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Developing Nursing Students' Critical Thinking Through Classroom, Simulation, and Clinical Practice: A Perspective

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Abstract

Background: Critical thinking is a core competency in nursing education that enables students to interpret patient information, manage clinical uncertainty, establish priorities, and make safe, evidence-informed decisions. However, theoretical knowledge does not automatically translate into effective clinical reasoning. Fragmented learning across classroom, simulation, and clinical settings may create a theory-practice gap and limit the transfer of reasoning skills into authentic patient care.

Objective: This perspective article examines the gap between conceptual knowledge and clinical application and argues that critical thinking should not be viewed solely as an individual student outcome. Rather, it should be developed as a longitudinal competency jointly supported across classroom education, simulation, and clinical practice.

Main Discussion: Critical thinking development requires continuity across learning environments, with shared responsibility among nursing educators, simulation facilitators, clinical preceptors, and healthcare organizations. Classroom learning should establish conceptual foundations and make reasoning processes explicit; simulation should provide a psychologically safe environment for students to test, question, and revise clinical decisions; and clinical practice should facilitate supervised application and refinement of reasoning in authentic patient-care situations. Explicit instruction, complex clinical cases, structured debriefing, reflective supervision, psychological safety, and authentic assessment can support this longitudinal process. Assessment should examine not only whether students reach the correct decision but also how they recognize clinical cues, examine assumptions, consider alternatives, justify actions, and evaluate patient responses.

Conclusion: Critical thinking is best understood as a longitudinal competency that develops through interconnected educational experiences rather than as an individual student attribute. A coherent educational ecosystem linking classroom education, simulation, and clinical practice, with shared responsibility across these settings, may better support the development and transfer of clinical reasoning. This approach can prepare nursing graduates who can explain not only what to do, but also why, when, and under what circumstances an action represents the safest, most ethical, and patient-centred decision.

Keywords:

Critical Thinking; Nursing Students; Nursing Education; Simulation-Based Learning; Clinical Practice; Clinical Reasoning

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Introduction

The complexity of healthcare delivery is characterized by diverse patient conditions, technological advancement, clinical uncertainty, demands for rapid decision-making, and These conditions make critical thinking

an essential competency for nurses, enabling them to analyze information, compare alternatives, anticipate consequences, and make safe, patient-centered decisions (Reggoug et al., 2024; Sanyal et al., 2025). This competency has become increasingly important because clinical judgment may be influenced by cognitive biases, limitations in diagnostic tools, and overreliance on technology (Sanyal et al., 2025). Technology should support, rather than replace, professional judgment that accounts for each patient's individual context. Nurses must also be able to interpret vital signs and recognize subtle changes in behavior, consciousness, or mental status that may indicate early clinical deterioration (Alhaddad et al., 2024). This process involves recognizing clinical cues, prioritizing hypotheses, selecting appropriate actions, and evaluating patient responses (Saharuddin et al., 2025). Although experience-based intuition can be valuable in emergencies, decisions still require critical evaluation to prevent them from being dominated by assumptions or biases. Critical thinking therefore provides the foundation for reasoned and accountable clinical decision-making and supports the delivery of high-quality care (Koohkan, 2025; Kose Tosunoz, 2022).

This urgency positions critical thinking as a core competency in nursing education. It underpins assessment, data interpretation, nursing diagnosis formulation, priority setting, intervention selection, and the evaluation of care outcomes. Critical thinking also supports therapeutic communication, ethical deliberation, and patient-safety-oriented decision-making (Zarzycka & Gesek, 2022). Its

development should therefore be established as a longitudinal learning outcome that is explicitly cultivated across classroom instruction, laboratory learning, simulation, and clinical practice. However, a study involving Indonesian undergraduate nursing students found no significant differences in the four dimensions of critical thinking among students in the third, fifth, and seventh semesters, despite a tendency toward higher intellectual and cognitive scores among students in the later semesters (Adelia, et al., 2026). This finding suggests that academic progression does not necessarily result in measurable development in critical thinking.

A similar pattern was identified among students enrolled in diploma, undergraduate nursing, and professional nursing programs. Educational program was not significantly associated with critical thinking categories, and no significant differences were found across the four dimensions, with effect sizes being very small (Adelia, et al., 2026). Another study reported that nursing students generally demonstrated a moderate level of critical thinking. Gender, educational program, academic year, and semester were associated with critical thinking categories, whereas age was not significantly associated with critical thinking (Adelia, et al., 2026). A more recent study also found that the moderate category was predominant. The distribution of critical thinking categories differed by gender; however, none of the dimensional scores differed significantly between male and female students (Adelia, et al., 2026). The divergence between category-based and dimension-level findings indicates that critical thinking is multidimensional and

that the results may be influenced by the measurement and analytical approaches employed.

These findings indicate that the development of critical thinking cannot be explained solely by academic progression or student characteristics. Sociodemographic factors and social relationships may contribute to this development, but their influence should not be interpreted deterministically (Basco-Prado et al., 2024). The quality of the learning environment, instructor support, and opportunities to practice and reflect on reasoning may play a more direct role in developing this competency (Sabetsarvestani, 2025). An adaptive and psychologically safe learning environment enables students to express uncertainty, challenge assumptions, learn from mistakes, and articulate the rationale underlying their decisions. Therefore, designating critical thinking as a curriculum outcome is insufficient unless students are provided with learning experiences that enable them to develop and demonstrate this competency in practice.

This need becomes increasingly evident in the persistent gap between conceptual knowledge and its application in clinical practice. Students may be able to explain diseases, the nursing process, and principles of intervention, yet remain unable to apply this knowledge when confronted with incomplete information, rapidly changing conditions, and competing priorities. Teaching that relies excessively on lectures and content mastery may restrict students' opportunities to analyze problems and apply knowledge contextually (Jaypee, 2025). Inconsistencies between

procedures taught in educational institutions and actual hospital practices may also create confusion (Odetola et al., 2018). Limited availability of clinical instructors, facilities, supervision, and feedback further widens the theory-practice gap (Khan, 2025). These conditions may increase anxiety and undermine students' self-confidence (Odetola et al., 2018). If left unaddressed, difficulties in translating knowledge into action may compromise decision accuracy, quality of care, and patient safety (Zeb et al., 2025).

This gap demonstrates that developing critical thinking is not solely the responsibility of individual students; it is also shaped by the alignment of curricula, instructional strategies, simulation, clinical supervision, and organizational culture. Approaches centered on memorization, answer reproduction, and procedural compliance may produce students who can follow checklists without understanding the reasoning underlying their actions. In contrast, concept mapping, case-based learning, and simulation can train students to connect data, recognize cues, prioritize hypotheses, and evaluate the potential consequences of their decisions (Zarzycka & Gesek, 2022). These strategies should be complemented by debriefing and reflective feedback that focus on the reasoning process. Ethical considerations must also be integrated to ensure that decisions respect patients' rights, values, preferences, and best interests (Manfred, 2020). The effectiveness of these approaches depends on educational continuity, facilitation quality, effective communication, and organizational support (Alshammari et al., 2024; Areej

Mohammed Alhaddad et al., 2024; Song, 2025)

The central argument of this perspective is that critical thinking develops longitudinally through the interaction of these learning environments. Classroom education provides the conceptual foundation for interpreting clinical information and understanding principles of reasoning. Simulation provides opportunities to apply these principles, test decisions, recognize errors, and revise reasoning within a psychologically safe environment. Clinical practice then extends this process into authentic patient-care situations through supervision, feedback, and reflection. These environments should not function as separate educational components; rather, they should form a continuous developmental pathway in which the reasoning processes introduced in the classroom are rehearsed in simulation and subsequently applied and refined in clinical practice.

Accordingly, this perspective repositions critical-thinking development as a shared responsibility among educational institutions, academic educators, simulation facilitators, clinical preceptors, and healthcare organizations. The responsibility is distributed across the educational continuum, with each setting contributing a distinct but connected function. Critical thinking should therefore be taught explicitly, practiced repeatedly, supported within authentic contexts, and assessed through the quality of students' reasoning rather than through correct answers alone. Assessment should examine how students recognize clinical cues, interpret information, generate and compare alternatives, justify decisions, consider ethical implications, and

evaluate patient responses. Such integration may reduce the theory-practice gap by creating continuity between knowing, reasoning, and acting. The proposed perspective is that critical thinking becomes more sustainable when classroom learning, simulation, and clinical practice jointly assume responsibility for its development rather than treating it as an individual student attribute.

Discussion

Critical Thinking as a Longitudinally Developed Competency

The development of critical thinking among nursing students should be conceptualized as an explicitly designed longitudinal process rather than as an automatic consequence of progression through semesters, educational levels, or clinical exposure. Evidence indicates that this development does not necessarily occur uniformly across all dimensions, particularly in students' ability to consider alternative perspectives and evaluate conflicting arguments (Jimenez et al., 2021). Consistent with this evidence, one study found no significant differences in the four dimensions of critical thinking across semesters, while another involving 493 diploma, undergraduate nursing, and professional nursing students similarly reported no significant differences and very small effect sizes (Adelia, et al., 2026; Adelia, et al., 2026). Given their cross-sectional designs, these findings do not demonstrate an absence of individual development. Rather, they suggest that the accumulation of knowledge and clinical experience alone may be insufficient when learning activities do not consistently cultivate analysis, reflection, evidence appraisal, and the

justification of clinical decisions. Nursing curricula should therefore establish a progressive competency trajectory characterized by increasing case complexity, learner autonomy, and expectations for reasoned argumentation, enabling students to advance beyond merely knowing that toward knowing how and why in clinical situations (Westerdahl et al., 2022).

The Theory-Practice Gap in Clinical Settings

The theory-practice gap does not merely indicate shortcomings among students; it also reflects a lack of alignment between academic curricula and the realities of healthcare delivery. Students may learn ideal procedures in classrooms or laboratories but encounter different practices in hospitals because of resource constraints, local policies, workloads, or established clinical routines. A qualitative study involving nursing students found that discrepancies between learned theory and observed practice caused confusion, diminished self-confidence, and hindered the application of knowledge (Tambunan, 2024). When confronted with such discrepancies, students often choose to conform to prevailing practices without discussing their scientific rationale or implications for patient safety. Although this response may facilitate short-term adaptation, it can reinforce passive compliance and impede the development of professional judgment. Discrepancies between theory and practice should therefore be used as opportunities for critical reflection, enabling students to distinguish contextually justified adaptations from practices that deviate from evidence or safety standards.

The quality of clinical learning is also determined by the availability of supervision, mentorship, and opportunities to participate in decision-making. Nursing workforce shortages may reduce the time available for student guidance and lead clinical preceptors to prioritize service delivery over educational activities. A systematic narrative review found that staffing shortages within clinical learning environments compromised the quality of supervision and mentorship while also affecting students' learning experiences and perceptions of the nursing profession (Oshodi & Sookhoo, 2025). Therefore, increasing clinical placement hours without ensuring adequate supervisory quality may not necessarily strengthen critical thinking. Clinical exposure becomes educationally meaningful only when students are given opportunities to interpret data, propose clinical decisions, respond to questions that challenge their reasoning, and evaluate the consequences of their actions collaboratively with their preceptors..

The Classroom as a Foundation for Reasoning, Not a Space for Knowledge Reproduction

Classroom learning should shift from reproducing predetermined answers toward exploring problems involving uncertainty, alternative courses of action, and clinical consequences. Problem-based learning positions students as active learners who identify problems, determine their learning needs, seek relevant evidence, and defend their decisions through discussion. This approach can support the development of critical thinking when the problems are authentic, facilitators are competent, and students

are actively engaged (Wei et al., 2024). Problem-based learning should therefore not be treated merely as a group discussion method but as a structured process through which students distinguish facts from assumptions, examine alternatives, appraise evidence, and revise conclusions.

Collaborative learning can also strengthen the dialogical dimension of critical thinking by requiring students to articulate their reasoning, evaluate their peers' perspectives, and construct shared decisions. Team-based learning has the potential to improve problem-solving and critical thinking skills, although its effectiveness depends substantially on instructional design and implementation consistency (Yeung et al., 2023). The use of active learning methods does not, in itself, guarantee the development of in-depth reasoning. Educators must formulate analytical questions, ensure individual accountability, and provide feedback on the quality of students' arguments. Without these components, problem-based and team-based learning may be reduced to a division of tasks that produces collective answers without meaningful critical reasoning..

Simulation as a Bridge Between Knowledge and Action

Simulation bridges classroom learning and clinical practice by recreating situations that resemble real-world healthcare delivery without exposing patients to direct risk. This approach can enhance nursing students' knowledge, professional skills, critical thinking, clinical judgment, communication, and decision-making abilities (Görücü et al., 2024; Lei et al., 2022). However,

simulation effectiveness is not primarily determined by the sophistication of the technology or mannequins employed. Its educational value lies in the capacity of scenarios to incorporate uncertainty, changes in patient condition, competing priorities, and repeated evaluation of decisions. Simulation should therefore be designed as a setting in which students' reasoning processes become visible, rather than merely as a means of assessing procedural accuracy.

Virtual simulation can broaden students' access to clinical situations that are uncommon or difficult to encounter in direct practice while supporting the development of clinical reasoning and performance (Sim et al., 2022). Nevertheless, technology should not be positioned as a stand-alone solution because its effectiveness is influenced by pedagogical design, educational context, faculty readiness, and resource availability (Stenseth et al., 2025). Nursing education institutions with limited facilities need not prioritize high-cost technologies, as low-technology simulations designed around authentic clinical situations can still provide meaningful learning experiences. The essential considerations are not the sophistication of the technology but the quality of the problem, the cognitive demands placed on students, opportunities for reflection, and the feedback they receive. Simulation should therefore provide a psychologically safe environment in which students can test assumptions, consider alternative courses of action, make mistakes, and refine their decisions before providing care to actual patients.

Debriefing as the Core of Reflective Learning

Simulation experiences do not automatically result in learning unless students are given opportunities to examine their reasoning processes retrospectively. Debriefing transforms experience into reflective learning by helping students identify clinical cues they recognized or overlooked, articulate the rationale underlying their decisions, evaluate the consequences of their actions, and formulate alternative approaches. Structured debriefing approaches, including Debriefing for Meaningful Learning and video-assisted debriefing, can enhance nursing students' learning experiences and critical thinking abilities (Niu et al., 2021). Thus, the pedagogical value of simulation lies not only in students' actions during the scenario but, more importantly, in the reflection that follows. Debriefing should not be limited to determining whether procedures were performed correctly or incorrectly; instead, it should be directed toward eliciting, examining, and refining the reasoning processes underlying students' decisions.

Learning Environment and Psychological Safety

Students can only make their reasoning processes visible when the learning environment provides sufficient safety to ask questions, express uncertainty, and acknowledge mistakes. Hierarchical or punitive environments may encourage students to conceal their doubts and follow instructions without evaluating the rationale underlying clinical decisions. A review of psychological safety in clinical supervision indicates that fear-free communication, mutually respectful relationships, preceptor

support, and critical reflection are essential components of clinical learning (Hardie et al., 2022). Research in health professions education also suggests that clear expectations, appropriate autonomy, positive relationships, and regular feedback promote psychological safety, whereas unanswered questions and role ambiguity increase cognitive load and discourage students from participating actively (McClintock et al., 2022). Psychological safety does not mean lowering standards or avoiding corrective feedback; rather, it ensures that mistakes and uncertainties can be discussed constructively before they compromise patient safety..

Authentic Assessment of Critical Thinking

Changes in instructional strategies should be accompanied by corresponding changes in assessment systems because students tend to direct their efforts toward the competencies that are formally evaluated. Multiple-choice examinations can assess knowledge and certain analytical processes but are less adequate for evaluating how students recognize clinical cues, establish priorities, and adapt their decisions as a patient's condition changes. A scoping review of clinical judgment assessment identified substantial variation in concepts, instruments, contexts, and measurement methods, highlighting the need for more consistent and multidimensional assessment approaches (Bussard et al., 2024). Critical thinking assessment should therefore combine validated instruments, case analyses, unfolding case studies, objective structured clinical examinations (OSCEs), clinical observation, concept mapping, and

written reflection. Across these methods, students should be required to identify the data they consider relevant, the hypotheses they formulate, the alternatives they consider, the rationale for their selected actions, and the indicators used to evaluate outcomes.

Assessment should also distinguish between answer accuracy and the quality of the underlying reasoning process. A student may select the correct answer through guessing or weak reasoning, whereas another may reach a suboptimal decision despite demonstrating an analytical process that can be further refined. When assessment focuses solely on the final outcome, educators lose the opportunity to identify where reasoning failures occur. Unfolding case studies are particularly relevant because information can be introduced progressively, requiring students to continuously update their interpretations and decisions. Quasi-experimental evidence indicates that this approach can improve nursing students' academic achievement, critical thinking, and self-confidence (Ma & Zhou, 2022). Nevertheless, findings from short-term intervention studies should be interpreted cautiously, as improvements observed immediately after an educational intervention do not necessarily demonstrate long-term retention or transfer to clinical practice.

Critical Thinking as a Shared Educational Responsibility

The available evidence supports the argument that critical thinking emerges from interactions among students, educators, curricula, simulation-based learning, clinical preceptors, and healthcare organizations. Educational institutions are responsible for

establishing a longitudinal trajectory for critical thinking development; educators must design questions and cases that require reasoned argumentation; simulation facilitators should construct meaningful scenarios and debriefing sessions; and clinical preceptors should provide students with opportunities to articulate their clinical judgments under safe and appropriate supervision. Collaboration between academic institutions and healthcare services is essential to align procedures, competency expectations, terminology, and assessment rubrics. Literature on critical thinking instruction indicates that variations in educators' conceptual understanding of critical thinking may result in inconsistent teaching practices (Westerdahl et al., 2022) Faculty and clinical preceptor capacity-building should therefore form part of an institution-wide strategy.

The preceding discussion supports a conceptual view of critical thinking as a longitudinal competency that develops through connected educational experiences rather than through isolated instructional activities. Classroom learning, simulation, debriefing, clinical practice, reflection, and assessment should therefore be understood as interdependent components of a continuous developmental process. Each environment contributes a distinct function, while feedback and assessment provide opportunities to identify gaps in reasoning and progressively refine students' clinical judgment. Figure 1 presents the proposed conceptual framework, illustrating how these interconnected components can function as a shared educational pathway for progressive critical-thinking development.

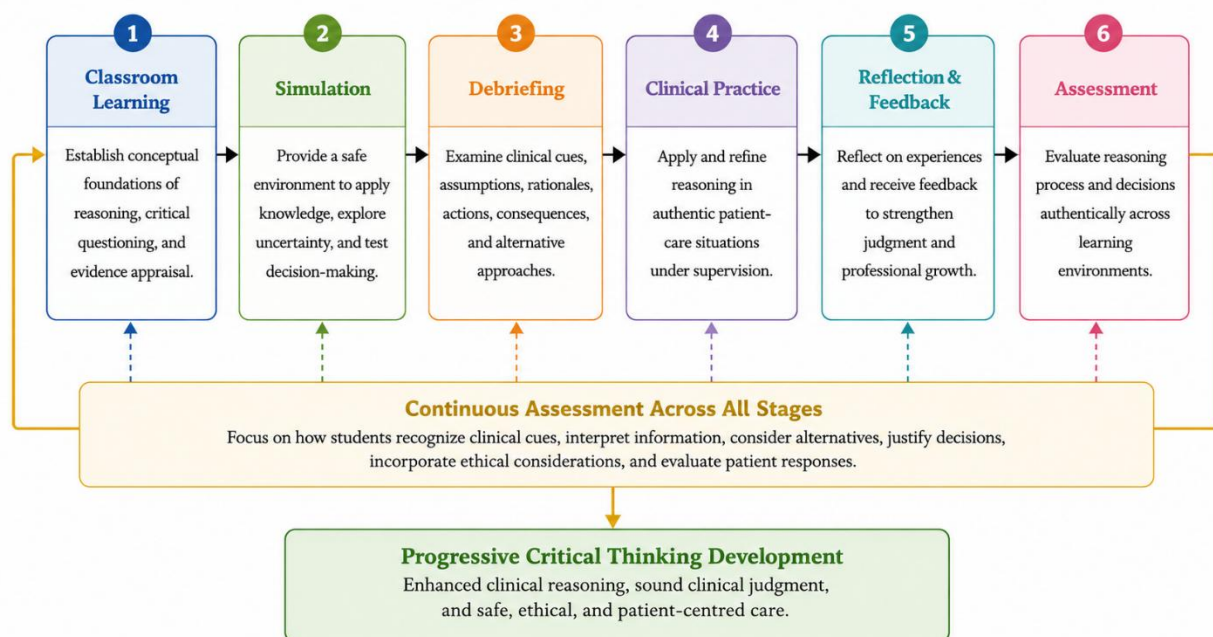


Figure 1. Conceptual Framework for Progressive Critical Thinking Development Across Nursing Education and Clinical Practice.

The framework illustrates a sequential yet iterative pathway linking classroom learning, simulation, debriefing, clinical practice, reflection and feedback, and assessment. Classroom learning establishes the conceptual foundations for reasoning, including critical questioning and evidence appraisal. Simulation provides a psychologically safe environment in which students can apply knowledge, manage uncertainty, and test clinical decisions without exposing patients to direct risk. Debriefing then facilitates examination of clinical cues, assumptions, decision rationales, consequences, and alternative approaches. Clinical practice extends these reasoning processes into authentic patient-care situations under appropriate supervision. Reflection and

feedback enable students to examine their experiences and refine clinical judgment. Assessment operates continuously across all stages, focusing not only on the accuracy of final decisions but also on how students recognize clinical cues, interpret information, consider alternatives, justify decisions, incorporate ethical considerations, and evaluate patient responses. The process culminates in progressive critical-thinking development, with the iterative pathway supporting the transfer of reasoning into sound clinical judgment and safe, ethical, and patient-centred care.

Research Implications

Implementing a shared-responsibility framework requires mapping critical

thinking outcomes across the entire educational program, integrating progressively complex cases, employing resource-appropriate simulation, providing reflective supervision, and consistently applying authentic assessment. However, much of the existing research is characterized by quasi-experimental designs, single-institution samples, short intervention periods, and self-report instruments. Conceptual heterogeneity across critical thinking, clinical reasoning, decision-making, and clinical judgment further complicates comparisons among studies (Bussard et al., 2024b; Stenseth et al., 2025). Future research should employ longitudinal, multicenter designs; evaluate the retention and transfer of competencies to clinical practice; and examine associations between educational interventions and indicators of clinical performance or patient safety. Research in low- and middle-income countries is also essential to ensure that proposed strategies are feasible in contexts characterized by technological limitations, high student-to-preceptor ratios, and hierarchical educational cultures.

Overall, classroom learning, simulation, and clinical practice perform distinct yet interdependent functions in critical thinking development. The classroom provides the concepts and language of reasoning, simulation offers a safe environment for testing decisions, and clinical practice introduces the authentic complexity required to develop professional judgment. These components are unlikely to produce optimal development when implemented in isolation or focused primarily on content coverage and procedural completion. Evidence

suggests that problem-based learning, team-based learning, simulation, and debriefing can enhance critical thinking or related competencies; however, their effectiveness is shaped by instructional design, facilitation quality, the learning environment, and assessment methods (Lei et al., 2022; Niu et al., 2021; Wei et al., 2024). Critical thinking should therefore be taught explicitly, practiced repeatedly, supported contextually, and assessed authentically as a shared responsibility across the nursing education ecosystem.

Challenges and Future Directions

The development of critical thinking among nursing students continues to face several challenges, including unclear conceptual boundaries among critical thinking, clinical reasoning, decision-making, and clinical judgment. Classroom instruction, simulation, and clinical practice are also frequently implemented in isolation, making it difficult for students to transfer knowledge to complex patient-care situations. Other barriers include the predominance of memorization- and procedure-oriented instruction, limited availability of clinical preceptors, high clinical workloads, inequitable access to simulation technologies, and learning environments that do not consistently promote psychological safety. Furthermore, assessments that rely heavily on written examinations or self-report questionnaires may not adequately capture the quality of students' reasoning under conditions of clinical uncertainty. The growing use of artificial intelligence adds further complexity: although it can support learning, its uncritical use may foster cognitive dependence, weaken

independent reasoning, and compromise academic integrity.

Future development should position critical thinking as a longitudinal competency that is consistently integrated across classroom learning, simulation, and clinical practice. Curricula should map the progressive complexity of reasoning expected at each stage of education and incorporate problem-based learning, unfolding cases, simulation, reflective debriefing, and psychologically safe clinical supervision. Assessment should be multimodal, combining case analysis, objective structured clinical examinations, clinical observation, written reflection, and explicit articulation of students' reasoning processes, rather than focusing solely on the accuracy of final answers. Technology and artificial intelligence should be used to challenge students to verify information, identify bias, and defend evidence-informed decisions—not to replace the reasoning process. Future research should employ longitudinal, multicenter, and cross-cultural designs to evaluate knowledge and skill retention, transfer of learning, clinical performance, and the effects of critical thinking competence on the quality and safety of patient care.

Implications for Nursing Practice

Developing critical thinking among nursing students has direct implications for practice readiness, quality of care, and patient safety. Students with well-developed critical thinking skills are better equipped to integrate assessment data, recognize early signs of clinical deterioration, establish priorities, consider alternative interventions, and continuously evaluate patient responses.

This competency also supports effective clinical communication, interprofessional collaboration, evidence-informed practice, and the confidence to voice concerns when potential safety risks are identified. Clinical placements should therefore provide students with opportunities to participate in decision-making appropriate to their level of competence, rather than limiting their involvement to routine tasks or passive adherence to instructions.

Clinical nurses and preceptors play a crucial role in making the reasoning process visible through case discussions, think-aloud strategies, reflective questioning, and feedback focused on the rationale underlying clinical actions. Healthcare organizations should also foster psychologically safe environments in which students can ask questions, express uncertainty, and report potential risks without fear of embarrassment or humiliation. Alignment between educational institutions and clinical placement settings is necessary to ensure consistency in standards, learning outcomes, supervision, and competency assessment. Strengthening critical thinking should therefore form an integral part of patient safety culture and professional development, enabling nursing graduates to provide responsive, evidence-informed, ethical, and patient-centered care

Conclusion

Critical thinking is a core competency that enables nursing students to translate theoretical knowledge into safe, evidence-informed, and patient-centered clinical decisions. However, this competency does not develop automatically through academic



progression or repeated clinical exposure. Its development requires explicit instruction, active engagement, sustained practice, reflective feedback, psychological safety, and authentic assessment. Fragmentation across classroom learning, simulation, and clinical practice may constrain students' ability to interpret complex information, manage uncertainty, and provide sound rationales for their clinical decisions.

Critical thinking development should therefore be regarded as a shared responsibility among nursing education institutions, academic educators, simulation facilitators, clinical preceptors, and healthcare organizations. Classroom learning should establish the conceptual foundations of reasoning, simulation should provide a safe environment in which students can test and refine decisions, and clinical practice should facilitate the application of reasoning in authentic patient-care situations. Integrating these three learning environments within a coherent and continuous educational pathway can produce nursing graduates who not only know what actions to perform but can also explain why, when, and under what circumstances those actions represent the safest and most appropriate clinical decisions.

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Author contribution

Gita contributed to the conceptualization, literature review, manuscript drafting, and development of the central arguments. Esperanza contributed to the literature review, critical analysis, and manuscript revision. Eka contributed to the conceptual refinement, scholarly review, and editing of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for its content

Conflict of interest

The authors declare that they have no conflicts of interest related to the authorship, research, or publication of this article

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