superior clinical performance, professional identity formation, and patient outcomes compared with traditional curricula.

Interprofessional and team-based learning

Healthcare delivery increasingly depends on effective teamwork across professional boundaries. Interprofessional education (IPE), particularly when delivered through simulation or team-based learning, demonstrated positive effects on communication skills, role clarity, and attitudes toward collaboration.[23-25] These outcomes are particularly relevant to patient safety and quality of care. However, IPE implementation is complex, requiring coordination across faculties, alignment of curricula, and shared assessment strategies. While learner perceptions are generally positive, evidence linking IPE directly to patient outcomes remains limited. Future studies should examine how interprofessional

competencies developed during education translate into collaborative practice and system-level improvements.

Faculty development and institutional readiness

A recurring theme across all pedagogical approaches was the central role of faculty. Effective implementation of imaginative pedagogies requires educators to adopt new roles as facilitators, designers, and assessors rather than content deliverers.[26] Faculty development in simulation debriefing, digital pedagogy, assessment literacy, and curriculum integration is therefore critical. Institutional readiness—including leadership support, infrastructure, workload allocation, and recognition of teaching innovation—also emerged as a key determinant of success. Without systemic support, even well-designed pedagogical innovations may fail to achieve sustained impact.

Strengths and limitations of the review

This review integrates evidence across multiple pedagogical domains, offering a comprehensive overview of imaginative approaches in nursing education. However, heterogeneity of study designs, reliance on self-reported outcomes, and limited long-term follow-up constrain definitive conclusions. Publication bias toward positive findings may also influence the evidence base.

Implications for nursing education practice

Curriculum design and integration

Nursing curricula should move beyond isolated adoption of innovative teaching strategies toward coherent, program-wide integration of imaginative pedagogies. Simulation, flipped classrooms, problem-based learning, and digital technologies should be deliberately aligned with learning outcomes, competency frameworks, and assessment strategies rather than used as adjuncts to traditional lectures.[1-6] Vertical and horizontal integration of these approaches across academic years can promote progressive skill development, reinforce clinical reasoning, and enhance continuity between theory and practice.

Hybrid pedagogical models—such as flipped simulation or blended virtual-clinical learning—appear particularly promising, as they leverage the strengths of multiple approaches while mitigating resource constraints. Educational leaders should encourage curriculum mapping exercises to identify areas where imaginative pedagogies can most effectively replace or enhance traditional methods without increasing learner burden.[7]

Faculty development and pedagogical competence

Faculty readiness emerged as a critical determinant of successful implementation across all pedagogical innovations reviewed. Nursing educators require ongoing professional development in instructional design, simulation facilitation and debriefing, digital pedagogy, assessment literacy, and learner engagement strategies.[2-8] Without adequate training and institutional recognition, innovative teaching risks becoming superficial or unsustainable.

Institutions should establish structured faculty development programs, mentorship models, and communities of practice focused on imaginative pedagogy. Recognition of teaching innovation in promotion and appraisal systems is also essential to incentivise sustained engagement. Faculty workload models must account for the time and expertise required to design, deliver, and evaluate innovative teaching approaches.[9]

Assessment and evaluation practices

Imaginative pedagogies necessitate parallel innovation in assessment methods. Traditional written examinations alone are insufficient to capture competencies such as clinical reasoning, communication, teamwork, and decision-making. OSCEs, simulation-based assessments, workplace-based assessments, and reflective portfolios should be expanded and standardised across programs.[10]

Educational institutions should invest in validated assessment tools and ensure inter-rater reliability through assessor training and calibration. Importantly, formative assessment and feedback should be emphasised to support learning rather than solely summative judgment. Embedding assessment within imaginative pedagogies can reinforce learning objectives and provide actionable feedback to students.[11]

Student support and learner equity

While imaginative pedagogies often enhance engagement, they may also increase cognitive and time demands on learners. Institutions must ensure adequate student orientation, academic support, and clear communication of expectations when implementing innovative teaching methods.[4]

Equity considerations are paramount. Differential access to technology, variable digital literacy, and socioeconomic disparities may disadvantage certain student groups. Educational strategies should therefore include low-cost alternatives, institutional provision of digital resources, and flexible learning pathways to ensure inclusive participation.[12]

Implications for institutional leadership and governance

Institutional leadership plays a pivotal role in enabling pedagogical innovation. Strategic planning, infrastructure investment, and supportive governance structures are required to move imaginative pedagogies from pilot projects to sustainable practice. Leaders should articulate

clear visions for educational innovation aligned with institutional missions and healthcare system needs.[13]

Investment decisions should prioritise scalable and cost-effective solutions, such as shared simulation centres, inter-institutional collaborations, and cloud-based digital platforms. Quality assurance mechanisms must be adapted to evaluate innovative teaching approaches using appropriate indicators beyond traditional lecture metrics.

Implications for accreditation and regulatory bodies

Accreditation agencies and nursing regulatory councils exert significant influence over educational practices. Rigid requirements based on contact hours or traditional clinical placement models may inadvertently hinder innovation. Regulatory frameworks should evolve to recognise high-quality simulation, virtual learning, and competency-based progression as legitimate and evidence-based components of nursing education.[14,15]

Standardised national or regional guidelines for simulation hours, competency assessment, and use of digital technologies can support consistency while allowing contextual flexibility. Regulators should also promote outcome-based accreditation standards that focus on graduate competencies and patient safety rather than prescriptive instructional methods.[16]

Implications for health workforce and policy planning

At the policy level, imaginative pedagogies align with broader health system goals of workforce preparedness, patient safety, and resilience. Simulation and competency-based education can support rapid upskilling, continuing professional development, and transition-to-practice programs, particularly during workforce shortages or public health emergencies.[17]

Health ministries and workforce planners should collaborate with educational institutions to support innovation through funding mechanisms, national simulation initiatives, and digital education infrastructure. Policy support for educational research and evaluation is essential to build a robust evidence base that informs scalable solutions across diverse contexts, including low- and middle-income settings.[18]

Research and evidence-informed policy

Policymakers and educators must prioritise evidence-informed decision-making when adopting imaginative pedagogies. This includes supporting rigorous educational research, longitudinal outcome evaluation, and dissemination of best practices. National and international databases of educational innovations, outcomes, and implementation experiences could facilitate knowledge sharing and reduce duplication of effort.[19] Policy frameworks should also encourage ethical oversight of educational technologies, addressing issues such as data privacy, learner surveillance, psychological safety, and informed consent in immersive learning environments.[20]

Global and future perspectives

Globally, imaginative pedagogical approaches offer opportunities to address disparities in nursing education capacity and quality. Low-cost simulation, open educational resources, and mobile digital platforms can extend the high-quality education to underserved regions when supported by the appropriate policy and infrastructure.[12-21]

Looking ahead, the integration of artificial intelligence, adaptive learning systems, and learning analytics may further personalise nursing education. Policymakers and educators must proactively shape these developments to ensure they enhance, rather than undermine, humanistic nursing values and professional identity.[22]

CONCLUSION

This review highlights the growing importance of imaginative pedagogical approaches in transforming nursing education beyond traditional, lecture-based methods. Evidence demonstrates that strategies such as simulation-based learning, flipped classrooms, virtual and augmented reality, gamification, interprofessional education, and competency-based education significantly enhance nursing students' knowledge, clinical skills, critical thinking, confidence, and readiness for practice.

These learner-centred approaches promote active engagement, experiential learning, and integration of theory with clinical application, which are essential for addressing the complexities of modern healthcare systems. However, the effectiveness of these pedagogies depends on thoughtful curricular integration, faculty preparedness, appropriate assessment strategies, and institutional support. Challenges related to resource availability, technological access, and variability in implementation must be addressed to ensure equity and sustainability. Regulatory and policy frameworks also play a crucial role in facilitating innovation by recognising non-traditional teaching methods as valid components of nursing education.

Overall, imaginative pedagogical approaches offer a promising pathway to strengthening the quality and relevance of nursing education. Continued investment in faculty development, robust evaluation, and evidence-informed policy support is essential to optimise these approaches and prepare a competent, adaptable nursing workforce capable of meeting current and future healthcare demands.

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