Simulation-Based Learning and Critical Thinking Skills as Predictors of Clinical Judgment among Nursing Students

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ABSTRACT

Simulation-based learning has become an essential instructional strategy in nursing education because of its potential to enhance students' critical thinking and clinical judgment. This study aimed to determine the relationship among simulation-based learning, critical thinking skills, and clinical judgment in nursing students and to explore their lived experiences with simulation-based learning. An explanatory sequential mixed-method design was employed. The quantitative phase involved 216 third- and fourth-year nursing students selected through stratified random sampling from a higher education institution in Ozamiz City. Data were collected using questionnaires on simulation-based learning, critical thinking skills, and clinical judgment. Descriptive statistics, the Spearman Rank Correlation Coefficient, and multiple linear regression were used to analyze the quantitative data. The qualitative phase involved seven purposively selected nursing students who participated in in-depth interviews. Qualitative data were analyzed using thematic analysis. Quantitative findings revealed that nursing students demonstrated high levels of simulation-based learning, critical thinking skills, and clinical judgment. Significant positive relationships were found between simulation-based learning and clinical judgment, and between critical thinking skills and clinical judgment. Furthermore, simulation-based learning and critical thinking skills significantly predicted clinical judgment among nursing students. Qualitative analysis generated four essential themes: **Simulation as a Realistic Bridge Between Theory and Practice; Development of Critical Thinking and Clinical Judgment Through Active Decision-Making; Emotional Transformation Toward Confidence and Professional Growth;** and **Reflective Learning Through Debriefing and Collaboration.** The essence of the lived experience revealed that simulation-based learning serves as a transformative educational process that bridges theory and practice while fostering critical thinking, clinical judgment, confidence, reflective learning, and professional growth. Simulation-based learning is a valuable pedagogical approach that enhances nursing students' preparedness for clinical practice. Nursing educators should enhance simulation-based learning through realistic clinical scenarios and structured debriefing to strengthen students' critical thinking skills and clinical judgment.

Keywords: simulation-based learning, critical thinking skills, clinical judgment, nursing students, mixed-method research, transcendental phenomenology

INTRODUCTION

Simulation-based learning has become an essential instructional strategy in nursing education, providing students with opportunities to apply theoretical knowledge in realistic clinical scenarios within a safe and controlled environment. Through simulation, nursing students are able to practice clinical skills, develop decision-making abilities, and enhance their clinical reasoning without compromising patient safety. Simulation-based learning includes various components such as scenario design, simulation fidelity, experiential engagement, and debriefing, all of which contribute to meaningful learning experiences among nursing students (Berragan & Jensen, 2020; Cheng et al., 2020; Lee & Hong, 2022).

In recent years, simulation-based learning has evolved with the integration of virtual simulation, mixed reality, and immersive technologies that further enhance student engagement and learning outcomes. These innovations allow students to experience complex patient scenarios and improve clinical reasoning, decision-making, and problem-solving skills (Guillen-Aguinaga et al., 2025; Chan et al., 2025; Koivisto et al., 2021). Studies have shown that simulation-based education improves student competence, confidence, and clinical performance, making it an important component of nursing education programs (Cant et al., 2021; Herron et al., 2020).

One of the most important outcomes of simulation-based learning is the development of critical thinking skills. Critical thinking is an essential competency in nursing practice because nurses are required to analyze patient information, interpret clinical data, prioritize nursing interventions, and evaluate patient outcomes. Critical thinking supports clinical reasoning and safe decision-making in patient care situations (Chan, 2022; Silva et al., 2023). Educational strategies such as experiential learning, reflective practice, and simulation activities have been shown to enhance critical thinking among nursing students (Tseng et al., 2022; Sterner et al., 2023).

Closely related to critical thinking is clinical judgment, which refers to the nurse's ability to notice patient cues, interpret clinical data, respond appropriately, and reflect on the effectiveness of interventions. Clinical judgment is considered one of the most important competencies in nursing practice because it directly affects patient safety and quality of care (Lasater et al., 2020; Ma & Chen, 2021). Simulation-based learning provides opportunities for students to develop clinical judgment through realistic patient scenarios, decision-making exercises, and reflective debriefing sessions (Jensen & Joyner, 2019; Shin et al., 2022).

Several studies have suggested that simulation-based learning contributes to the development of both critical thinking and clinical judgment among nursing students. Simulation activities encourage students to analyze situations, make clinical decisions, and reflect on their actions, which are essential processes in developing clinical reasoning and judgment (Loubbairi et al., 2025; Zhang et al., 2024). Furthermore, simulation-based learning environments promote metacognition and reflective thinking, which are important components in the development of higher-order thinking skills in nursing education (Alconero-Camarero et al., 2023).

Despite the growing body of literature on simulation-based learning and critical thinking in nursing education, a clear **theoretical and empirical integration gap** remains. Existing studies tend to examine simulation-based learning, critical thinking, self-regulation, and clinical judgment as separate constructs, often testing their effects in isolation rather than within an integrated explanatory framework. As a result, there is limited theoretical clarity on how these variables collectively and sequentially contribute to the development of clinical judgment, particularly across its dimensions such as noticing, interpreting, responding, and reflecting. While individual relationships have been established, the lack of a unified model limits a comprehensive understanding of how cognitive and experiential factors interact in shaping clinical judgment.

Therefore, this study aimed to examine the relationship between simulation-based learning, critical thinking skills, and clinical judgment among nursing students and explored students' experiences in simulation-based learning that contribute to the development of critical thinking skills and clinical judgment using a mixed-method research design. Specifically, this study sought to answer the following questions: (1) What is the level of simulation-based learning among nursing students in terms of scenario design and complexity, simulation fidelity, debriefing quality and experiential engagement; (2) What is the level of critical thinking skills among nursing students in terms of analysis, clinical decision-making and self-regulation; (3) What is the level of clinical judgment among nursing students in terms of noticing, interpreting, responding and reflecting; (4) Is there a significant relationship between simulation-based learning and clinical judgment among nursing students; (5) Is there a significant relationship between critical thinking skills and clinical judgment among nursing students;; (6) Which among the variables significantly predict clinical judgment among nursing students; (7) What is the lived experiences of the nursing students in their simulation-based learning?

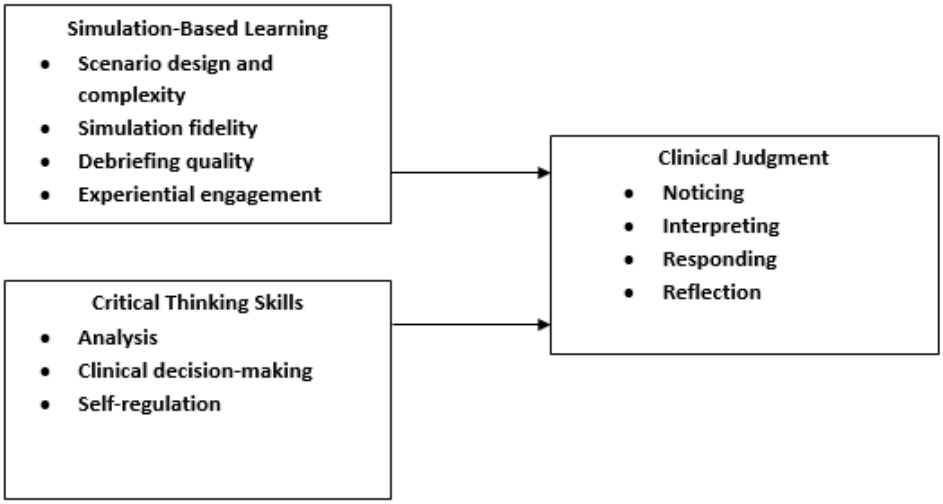

Figure 1. Conceptual Framework of the Study
Grounded on:
Kolb's Experiential Learning Theory (1984)
Benner's Novice to Expert Theory (1982)
Facione's Critical Thinking Theory (2015)
Tanner's Clinical Judgment Model (2006)

METHODS

Research Design. This mixed-method study employed an explanatory sequential design, starting with a quantitative phase to identify significant relationships, followed by a qualitative phase to explore the reasons behind these findings (Crewell, 2011). The qualitative phase provided a more profound insight into the simulation-based learning experiences of nursing students.

The quantitative part of the study examined the significant relationship between simulation-based learning, critical thinking, and clinical judgment among nursing students as well as how simulation-based learning and critical thinking skills predicted clinical judgment of nursing students. The qualitative phase further explored the lived experiences of nursing students in their simulation-based learning.

Setting. The study was conducted in one of the higher education institutions in Ozamiz City that offers a Bachelor of Science in Nursing program with an integrated clinical and simulation-based curriculum. The institution provided students with access to high-fidelity simulation laboratories, clinical skills laboratories, and affiliated healthcare facilities, ensuring exposure to a variety of patient care scenarios. These facilities allow students to practice and refine their clinical skills in a safe and controlled environment, which is essential for the assessment of clinical judgment.

The simulation laboratories were equipped with mannequins, task trainers, and virtual simulation tools that replicate real-life clinical situations. These resources provided opportunities for students to engage in structured, experiential learning and develop critical thinking and decision-making skills under the guidance of trained faculty.

Respondents. For the quantitative component, 216 nursing students from the third- to fourth-year levels were selected through stratified random sampling. The selection of the respondents consists of the following inclusion criteria: (1) were officially enrolled in the third or fourth year of the BSN program SY 2025-2026; (2) have participated in at least one structured simulation-based learning activity; and (3) voluntarily agreed to participate in the study. Students who were on academic leave or not currently enrolled during the data collection period, had not yet experienced simulation-based learning, or failed to provide complete responses to the research instruments, were excluded from the study. For the qualitative component, seven (7) nursing students were purposively selected to participate in in-depth interviews. Participants had prior exposure to simulation-based

learning activities and shared their experiences regarding the development of critical thinking skills and clinical judgment.

A priori power analysis was conducted using G*Power 3.1 to determine the minimum sample size required for multiple regression analysis. Assuming a medium effect size (f2 = 0.15), an alpha level of 0.05, statistical power of 0.80, and six predictor variables, the minimum required sample size was approximately 98 participants. Since the study included 216 nursing students, the sample size exceeded the minimum requirement, thereby providing adequate statistical power to detect significant relationships among the variables. Of the 280 eligible third- and fourth-year nursing students, 216 participated in the study, yielding a response rate of 77.1%.

Instruments. There were three researcher-made questionnaires used to collect data:

Simulation-based Learning Questionnaire. It assessed the level of simulation-based learning among nursing students in terms of scenario design and complexity, simulation fidelity, debriefing quality, and experiential engagement. Each construct consists of seven statements, which are rated using a four-point Likert scale ranging from "4 – Strongly Agree" to "1 – Strongly Disagree". The questionnaire underwent a pilot test to ensure reliability, with a Cronbach's alpha of 0.912.

Critical Thinking Skills Questionnaire. It measured the level of critical thinking skills among nursing students in terms of analysis, clinical decision-making, and self-regulation. Each construct consists of seven statements, which are rated using a four-point Likert scale ranging from "4 – Strongly Agree" to "1 – Strongly Disagree". The questionnaire underwent a pilot test to ensure reliability, yielding a Cronbach's alpha of 0.735.

Clinical Judgment Questionnaire. It determined the level of clinical judgment of nursing students in terms of noticing, interpreting, responding, and reflecting. Each construct consists of seven statements, which are rated using a four-point Likert scale ranging from "4 – Strongly Agree" to "1 – Strongly Disagree". The questionnaire underwent a pilot test to ensure reliability, with a Cronbach's alpha of 0.871.

Content validity of the instruments was established through expert evaluation by three nursing educators with expertise in simulation and nursing research. The scale-content validity index (S-CVI) exceeded 0.90, indicating excellent content validity.

Interview Guide. It was used to gather data on the lived experiences of nursing students in their simulation-based learning. It explored how these experiences shape the critical thinking skills and clinical judgment of nursing students.

Data Collection. After obtaining approval from the Research Ethics Committee, data collection was initiated to address the research objectives. The quantitative component involved an online survey via Google Forms, which included a consent form and three structured questionnaires: Simulation-based Learning Questionnaire, Critical Thinking Skills Questionnaire, and Clinical Judgment Questionnaire. The survey was distributed to 216 randomly selected nursing students using a stratified random sampling technique, ensuring equal representation by year level. Google Sheets were provided to students with responses recorded in Excel for statistical analysis.

For the qualitative component, the researchers purposively selected participants and conducted face-to-face interviews. Data saturation was achieved after the sixth interview, as no new themes or meanings emerged from the participant's narratives. One additional interview was conducted to confirm saturation, resulting in a total of seven participants. The interviews explored the students' lived experiences in simulation-based learning and how these experiences shape critical thinking skills and clinical judgment among nursing students.

Ethical Considerations. The researchers strictly adhered to ethical guidelines to protect participants' rights and confidentiality throughout data collection and analysis. Informed consent was obtained from all participants, with a clear explanation of the study's purpose, procedures, risks, and benefits. Survey responses and interview data were anonymized, securely stored in password-protected files, and accessible only to the research team. Participants retained the right to withdraw at any time without penalty.

Data storage was limited to password-protected devices and the institution's secured server, with cloud storage

used temporarily during the data collection and analysis. Sensitive files were encrypted, and after one year, all digital data was permanently deleted, and physical documents were shredded. Publications from the study anonymized participant information and complied with institutional and ethical standards to ensure privacy and data security.

Data Analysis. Quantitative data were analyzed using Jamovi statistical software. Descriptive statistics, including the weighted mean and standard deviation, were used to assess the levels of simulation-based learning, critical thinking skills, and clinical judgment among nursing students. To examine the relationships among the study variables, the Spearman Rank Correlation Coefficient (ρ) was utilized to assess the strength and direction of the associations between simulation-based learning and clinical judgment, as well as between critical thinking skills and clinical judgment. The Shapiro-Wilk test indicated that the data were not normally distributed; therefore, Spearman's rank-order correlation coefficient was employed. Furthermore, multiple linear regression analysis was performed to determine the predictive influence of simulation-based learning and critical thinking skills on clinical judgment and to identify the extent to which these variables accounted for variation in nursing students' clinical judgment. Statistical significance was established at the 0.05 level. Prior to regression analysis, assumptions of linearity, independence of errors, multicollinearity, homoscedasticity, and normality of residuals were examined and found to be satisfactory.

HyperResearch was used in the qualitative component to systematically organize, code, and retrieve interview data; however, the analysis was not conducted exclusively in the software. The qualitative data were analyzed following Moustaka's transcendental phenomenological approach. This included data familiarization through repeated reading of transcripts followed by horizonalization and initial coding of significant statements. These statements were clustered into meaning units and organized into emerging themes. The themes were then reviewed, refined, and defined to ensure consistency and accuracy in representing participants' lived experiences.

Trustworthiness of the Qualitative Findings

To ensure the rigor and trustworthiness of the qualitative findings, the study adhered to the criteria proposed by Lincoln and Guba (1985), namely credibility, dependability, confirmability, and transferability.

Credibility. Credibility was enhanced through prolonged engagement with the data, repeated reading of transcripts, and triangulation of quantitative and qualitative findings inherent in the explanatory sequential mixed-method design. Member checking was conducted with selected participants to verify whether the interpreted meanings and themes accurately reflected their experiences. Data saturation was achieved after the sixth interview, as no new themes emerged, and one additional interview was conducted to confirm saturation. Peer debriefing with experienced nursing researchers was also undertaken to review the coding process and thematic interpretations. Furthermore, verbatim quotations were incorporated to provide authentic representations of participants' lived experiences.

Dependability. Dependability was ensured by maintaining a clear and systematic audit trail throughout the research process. Detailed records were kept regarding participant recruitment, interview procedures, transcription, coding, theme development, and analytic decisions. The use of HyperResearch software facilitated the organization and retrieval of qualitative data, allowing for a transparent and consistent analysis process. The researchers also followed Moustakas' transcendental phenomenological approach to provide methodological consistency in analyzing participants' lived experiences.

Confirmability. Confirmability was established by ensuring that the findings were grounded in the participants' narratives rather than the researchers' personal assumptions or biases. Reflexive notes and analytic memos were maintained throughout the study to enhance self-awareness and minimize subjective influence during data interpretation. In addition, significant statements and verbatim quotations were retained to provide evidence linking the themes directly to participants' experiences, thereby enhancing the objectivity and neutrality of the findings.

Transferability. Transferability was enhanced through thick description of the research context, participant characteristics, and simulation-based learning experiences. Detailed descriptions of the study setting, participant selection, and thematic findings enable readers to determine the applicability of the findings to other nursing

education contexts. By providing rich descriptions and illustrative quotations, the study offers insights that may be relevant to nursing students and educators in similar academic and clinical settings.

RESULTS AND DISCUSSIONS

Level of Simulation-Based Learning among Nursing Students

Table 1 presents the level of simulation-based learning among nursing students across scenario design and complexity, simulation fidelity, debriefing quality, and experiential engagement. The findings revealed that the respondents demonstrated a **very high level of simulation-based learning in general (M = 3.40, SD = 0.30)**. This indicates that nursing students strongly perceived simulation-based learning as highly beneficial in enhancing their learning experiences. The low standard deviation suggests consistency in responses, indicating similar perceptions among the participants.

Simulation-based learning is widely recognized as an effective pedagogical approach in nursing education that strengthens clinical reasoning by providing realistic, experiential, and safe learning environments. Recent studies emphasize that simulation enhances students' clinical competence, confidence, and preparedness for real-world practice, particularly when combined with structured facilitation and reflective learning strategies (Cant et al., 2021; Shin et al., 2023). Furthermore, high-quality simulation experiences promote deeper integration of theory and practice, which is essential in developing competent and safe future nurses (Foronda et al., 2020).

In terms of specific indicators, **debriefing quality obtained the highest mean score (M = 3.46, SD = 0.287), interpreted as very high**, indicating that students highly value post-simulation reflection and feedback sessions. This aligns with recent evidence that structured debriefing significantly enhances clinical reasoning, self-awareness, and consolidation of learning in nursing education (Cheng et al., 2021; Eppich & Cheng, 2022). Similarly, **simulation fidelity reached a very high level (M = 3.42, SD = 0.263), suggesting that realistic and immersive simulation environments strongly contribute** to student engagement and learning outcomes, as supported by studies highlighting the importance of fidelity in improving clinical performance and confidence (Kim et al., 2022).

Meanwhile**, experiential engagement (M = 3.37, SD = 0.336)** and **scenario design and complexity (M = 3.36, SD = 0.283)** were also interpreted as **very high**, indicating that students were highly engaged in simulation activities and perceived scenarios as appropriately structured and challenging. Recent literature supports the view that active engagement and well-designed scenarios enhance the development of critical thinking and clinical judgment, especially when simulations progressively increase in complexity (Jeffries et al., 2021; Cant et al., 2021). These findings suggest that even foundational simulation components are effectively implemented in the program.

The findings suggest that simulation-based learning is highly effective at enhancing nursing students' learning experiences, particularly by promoting engagement, realism, and reflective practice. Pedagogically, educators should continue to strengthen simulation design by maintaining high-fidelity environments, increasing scenario complexity, and sustaining high-quality debriefing practices to maximize learning outcomes. In the clinical workplace, these strengths suggest that nursing students are better prepared for real-world practice, demonstrating improved confidence, readiness, and clinical reasoning skills that are essential for safe and competent patient care (Shin et al., 2023; Foronda et al., 2020).

Table 1 Level of Simulation-based Learning

Constructs	M	SD	Interpretation
Scenario Design and Complexity	3.36	0.28	Very High
Simulation Fidelity	3.42	0.26	Very High
Debriefing Quality	3.46	0.29	Very High
Experiential Engagement	3.37	0.34	Very High
Overall level of learning	3.40	0.29	Very High

Note: 3.26 – 4.00 Very High(VH), 1.76 – 2.50 Low (L), 2.51 – 3.25 High (H), 1.00 – 1.75Very Low (VL)

Level of Critical Thinking Skills among Nursing Students

Table 2 presents the levels of critical thinking skills among nursing students in the areas of analysis, clinical decision-making, and self-regulation. The findings revealed that the respondents demonstrated a **very high level of critical thinking skills in general (M = 3.42; SD = 0.32)**. This indicates that nursing students exhibit strong critical thinking abilities in both academic and clinical learning contexts. The low standard deviation suggests consistency in responses, indicating similar perceptions among participants. Nursing students exhibited a very high level of critical thinking in self-regulation (M = 3.46; SD = 0.275), indicating a strong ability to manage, monitor, and adjust their own learning and behavior. This was followed by **clinical decision-making (M = 3.41, SD = 0.299), which was also interpreted as very high, suggesting that students are capable of making appropriate clinical judgments in both** simulated and actual learning situations. These findings are supported by recent evidence showing that metacognitive regulation and decision-making skills are key predictors of effective clinical performance among nursing students (Fang et al., 2024; Jawabreh, 2024).

Meanwhile, the **analysis obtained a mean score of 3.39 (SD = 0.399), interpreted as very high,** indicating that students demonstrate good ability to examine, interpret, and evaluate clinical information, although this remains the most variable domain. The literature suggests that analytical skills develop more gradually than self-regulation and decision-making, as they require repeated exposure to complex clinical reasoning tasks (Cant et al., 2021; Shin et al., 2023). Overall, the findings suggest that nursing students possess strong critical thinking skills, particularly in self-regulation and clinical decision-making, with continued strengthening of analytical reasoning needed to achieve a more balanced cognitive profile.

Critical thinking is a core competency in nursing education that enables students to analyze clinical situations, make sound judgments, and regulate their learning and decision-making processes. Recent studies emphasize that critical thinking is strongly associated with clinical decision-making competence and safe patient care outcomes (Fang et al., 2024; Shin et al., 2023). Moreover, the literature highlights that structured learning experiences, such as simulation and case-based instruction, significantly enhance the development of higher-order thinking skills among nursing students (Cant et al., 2021). However, some studies also note that the development of critical thinking varies with exposure to complex clinical scenarios and guided reflection (Kim et al., 2022).

The findings have important implications for nursing education and clinical training. The very high levels of critical thinking skills demonstrated by nursing students suggest that current educational strategies are effective in fostering higher-order cognitive abilities essential for safe and competent nursing practice. The strong performance in self-regulation and clinical decision-making indicates that students are capable of reflective learning and sound clinical judgment, which are critical for managing complex patient situations. However, the relatively lower mean and greater variability observed in analytical skills highlight the need for educators to provide more opportunities for students to engage in complex problem-solving, case analysis, and simulation-based activities that challenge clinical reasoning. Strengthening analytical thinking through structured learning experiences and reflective debriefing may further enhance students' overall critical thinking competence and better prepare them for the demands of professional nursing practice.

Table 2 Level of Critical Thinking Skills

Constructs	M	SD	Interpretation
Analysis	3.39	0.40	Very High
Clinical Decision-Making	3.41	0.30	Very High
Self-Regulation	3.46	0.28	Very High
Overall Critical Thinking Skills	3.42	0.33	Very High

Note: 3.26 – 4.00 Very High (VH), 2.51 – 3.25 High (H), 1.76 – 2.50 Low (L), 1.00 – 1.75 Very Low (VL)

Level of Clinical Judgment among Nursing Students

Table 3 presents the level of clinical judgment among nursing students in terms of noticing, interpreting, responding, and reflecting. The findings revealed that the nursing students demonstrated a **very high level of**

clinical judgment (M = 3.26; SD = 0.25). This indicates that nursing students exhibit strong clinical judgment abilities in applying the phases of clinical reasoning in both academic and clinical learning contexts. The low standard deviation suggests consistent responses, indicating relatively similar perceptions among participants.

Nursing students exhibited a very high level of clinical judgment in terms of reflection (M = 3.43, SD = 0.209), indicating a strong ability to evaluate their clinical experiences and learn from them. This was followed by **responding (M = 3.42, SD = 0.341), also interpreted as very high**, suggesting that students are capable of taking appropriate and timely actions in clinical situations. These findings align with studies indicating that reflection and response are strengthened by simulation-based debriefing and guided clinical exposure, thereby promoting deeper learning and clinical reasoning (Lasater & Nielsen, 2021; Shin et al., 2023).

Both the constructs interpreting (M = 3.32; SD = 0.250) and noticing (M = 3.26; SD = 0.216) were interpreted as very high, although they represent the lowest among the four indicators. This suggests that while students are generally competent in recognizing and analyzing clinical cues, these foundational skills still require continued reinforcement to support more accurate clinical reasoning. The literature indicates that noticing and interpreting are often the most challenging early stages of clinical judgment development, requiring repeated exposure to patient scenarios and structured feedback (Tanner, 2020; Foronda et al., 2020). The findings imply that nursing students demonstrate strong clinical judgment skills, particularly in reflection and response, with continued development needed in early cue recognition and interpretation to further enhance clinical competence.

Clinical judgment is a fundamental competency in nursing practice that involves recognizing patient cues, interpreting relevant data, taking appropriate action, and reflecting on outcomes to improve future care. Recent literature emphasizes that clinical judgment is strongly influenced by experiential learning strategies such as simulation-based education, which enhances students' ability to think critically and respond effectively in dynamic clinical situations (Lasater & Nielsen, 2021; Tanner, 2020). Studies also highlight that repeated exposure to structured clinical experiences strengthens students' ability to integrate noticing, interpreting, responding, and reflecting into coherent decision-making processes (Foronda et al., 2020).

The findings have significant implications for nursing education and clinical training. The very high level of clinical judgment demonstrated by nursing students suggests that current teaching and learning strategies effectively support the development of essential clinical reasoning competencies. The strong performance in reflecting and responding indicates that students can evaluate their actions and implement appropriate interventions, which are critical to ensuring patient safety and quality care. However, the relatively lower scores in noticing and interpreting highlight the need for educators to further strengthen students' abilities in early cue recognition and data analysis. Incorporating more high-fidelity simulations, case-based learning activities, and structured debriefing sessions may enhance students' capacity to identify subtle clinical changes and accurately interpret patient information. Strengthening these foundational aspects of clinical judgment can contribute to more effective decision-making and better preparedness for the complexities of professional nursing practice.

Table 3 Level of Clinical Judgment

Constructs	M	SD	Interpretation
Noticing	3.26	0.22	Very High
Interpreting	3.32	0.25	Very High
Responding	3.42	0.34	Very High
Reflecting	3.43	0.21	Very High
Overall Clinical Judgment	3.36	0.26	Very High

Scale: 3.26 – 4.00 Very High (VH), 2.51 – 3.25 High (H),1.76 – 2.50 Low (L), 1.00 – 1.75 Very Low (VL)

Significant Relationship Between Simulation-Based Learning and Clinical Judgment among Nursing Students

Table 4 presents the significant relationship between the level of simulation-based learning and clinical judgment among nursing students. Simulation-based learning was measured through four constructs: scenario design and

complexity, simulation fidelity, debriefing quality, and experiential engagement. Clinical judgment was assessed across four dimensions: noticing, interpreting, responding, and reflecting. The table shows the Spearman Rank Correlation Coefficients (r) and corresponding p-values indicating the strength, direction, and significance of the relationships between the variables.

There are several significant positive relationships between simulation-based learning and clinical judgment dimensions. Scenario design and complexity were significantly associated with noticing (r = .211, p = .002), interpreting (r = .198, p = .003), and reflecting (r = .199, p = .003). Simulation fidelity was significantly related to noticing (r = .155, p = .022) and reflecting (r = .245, p < .001), while debriefing quality was significantly associated only with interpreting (r = .228, p < .001). Experiential engagement demonstrated significant relationships with interpreting (r = .185, p = .006) and reflecting (r = .272, p < .001), with the strongest correlation observed between experiential engagement and reflecting. No significant relationships were found between any simulation-based learning construct and the responding dimension of clinical judgment.

Simulation-based learning contributes to the development of nursing students' clinical judgment, particularly in noticing, interpreting, and reflecting. Although several correlations between simulation-based learning and clinical judgment were statistically significant, most correlation coefficients were weak (r < 0.30). These findings suggest that simulation-based learning contributes positively to clinical judgment but explains only a small proportion of the variance in specific clinical judgment dimensions. Consequently, other cognitive, experiential, and contextual factors may exert stronger influences on the development of clinical judgment among nursing students.

In the context of this study, the theoretical assumptions of Christine A. Tanner's Clinical Judgment Model posit that noticing, interpreting, responding, and reflecting are essential components of sound clinical decision-making. High-quality simulation experiences provide students with opportunities to recognize clinical cues, process information, and reflect, thereby strengthening clinical judgment. Recent studies have reported that simulation-based learning significantly improves nursing students' ability to recognize patient deterioration, interpret clinical data, and reflect on clinical performance. For instance, Hye-Kyung Son (2023) found that simulation-based learning enhances clinical reasoning and judgment by exposing students to realistic patient scenarios that require cue recognition and prioritization. Similarly, recent systematic reviews have shown that realistic simulation environments and structured debriefing sessions contribute significantly to students' reflective thinking, situational awareness, and clinical reasoning skills. The significant relationships observed in noticing, interpreting, and reflecting support growing evidence that simulation-based learning is an effective educational strategy for fostering higher-order cognitive processes necessary for safe and competent nursing practice.

Table 4 Significant Relationship between Level of Simulation-based Learning and Level of Clinical Judgment

Variables		Noticing	Interpreting	Responding	Reflecting
Scenario Design and Complexity	r_s	.211**	0.198**	0.024	0.199**
	p	0.002	0.003	0.730	0.003
Simulation Fidelity	r_s	0.155*	0.097	0.085	0.245***
	p	0.022	0.155	0.213	< 0.001
Debriefing Quality	r_s	-0.003	0.228***	0.046	0.120
	p	0.962	< 0.001	0.506	0.078
Experiential Engagement	r_s	0.127	0.185***	0.077	0.272***
	p	0.063	0.006	0.262	< 0.001

Note. * p < .05, ** p < .01, *** p < .001

Significant Relationship between Critical Thinking Skills and Clinical Judgment among Nursing Students

Table 5 presents the relationships between the dimensions of critical thinking skills and the domains of clinical judgment among nursing students. The findings revealed that only selected dimensions of critical thinking were significantly associated with specific phases of clinical judgment, indicating that the contribution of critical thinking to clinical judgment is selective and multidimensional.

A significant but weak negative relationship was found with interpreting ($r = –0.143$, $p = 0.035$), suggesting that higher analytical tendencies were associated with slightly lower scores on interpreting clinical cues. Although the magnitude of the correlation was small, this finding may indicate that interpretation requires not only analytical reasoning but also contextual understanding and intuitive pattern recognition developed through clinical experience. According to Tanner (2006), the interpreting phase involves making sense of clinical data by integrating theoretical knowledge with experiential understanding. Benner et al. (2010) similarly emphasized that clinical reasoning is not solely dependent on analytical processes but also on situated cognition and experiential learning. Thus, excessive reliance on analytical thinking alone may not necessarily translate into more effective interpretation of patient situations.

The weak negative association between analysis and interpreting may indicate that interpretation in clinical settings involves not only analytical reasoning but also intuitive pattern recognition, contextual understanding, and experiential knowledge. According to Benner et al. (2010), expert nurses frequently rely on tacit knowledge and situated cognition when interpreting patient situations. Thus, excessive reliance on analytical processes alone may not necessarily facilitate interpretation. It is possible that nursing students who focus heavily on analytical processing may experience cognitive overload or difficulty integrating contextual information. Future qualitative studies may further explore how intuitive and experiential forms of reasoning contribute to clinical judgment.

Analysis demonstrated a weak but significant positive relationship with reflecting ($r = 0.182$, $p = 0.007$). This finding suggests that students with stronger analytical abilities are more likely to engage in reflective evaluation of their clinical actions and outcomes. Reflection is considered a higher-order cognitive process that promotes self-awareness and continuous learning (Schön, 1983). Likewise, Facione (1990) identified analysis as one of the core components of critical thinking necessary for evaluating evidence and examining one's own reasoning processes. Hence, students with better analytical skills may possess greater capacity for reflective practice.

Among the dimensions of critical thinking, clinical decision-making exhibited the strongest association with clinical judgment. Specifically, a moderate positive relationship was observed between clinical decision-making and responding ($r = 0.303$, $p < 0.001$). This finding suggests that nursing students with stronger decision-making abilities are more likely to implement timely and appropriate nursing interventions. The result is congruent with Tanner's (2006) Clinical Judgment Model, which describes responding as the phase in which nurses determine and carry out suitable actions based on their interpretation of clinical situations. Similarly, Lasater (2007) emphasized that effective clinical judgment is manifested through appropriate responses to patient needs. Previous studies by Shin et al. (2015) and Kim and Kim (2014) also reported that decision-making competency significantly predicts clinical performance and judgment among nursing students. Therefore, the present findings highlight the importance of developing students' decision-making abilities to enhance their responsiveness in clinical settings.

Self-regulation was significantly associated with both interpreting ($r = 0.184$, $p = 0.007$) and reflecting ($r = 0.257$, $p < 0.001$). These findings indicate that students with higher levels of self-monitoring and metacognitive awareness tend to demonstrate greater competence in interpreting patient information and evaluating the effectiveness of their clinical decisions. The strongest relationship involving self-regulation was found with reflecting, highlighting the central role of metacognition in reflective practice. Facione (1990) identified self-regulation as a key dimension of critical thinking involving self-examination and self-correction. Furthermore, Kuiper and Pesut (2004) argued that metacognitive abilities enhance nurses' capacity for reflection and clinical reasoning. This finding is further supported by Nielsen et al. (2013), who reported that reflective thinking and self-regulation contribute significantly to the development of clinical judgment and professional competence among nursing students.

None of the dimensions of critical thinking showed a significant relationship with noticing. This finding suggests that the ability to recognize relevant clinical cues may depend more heavily on experiential learning, situational awareness, and pattern recognition rather than on cognitive skills alone. Tanner (2006) emphasized that noticing is influenced by the nurse's background, clinical experience, and expectations of the patient situation. Benner et al. (2010) similarly posited that expert nurses rely on experiential knowledge and intuitive grasp of clinical situations to identify salient cues. Thus, the absence of significant relationships between critical thinking dimensions and noticing in the present study may indicate that cue recognition develops primarily through

repeated exposure to clinical experiences rather than through cognitive abilities alone.

In the context of this study, Tanner's Clinical Judgment Model (2006) conceptualizes clinical judgment as a dynamic process involving noticing, interpreting, responding, and reflecting. The results suggest that different dimensions of critical thinking contribute to distinct phases of clinical judgment. Specifically, clinical decision-making appears to be most influential in facilitating appropriate responses, whereas self-regulation contributes more substantially to interpretation and reflection. Consequently, nursing education programs should emphasize pedagogical strategies such as simulation-based learning, case-based discussions, concept mapping, reflective journaling, and structured debriefing to strengthen students' decision-making and metacognitive abilities, thereby enhancing their clinical judgment and promoting safe and effective patient care.

Table 5 Significant Relationship between Critical Thinking Skills and Clinical Judgment among Nursing Students

Variables		Noticing	Interpreting	Responding	Reflecting
Analysis	r	0.059	-0.143*	0.042	0.182**
	p	0.385	0.035	0.540	0.007
Clinical Decision-Making	r	0.109	0.110	0.303***	0.064
	p	0.112	0.106	< 0.001	0.351
Self-Regulation	r	0.047	0.184**	0.078	0.257***
	p	0.487	0.007	0.251	< 0.001

Note. * p < .05, ** p < .01, *** p < .001

Predictors of Clinical Judgment among Nursing Students

Table 6 presents the multiple regression analysis examining the predictors of clinical judgment among nursing students. Three dimensions of simulation-based learning, such as scenario design and complexity, clinical decision-making, and self-regulation, were entered as independent variables, while clinical judgment serves as the dependent variable. The table shows the regression coefficients (β), standard errors, t-values, and p-values for each predictor. The overall regression model was statistically significant (F = 16.5; p-value < 0.001), with an adjusted R^2 of 0.265, indicating that approximately 26.5% of the variance in nursing students' clinical judgment was explained by the three predictor variables.

Scenario design and complexity, clinical decision-making, and self-regulation significantly influenced nursing students' clinical judgment. Self-regulation emerged as the strongest predictor (β = 0.1234; t = 3.92; p = < 0.001), followed closely by clinical decision-making (β = 0.1201; t =4.27; p = < 0.001), and scenario design and complexity (β = 0.1062; t = 3.5; p = < 0.001). The positive beta coefficients indicate that increases in these dimensions are associated with corresponding improvements in clinical judgment. These results suggest that nursing students who actively regulate their learning, effectively analyze clinical situations, and engage in well-designed and complex simulation scenarios tend to demonstrate higher levels of clinical judgment. Moreover, the significant F-value indicates that the combined influence of these variables meaningfully contributes to predicting clinical judgment. Although the regression model was statistically significant, the adjusted R^2 value of 0.265 indicates that simulation-based learning and critical thinking skills accounted for only 26.5% of the variance in clinical judgment. This finding suggests that additional factors not included in the model likely contribute substantially to clinical judgment development. Variables such as prior clinical experience, self-efficacy, motivation, emotional intelligence, academic achievement, and the quality of clinical placements may play important roles and should be examined in future studies.

These are supported by recent evidence highlighting the importance of simulation-based learning in fostering clinical judgment among nursing students. A study by Son (2023) found that simulation integrated with problem-based learning significantly enhanced nursing students' clinical reasoning. And judgment by exposing them to realistic patient scenarios that required critical analysis and decision-making. Similarly, Yang et al. (2024) reported that integrating virtual and face-to-face simulations significantly improved students' clinical judgment through repeated engagement with complex clinical situations. Recent evidence also underscores the role of self-

regulation in nursing education. A study by Karaca et al. (2025) found that self-regulated learning significantly predicted nursing students' confidence and effectiveness in clinical decision-making, underscoring the importance of learners' ability to monitor, evaluate, and adjust their learning processes. These studies support the present findings that scenario complexity, decision-making, and self-regulation are critical determinants of clinical judgment development among nursing students.

The findings underscore the need for nursing educators to design and implement simulation-based learning experiences that are realistic, challenging, and clinically relevant to further enhance students' clinical judgment competencies. Educational strategies should emphasize the development of clinical decision-making, critical thinking, and self-regulated learning through structured debriefing, reflective practice, and learner-centered instructional approaches. Strengthening these competencies can better equip nursing students to recognize and interpret clinical cues, make evidence-based decisions, and respond appropriately to complex patient situations. Fostering these essential skills may contribute to improved patient safety, higher-quality nursing care, and greater readiness for professional clinical practice.

Table 6 Predictors of Clinical Judgment among nursing students

Predictors	**Estimate (β)**	**SE Coef**		**t- value**	**p-value**
(Constant)	1.5841	0.1980		8.00	< 0.001
Scenario Design and Complexity	0.1062	0.0299		3.55	< 0.001
Clinical Decision-Making	0.1201	0.0281		4.27	< 0.001
Self-Regulation	0.1234	0.0315		3.92	< 0.001
Adjusted R^2 0.265					
F value 16.5					
p-value < 0.001					

Qualitative Findings: Lived Experiences of Nursing Students' Simulation-based Learning

The lived experiences of nursing students in simulation-based learning encompass their personal perceptions, emotions, reflections, and learning experiences during simulated clinical scenarios. These experiences are characterized by simulation serving as a bridge between theory and practice, fostering critical thinking and clinical judgment, facilitating emotional growth and confidence, and promoting reflective learning through debriefing and collaboration. Collectively, these experiences shape students' professional development and prepare them for safe, competent, and evidence-based nursing practice.

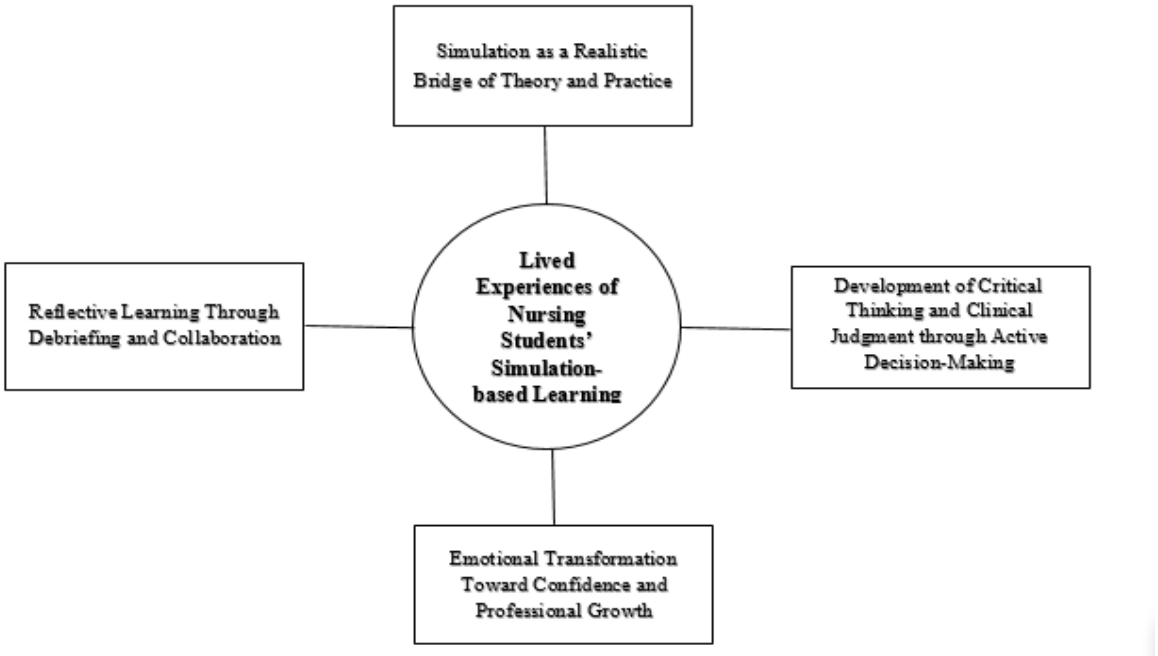

Figure 2. Schematic diagram of the Lived Experiences of Nursing Students' Simulation-based Learning

Simulation as a Realistic Bridge Between Theory and Practice

Simulation-based learning was experienced by nursing students as an authentic yet safe clinical environment where theoretical knowledge is translated into practical application. Participants consistently described simulation as a space that mimics real clinical situations, allowing them to practice nursing care without risk to actual patients. This theme reflects how simulation serves as a transitional bridge between classroom learning and real hospital exposure.

"When I hear the term simulation-based learning, I immediately think of a realistic learning environment where nursing students can practice patient care, make decisions, and apply what they have learned in the classroom without risking patient safety." (P1)

"For me, simulation-based learning is a teaching strategy that allows students to experience realistic clinical situations while developing the skills and confidence needed in nursing practice." (P2)

"One simulation experience that stands out in my memory involved caring for a patient who suddenly went into cardiac arrest… the realistic environment made us feel responsible for the patient's outcome." (P2)

The findings reveal that simulation functions as an experiential learning environment where students engage in situated clinical practice. This supports the work of Son et al. (2023), who found that simulation-based education enhances clinical reasoning by immersing students in real-life scenarios that promote decision-making and safe practice contexts. Similarly, Harry et al. (2025) emphasized that simulation bridges the gap between theoretical instruction and clinical application, strengthening students' readiness for practice.

"Simulation also helped me connect classroom learning with actual clinical situations. Concepts that once seemed theoretical became easier to understand when applied in realistic patient scenarios." (P1)

"Simulation also helped me understand how nursing theories and concepts are applied in real-life situations." (P2)

"Simulation improved my ability to connect theoretical concepts with patient care." (P5)

This finding aligns with recent literature indicating that simulation enhances knowledge integration and applied understanding. Sterner et al. (2023) emphasized that simulation strengthens cognitive connections between theory and practice by engaging learners in active problem-solving. Additionally, BMC Nursing studies (2025) highlight that simulation improves conceptual retention and clinical reasoning in undergraduate nursing students.

The findings of this study align with contemporary literature emphasizing simulation as an experiential bridge in nursing education. Simulation-based learning enhances cognitive integration by enabling students to transfer theoretical knowledge into clinical reasoning and nursing practice (Son et al., 2023). Consistent with Kolb's Experiential Learning Theory, simulation provides concrete experiences that facilitate reflective observation and knowledge construction. Recent studies have demonstrated that simulation significantly improves clinical competence by narrowing the gap between theory and practice (Harry et al., 2025). Likewise, Tanner's Clinical Judgment Model highlights the importance of experiential learning in developing students' ability to notice, interpret, and respond to clinical cues effectively. These findings suggest that simulation serves as a transformative learning environment that promotes meaningful knowledge application and clinical preparedness among nursing students.

Development of Critical Thinking and Clinical Judgment through Active Decision-Making

Participants described simulation as a cognitive training environment that strengthens analytical thinking, prioritization, and clinical reasoning. Through exposure to evolving patient conditions, students learned to interpret cues, analyze data, and make informed decisions under pressure.

"Simulation-based learning has greatly influenced my critical thinking skills. During simulations, I am required to assess patient information, identify priority problems, and determine appropriate interventions." (P1)

"Simulation has improved my critical thinking by teaching me how to prioritize patient problems." (P3)

"Simulation strengthened my critical thinking because it encouraged me to gather information, analyze patient conditions, and make evidence-based decisions." (P4)

These statements are consistent with Tanner's Clinical Judgment Model, which emphasizes noticing, interpreting, responding, and reflecting in clinical decision-making. Recent systematic reviews confirm that simulation significantly improves prioritization and analytical reasoning among nursing students (Harry et al., 2025).

"I noticed cues such as increased respiratory rate, decreased oxygen saturation, and signs of anxiety." (P1)

"I noticed changes in the patient's temperature, heart rate, blood pressure, and level of responsiveness." (P2)

The ability to recognize patient cues reflects the development of clinical reasoning competence. Studies indicate that simulation improves situational awareness and pattern recognition, which are essential components of clinical judgment (Yang et al., 2024). This supports the idea that simulation strengthens students' ability to detect early signs of deterioration and intervene appropriately.

"The pressure felt real." (P1)

"It was the first time I truly experienced the pressure of making quick decisions in a healthcare setting." (P2)

"The experience taught me to remain calm and think critically under pressure." (P5)

Simulation exposes students to cognitive stress similar to real clinical environments, which enhances their ability to perform under pressure. According to Son et al. (2023), high-fidelity simulation improves resilience and decision-making speed, preparing students for real-time clinical demands.

Emotional Transformation Toward Confidence and Professional Growth

This theme emerged as a significant aspect of nursing students' simulation-based learning experiences, reflecting a gradual psychological and professional evolution from feelings of anxiety, nervousness, and self-doubt toward increased confidence and competence. Students initially experienced fear of making mistakes, uncertainty in their clinical decisions, and pressure from being observed by instructors and peers, particularly during realistic and high-stakes simulation scenarios. However, through repeated exposure to simulation activities, opportunities to practice clinical skills, and constructive feedback during debriefing sessions, they developed greater confidence in their abilities to assess patient conditions, make informed decisions, and perform nursing responsibilities effectively. As their confidence grew, students also began to develop a stronger sense of professional identity, viewing themselves as capable future nurses who could manage clinical challenges, collaborate with healthcare teams, and provide safe patient care. Thus, simulation-based learning served not only as a means of acquiring knowledge and skills but also as a transformative experience that fostered emotional resilience, self-efficacy, and professional growth.

"I often felt nervous and anxious because I was afraid of making mistakes in front of my instructors and classmates." (P1)

"I often felt excited but also nervous because I was unsure whether I would perform well." (P2)

"One challenge was the fear of making mistakes in front of instructors and classmates." (P5)

These statements indicate that nursing students experienced anxiety and apprehension arising from concerns about their performance and the possibility of making mistakes in the presence of instructors and peers. The fear of being evaluated and judged created emotional pressure, contributing to feelings of nervousness, self-doubt,

and uncertainty during simulation activities. Despite these challenges, such experiences also highlighted students' awareness of professional expectations and their desire to perform competently, demonstrating the emotionally demanding nature of simulation-based learning.

"Over time, simulation-based learning significantly increased my confidence in making clinical decisions." (P1)

"As I gained more experience… I became more confident in assessing situations." (P2)

"My confidence in making clinical judgments increased through repeated exposure." (P4)

The participants' narratives indicate that repeated exposure to simulation-based learning fostered increased confidence in clinical decision-making and judgment. As students accumulated experience through successive simulation activities, they developed greater trust in their ability to assess situations, make appropriate nursing interventions, and respond effectively to patient needs. This suggests that simulation serves as a confidence-building mechanism that supports the transition from novice learner to a more competent and self-assured future nurse.

The emotional transformation observed in this study aligns with Bandura's Self-Efficacy Theory, which posits that mastery experiences are the strongest source of confidence development. Simulation provides repeated mastery experiences that enhance students' belief in their clinical abilities. Recent studies support that simulation-based learning significantly reduces anxiety while increasing self-confidence and clinical preparedness among nursing students (Harry et al., 2025). Similarly, Yang et al. (2024) found that repeated exposure to simulations improves emotional regulation and reduces performance-related stress.

From a phenomenological perspective, this emotional shift represents the lived transformation from "fearful novice" to "confident emerging practitioner," highlighting simulation as both a cognitive and emotional developmental process.

Reflective Learning Through Debriefing and Collaboration

Students described debriefing and teamwork as essential components of simulation-based learning that deepened understanding and improved clinical reasoning. Debriefing sessions allowed students to reflect on their actions, identify mistakes, and understand alternative approaches to patient care.

"The debriefing sessions following simulations were among the most valuable aspects of the experience." (P1)

"Debriefing sessions helped me recognize my mistakes and identify strategies for improvement." (P3)

"The debriefing process was valuable because it encouraged self-reflection." (P5)

The participants' narratives indicate that debriefing functioned as a vital reflective learning process that facilitated self-evaluation, awareness of clinical performance, and professional growth. Through guided reflection and feedback, students were able to identify errors, understand the rationale behind their actions, and develop strategies to improve future clinical performance. These experiences suggest that debriefing enhances learning by transforming simulation experiences into meaningful insights that strengthen critical thinking, clinical judgment, and self-reflection.

"Working with classmates during simulations taught me the value of collaboration and effective communication." (P1)

"I learned how to respond to emergencies, communicate with patients, and work effectively with other healthcare team members." (P2)

"The scenario required quick thinking and teamwork." (P4)

These statements indicate that simulation-based learning facilitated the development of teamwork and communication competencies among nursing students. Through collaborative engagement in realistic clinical scenarios, students learned the importance of effective communication, coordinated decision-making, and shared responsibility in patient care. These experiences contributed to their understanding of teamwork as a fundamental component of safe, high-quality nursing practice and enhanced their preparedness to work within interdisciplinary healthcare environments.

These findings strongly support Kolb's Experiential Learning Theory, which emphasizes that learning occurs through a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. Debriefing represents the reflective observation phase that consolidates learning. Recent literature confirms that structured debriefing significantly enhances clinical reasoning, knowledge retention, and self-assessment in nursing education (Sterner et al., 2023). Additionally, simulation-based teamwork improves communication, leadership, and interprofessional collaboration skills (Son et al., 2023). From a phenomenological standpoint, debriefing transforms simulation from a mere activity into a meaningful learning experience, while collaboration shapes students' understanding of nursing as a relational and team-based profession.

IMPLICATIONS

The findings of this study suggest that simulation-based learning should be continually strengthened and integrated across nursing curricula as a vital pedagogical approach to developing competent, confident, and clinically prepared nursing students. The identified themes demonstrate that simulation serves not only as a bridge between theory and practice but also as a catalyst for developing critical thinking, clinical judgment, emotional resilience, and reflective practice. Nursing educators should therefore design simulation experiences that incorporate realistic clinical scenarios, active decision-making opportunities, structured debriefing sessions, and collaborative learning activities to maximize student learning outcomes. Furthermore, educational institutions should invest in high-quality simulation resources, faculty training, and supportive learning environments that allow students to safely make mistakes, reflect on their experiences, and build professional confidence. Fostering these experiential learning opportunities may help prepare future nurses who are better equipped to deliver safe, effective, and patient-centered care in increasingly complex healthcare settings.

Essence of Lived Experience of Nursing Students

Simulation-based learning is experienced by nursing students as a transformative and meaningful educational journey that bridges the gap between theoretical knowledge and real-world nursing practice. Through realistic clinical scenarios, active engagement in decision-making, emotional challenges, and reflective learning opportunities, students develop critical thinking, clinical judgment, confidence, and professional competence. These experiences enable them to integrate knowledge with practice, learn from mistakes in a safe environment, and gain deeper insights into their roles as future healthcare professionals. Simulation-based learning fosters a gradual transformation from uncertain and apprehensive learners into confident, reflective, and practice-ready nurses equipped to provide safe and effective patient care.

LIMITATIONS OF THE STUDY

This study has several limitations. First, the study was conducted in a single higher education institution, which may limit the generalizability of the findings to other nursing programs and educational settings. Second, the use of self-report questionnaires may have introduced response bias and social desirability bias. Third, the cross-sectional nature of the quantitative phase precludes causal inferences regarding the relationships among simulation-based learning, critical thinking skills, and clinical judgment. Although the regression model was statistically significant, it explained only 26.5% of the variance in clinical judgment, suggesting that other factors not examined in this study may contribute to the development of clinical judgment. Finally, the qualitative findings were based on a small number of participants and may not represent the experiences of all nursing students. Despite these limitations, the mixed-method design provided a comprehensive understanding of how simulation-based learning contributes to critical thinking and clinical judgment among nursing students.

CONCLUSIONS

Simulation-based learning represents a transformative educational strategy that enhances nursing students' critical thinking and clinical judgment by providing realistic, reflective and experiential learning opportunities. The findings demonstrate that scenario design and complexity, clinical decision-making and self-regulation are significant contributors to clinical judgment, highlighting the importance of metacognitive and experiential processes in nursing education. Although the predictive model accounted for only a modest proportion of the variance in clinical judgment, the integration of quantitative and qualitative findings underscores the value of simulation as a bridge between theory and practice. These results support the continued use and refinement of simulation-based pedagogy to prepare nursing students for safe, competent, and evidence-based clinical practice.

RECOMMENDATIONS

Based on the study's findings, nursing educators are encouraged to continually strengthen simulation-based learning by providing realistic, engaging, and immersive experiences that promote reflective learning and clinical reasoning among nursing students. In line with this, nursing programs may further enhance the quality and consistency of high-fidelity simulations to improve students' clinical judgment skills, particularly in noticing, interpreting, and reflecting. Faculty members are also encouraged to integrate more critical thinking activities, such as case analysis, problem-based learning, and guided reflection exercises, to further develop students' analytical and reasoning abilities. Since clinical decision-making and self-regulation emerged as significant predictors of clinical judgment, educators should place greater emphasis on strategies that enhance these competencies, including reflective journaling, self-assessment, and metacognitive learning approaches. Furthermore, clinical instructors should provide students with more opportunities for hands-on clinical exposure and repeated practice to strengthen their responding skills and improve the application of clinical judgment in real-life patient care situations. Nursing schools may likewise adopt structured and theory-based debriefing approaches to maximize the benefits of simulation activities and encourage deeper reflective thinking. Lastly, future researchers are encouraged to conduct similar studies involving larger populations, varied nursing institutions, and additional variables to further explore factors influencing clinical judgment.

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APPENDIX

Appendix A – Research Questionnaire

A. SIMULATION-BASED LEARNING QUESTIONNAIRE

Directions: The statements below describe the simulation-based learning. Please indicate the level of your agreement to each statement by putting a check mark (/) in the column corresponding to your answer. Be guided by the following scale: 4-Strongly Agree (SA); 3-Agree (A); 2-Disagree (D); and 1-Strongly Disagree (SD).

Indicators	Responses			
	SA (4)	A (3)	D (2)	SD (1)
Scenario Design and Complexity				
1. The simulation scenarios I participate in clearly reflect real clinical situations.				
2. The objectives of each scenario are easy to understand and guide my actions during the activity.				
3. The scenarios provide an appropriate level of complexity that challenges my decision-making skills.				
4. I can identify the clinical priorities required to successfully manage the scenario.				
5. The scenario design helps me apply theoretical knowledge to practical situations.				
6. The tasks and conditions in the simulation unfold realistically as the case progresses.				
7. The simulation scenarios require me to analyze patient cues and make timely clinical judgments.				
Simulation Fidelity	SA (4)	A (3)	D (2)	SD (1)
1. The simulation environment closely resembles an actual clinical setting.				
2. The manikins, equipment, and materials used in simulation support realistic patient care.				
3. The physiological responses of the simulated patient reflect real-life conditions.				
4. The cues provided during the simulation feel authentic and consistent with real clinical practice.				
5. The simulation makes me feel immersed in the experience as if I were in a real clinical environment.				
6. The level of realism motivates me to perform procedures safely and accurately.				
7. The fidelity of the simulation enhances my confidence in performing clinical tasks.				
Debriefing Quality	SA (4)	A (3)	D (2)	SD (1)
1. The debriefing session allows me to reflect deeply on my performance.				
2. My instructor facilitates debriefing in a respectful and supportive manner.				
3. The feedback given during debriefing helps me identify my strengths in clinical judgment.				
4. Debriefing discussions help me recognize errors and understand how to correct them.				

5. I feel comfortable expressing my thoughts and experiences during debriefing.				
6. The debriefing helps me connect the simulation experience to real-world clinical practice.				
7. The debriefing process enhances my understanding of evidence-based decision-making.				
Experiential Engagement	SA (4)	A (3)	D (2)	SD (1)
1. I actively participate and stay focused throughout the entire simulation activity.				
2. The simulation encourages me to think critically and engage with clinical cues.				
3. I feel emotionally and cognitively involved during the simulation experience.				
4. The hands-on nature of the activity increases my motivation to learn.				
5. I take initiative and make independent decisions during simulation.				
6. I collaborate effectively with peers as part of the simulated healthcare team.				
7. The simulation experience makes learning more meaningful and memorable for me.				

B. CRITICAL THINKING SKILLS QUESTIONNAIRE

Directions: The statements below describe the critical thinking skills. Please indicate the level of your agreement to each statement by putting a check mark (/) in the column corresponding to your answer. Be guided by the following scale: 4-Strongly Agree (SA); 3-Agree (A); 2-Disagree (D); and 1-Strongly Disagree (SD).

Indicators	Responses			
	SA (4)	A (3)	D (2)	SD (1)
Analysis				
1. I carefully examine patient cues before making any clinical judgment.				
2. I can identify relevant and irrelevant information in a patient situation.				
3. I compare clinical findings to expected normal values to guide my decisions.				
4. I am able to break down complex patient problems into smaller, understandable components.				
5. I seek to understand the underlying cause of a patient's condition rather than focusing only on symptoms.				
6. I validate information from different sources before drawing conclusions.				
7. I use evidence and facts to support my interpretation of patient data.				
Clinical Decision-Making	SA (4)	A (3)	D (2)	SD (1)
1. I can prioritize nursing actions based on the patient's most urgent needs.				
2. I am able to choose appropriate interventions after evaluating patient information.				
3. I can make sound decisions even when faced with incomplete or rapidly changing data.				
4. I consider multiple possible solutions before choosing the best course of action.				
5. I base my clinical decisions on both evidence and the patient's unique circumstances.				

6. I feel confident making decisions during high-pressure or time-sensitive situations.				
7. I evaluate the potential consequences of my decisions before taking action.				
Self-Regulation	SA (4)	A (3)	D (2)	SD (1)
1. I regularly reflect on my clinical performance to identify areas for improvement.				
2. I recognize when I need additional information or clarification to make a good clinical judgment.				
3. I monitor my own biases or assumptions that may affect my decisions.				
4. I actively seek feedback from instructors or peers to improve my thinking processes.				
5. I adjust my strategies when I realize that my initial approach is not effective.				
6. I stay calm and composed when managing challenging clinical situations.				
7. I make conscious efforts to evaluate my reasoning after completing a patient care activity.				

C. CLINICAL JUDGMENT QUESTIONNAIRE

Directions: The statements below describe the clinical judgment. Please indicate the level of your agreement to each statement by putting a check mark (/) in the column corresponding to your answer. Be guided by the following scale: 4-Strongly Agree (SA); 3-Agree (A); 2-Disagree (D); and 1-Strongly Disagree (SD).

Indicators	Responses			
	SA (4)	A (3)	D (2)	SD (1)
Noticing				
1. I am able to recognize important changes in a patient's condition early.				
2. I notice subtle cues that may indicate potential complications.				
3. I quickly identify deviations from normal assessment findings.				
4. I pay close attention to patient behaviors and symptoms during assessment.				
5. I can differentiate between urgent and non-urgent patient needs.				
6. I actively scan the clinical environment for factors that may affect patient safety.				
7. I identify priority problems shortly after beginning patient assessment.				
Interpreting	SA (4)	A (3)	D (2)	SD (1)
1. I make sense of the patient cues by connecting them to relevant clinical information.				
2. I can explain the possible causes of a patient's condition based on the assessment findings.				
3. I consider multiple possible interpretations before making a clinical judgment.				
4. I can identify relationships between different patient cues to form a clearer picture.				
5. I evaluate whether my initial interpretation needs to change as new data emerge.				
6. I use clinical guidelines or evidence to support my interpretation of the situation.				

7. I feel confident analyzing patient information even when the scenario is complex.				
Responding	SA (4)	A (3)	D (2)	SD (1)
1. I choose nursing interventions that best address the patient's current needs.				
2. I respond promptly to changes in the patient's condition.				
3. I tailor my actions based on the patient's individual circumstances.				
4. I communicate effectively with the healthcare team when implementing care.				
5. I can modify my interventions when the patient does not respond as expected.				
6. I prioritize actions to ensure patient safety and optimal outcomes.				
7. I demonstrate confidence when performing interventions during simulation or clinical practice.				
Reflecting	SA (4)	A (3)	D (2)	SD (1)
1. I review my actions after patient care to determine whether they were effective.				
2. I learn from my mistakes and use them to improve future clinical performance.				
3. I assess whether my clinical judgment was accurate based on the outcomes.				
4. I reflect on the reasoning behind the decisions I made during patient care.				
5. I ask myself what I could have done differently to improve the situation.				
6. I evaluate how my emotions or biases may have influenced my clinical decisions.				
7. I use self-reflection to continuously improve my clinical judgment skills.				