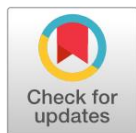


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## Professional Relationship Development Through Nursing Care Delivery System Training in Nursing Education

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### ABSTRACT

**Background.** However, a significant "theory-practice gap" persists, where nursing students often struggle to apply relational skills in complex clinical environments, potentially leading to medical errors and suboptimal care.

**Purpose.** This study aims to evaluate the effectiveness of Nursing Care Delivery System (NCDS) training in enhancing these professional relationships among nursing students.

**Method.** A quantitative approach with a quasi-experimental one-group pretest-posttest design was conducted on 60 nursing students selected via total sampling.

**Results.** The findings revealed a statistically significant improvement in relational scores ( $t = -7.010$ ,  $p = 0.000$ ) with an average increase of 19.63% (N-Gain = 0.1964). Despite this positive shift, the results suggest that the training's impact was not yet uniform across all participants.

**Conclusion.** This study's novelty lies in transforming the NCDS model from a technical task management tool into a holistic relational framework that integrates social dynamics and clinical roles.

### KEYWORDS

Clinical Pedagogy, Interpersonal Collaboration, Professional Relationship

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### INTRODUCTION

The development of professional relationships in nursing education has long been understood as a key foundation for creating quality healthcare services. Professional relationships reflect not only interpersonal communication skills but also aspects of empathy, trust, collaboration, and ethics in interactions between healthcare workers, patients, and multidisciplinary teams (Shubayr, 2025). Field experience demonstrates that the quality of professional relationships among nurses is often directly proportional to patient satisfaction, the effectiveness of care, and the safety of healthcare services (Fernández-Araque, 2024).



In recent years, the trend of global nursing research has begun to shift from simply mastering technical clinical skills to the development of relational competencies and interpersonal intelligence as the main pillars of patient safety. However, the current literature still shows a theoretical gap on how nursing management models such as the Nursing Care Delivery System (NCDS) can be adapted into pedagogical instruments to strengthen students' professional relationships in increasingly complex clinical environments. This research is academically important to enrich the theory of symbolic interaction in nursing education and practically provides concrete strategies for educational institutions to minimize barriers to collaboration in hospitals. Therefore, this study aims to in depth analyze the influence of NCDS training on specific dimensions of professional relationships, including interdisciplinary communication, team trust, and student relational self-efficacy, in order to provide a clear direction for the development of a team-based curriculum.

The context of nursing education positions students as future practitioners who must be equipped not only with clinical skills but also with the ability to build adaptive and responsive professional relationships. Modern nursing curricula have integrated various practice-based learning approaches, simulations, and clinical experiences to strengthen these competencies (Farfán-Zúñiga, 2024). However, gaps between classroom theory and real-world practice are still common, particularly in therapeutic communication and team coordination (Eminoğlu, 2024).

Hildegard Peplau's interpersonal relationship theory emphasizes that the interaction between nurses and patients is the core of nursing practice. This model emphasizes the stages of orientation, identification, exploitation, and resolution as a dynamic process in building a therapeutic relationship (Al-Hammouri, 2024). This perspective demonstrates that professional relationships are not simply formal interactions, but rather psychosocial processes that require reflective skills, emotional sensitivity, and the ability to adapt to the patient's individual needs (Johnston, 2024).

The implementation of a nursing care delivery system in nursing education has been recognized as a systematic strategy for organizing the delivery of nursing care in an effective and structured manner (Jantzen, 2024). This system encompasses various models such as team nursing, primary nursing, and the case method, each of which has implications for communication patterns, task allocation, and professional responsibilities. Understanding this system is believed to improve coordination among nurses and strengthen professional relationships within the healthcare team (Cardwell, 2024).

Empirical evidence suggests that nursing care delivery system-based training has the potential to be a strategic tool for developing professional relationships among nursing students. Structured training enables students to understand roles, functions, and teamwork dynamics more comprehensively (Estrada-Araoz, 2024). This emphasizes that strengthening professional relationships is inseparable from contextual, applicable, and practice-oriented learning designs in healthcare settings (Abujaber, 2024).

The quality of professional relationships in nursing education still shows significant variation, particularly among students transitioning from theoretical learning to clinical practice (Park, 2024). This phenomenon indicates a gap between expected competencies and the actual ability of students to build effective professional relationships. Existing learning evaluations tend to focus more on technical skills than on strengthening contextual interpersonal relationships (Amin, 2025).

The implementation of nursing care delivery systems in educational contexts has not been fully utilized as a pedagogical tool for developing professional relationships. Most research focuses on service efficiency and workload management, while the development of professional interaction patterns within these systems remains underexplored. This situation suggests that the system's potential as a relational learning medium has not been optimally explored (Tarsuslu, 2025).

Albert Bandura's social learning theory asserts that individuals learn through observation, imitation, and direct experience in social settings. This perspective suggests that the formation of professional relationships requires a learning environment that allows for active interaction and reflection on those experiences (Reeves, 2024). The absence of training designs that explicitly integrate these principles has the potential to hinder the development of relational competencies in nursing students (Zoromba, 2025).

The limitations of previous research are also evident in the lack of training models that specifically integrate nursing care delivery systems with the goal of strengthening professional relationships. Professional relationship variables are often positioned as indirect impacts, rather than the primary focus of interventions (Qutishat, 2025). This situation emphasizes the need to more deeply examine how nursing care delivery system-based training can be designed to directly improve the quality of professional relationships in nursing education (Kashmeeri, 2024).

Filling gaps in professional relationship development is crucial because professional relationships are a key element in the success of patient-centered nursing practice. Weaknesses in this area not only impact the quality of interactions but also potentially impact patient safety and the effectiveness of the healthcare team. Strengthening professional relationships from the educational stage is seen as a strategic step in developing holistically competent nurses (Dissanayake, 2024).

A nursing care delivery system-based training approach offers a systematic framework for integrating technical and relational aspects of learning (Chang, 2025). Jean Piaget's constructivist theory emphasizes that knowledge is built through active experience and interaction with the environment. Training designed around a care delivery system allows students to construct an understanding of professional roles through hands-on practice, team collaboration, and reflection on experiences (Hammad, 2024).

The development of this training model is expected to address the need for more applicable and contextual learning methods to enhance professional relationships. The proposed hypothesis states that nursing care delivery system training significantly improves the quality of professional relationships among nursing students (Qutishat, 2024). This effort is not only academically relevant but also has practical implications for continuously improving the quality of nursing education and services (Wilson, 2024).

This study specifically aims to evaluate the effect of Nursing Care Delivery System (NCDS) training on improving the quality of professional relationships of nursing students, with a deep focus on three main dimensions: the effectiveness of interdisciplinary communication, strengthening trust in the clinical team, and improving relational self-efficacy when interacting with other health workers. Through this analysis, the study is expected to map the extent to which the nursing care assignment model is able to transform student interaction patterns from just fulfilling technical tasks to solid professional collaboration. The final result of this goal detail is intended to provide an empirical foundation for the development of a nursing higher education curriculum that is more adaptive to collaborative dynamics in modern hospital environments.

## RESEARCH METHODOLOGY

This study used a quantitative approach with a quasi-experimental design in the form of a one-group pretest-posttest design. This design aims to measure changes in students' professional relationship levels before and after being given an intervention in the form of Nursing Care Delivery System (NCDS) training. The initial measurement (pretest) was conducted to determine the baseline condition of students' professional relationship skills, followed by the provision of the NCDS training intervention, and concluded with a final measurement (posttest) to observe the

improvements that occurred. The main focus of the analysis lies in the gain score as an indicator of the effectiveness of the training on the dependent variable (Galletta, 2024).

The population in this study was all nursing students at Bhakti Husada University Indonesia. The sample size of 60 students was selected using a total sampling technique, taking into account active involvement in the clinical learning process and readiness to participate in training. Respondent characteristics included educational background, semester level, and clinical practice experience as control variables that could influence the development of professional relationships (Knight, 2024).

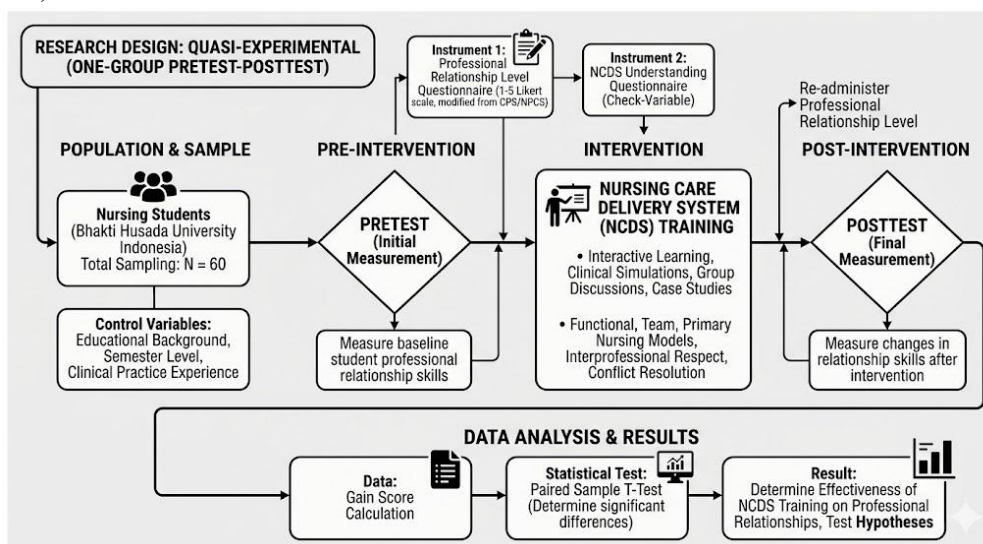


Figure 1. Research process

The research instrument was a structured questionnaire compiled using a 1-5 Likert scale to measure the level of professional relationships. This questionnaire adopted and modified instruments such as the Collaborative Practice Scales and the Nurse-Physician Collaboration Scale, with dimensions covering communication, trust and respect, shared decision-making, and conflict resolution (C. Li, 2024). Additional indicators relevant to the student context included shared identity, communication quality, role awareness, and interprofessional respect. The second instrument, a questionnaire on understanding the Nursing Care Delivery System, was used as a check-variable to ensure participants understood nursing care system concepts such as functional, team, and primary methods. Validity was tested through expert judgment and item-total correlation tests, while reliability was tested using the Cronbach's Alpha coefficient (Jiang, 2024).

The research procedure began with a pretest to measure the initial level of students' professional relationships. The next stage involved providing Nursing Care Delivery System training interventions designed through interactive learning, clinical simulations, group discussions, and case studies to strengthen conceptual understanding and practice of team collaboration (Gershater, 2024). The training materials covered NCDS models such as team nursing, primary nursing, and the functional method, along with their implications for professional relationships. The final stage was a posttest to measure changes after the intervention. The data obtained were analyzed using statistical tests such as paired sample t-tests to determine the significance of differences before and after training and to test the research hypotheses (Güler, 2024).

## RESULT AND DISCUSSION

The results of this study present empirical findings obtained from a series of statistical analyses of data collected from 60 nursing student respondents. The analysis was conducted in a step-by-step and systematic manner, starting with instrument quality testing through validity and reliability tests, followed by descriptive analysis to understand respondent characteristics and data distribution, and finally testing the effectiveness of the intervention using an inferential approach. This approach was designed to ensure that each conclusion drawn has a strong methodological basis and can be scientifically justified. The main focus in this section is to identify the extent to which nursing care delivery system training contributes to improving students' professional relationships, both from a statistical and substantive perspective.

The presentation of results emphasizes not only the significance of the numbers but also a thorough interpretation of the patterns emerging in the data. Variations in values, distribution trends, and relationships between variables are comprehensively analyzed to capture the dynamics of change that occurred before and after the intervention. This approach allows for a more comprehensive understanding of the training's effectiveness, including factors that may influence individual success rates. Thus, the results section goes beyond simply presenting data but also constructs an analytical narrative that connects the empirical findings to the broader context of nursing education.

The distribution of respondent characteristics shows a predominance of female students, as reflected in the mean value of 1.78, which is close to category 2. This pattern indicates that the composition of respondents is filled with more women than men, a phenomenon that is common in the context of nursing education. This gender distribution inequality has the potential to affect the dynamics of professional interactions, especially in aspects of interpersonal communication and empathy, which are theoretically often associated with differences in gender characteristics in nursing practice.

The semester-level distribution shows a concentration of respondents in the middle phase of education, with a mean score of 5.87 and a median of 6. The wide variation in semesters, indicated by the range from semester 4 to semester 8, reflects the heterogeneity of students' academic and clinical experiences. This condition provides important context that the measured professional relationship skills are influenced not only by training interventions, but also by varying levels of academic maturity and exposure to clinical practice among respondents.

Academic achievement and clinical experience indicators show significant and substantively relevant variations. The average GPA of 3.3072 with a relatively small standard deviation indicates homogeneity in the good academic ability category of respondents. Conversely, clinical experience shows a wider distribution, ranging from 2 to 24 months and a standard deviation of 6.185, indicating differences in the level of exposure to real-world practice. This variation reinforces the assumption that clinical experience is a crucial factor that has the potential to enrich or even shape the quality of students' professional relationships in complex healthcare situations.

**Table 1.** Instrument validity test results

Number	Statement	rhitung	rtable	Information
1	COM_P1	0.474	0.254	<b>Valid</b>
2	COM_P2	0.386	0.254	<b>Valid</b>
3	COM_P3	0.390	0.254	<b>Valid</b>
4	COM_P4	0.471	0.254	<b>Valid</b>
5	COM_P5	0.460	0.254	<b>Valid</b>

6	COM_P6	0.420	0.254	<b>Valid</b>
7	TRUST_P1	0.452	0.254	<b>Valid</b>
8	TRUST_P2	0.510	0.254	<b>Valid</b>
9	TRUST_P3	0.518	0.254	<b>Valid</b>
10	TRUST_P4	0.493	0.254	<b>Valid</b>
11	TRUST_P5	0.379	0.254	<b>Valid</b>
12	TRUST_P6	0.378	0.254	<b>Valid</b>
13	DECISION_P1	0.524	0.254	<b>Valid</b>
14	DECISION_P2	0.606	0.254	<b>Valid</b>
15	DECISION_P3	0.559	0.254	<b>Valid</b>
16	DECISION_P4	0.445	0.254	<b>Valid</b>
17	DECISION_P5	0.499	0.254	<b>Valid</b>
18	DECISION_P6	0.536	0.254	<b>Valid</b>
19	CONFLICT_P1	0.459	0.254	<b>Valid</b>
20	CONFLICT_P2	0.499	0.254	<b>Valid</b>
21	CONFLICT_P3	0.355	0.254	<b>Valid</b>
22	CONFLICT_P4	0.511	0.254	<b>Valid</b>
23	CONFLICT_P5	0.395	0.254	<b>Valid</b>
24	CONFLICT_P6	0.519	0.254	<b>Valid</b>

The validity test results show that all statement items have calculated  $r$  values that consistently exceed the table  $r$  of 0.254, so that all items are declared valid without exception. The range of correlation values is between 0.355 and 0.606, which indicates the strength of the item's relationship to the total score is in the moderate to strong category. The highest value was recorded in DECISION\_P2 (0.606), followed by DECISION\_P3 (0.559) and DECISION\_P6 (0.536), which indicates that the decision-making dimension has the most dominant contribution in forming the professional relationship construct. The lowest value is in CONFLICT\_P3 (0.355), but it is still above the validity threshold, so it is still worthy of being retained in the instrument.

The distribution of calculated  $r$  values for each dimension shows a relatively structured and consistent pattern. The communication dimension (COM) has a value range between 0.386 and 0.474, indicating that all items in this dimension have a moderate relationship with the total construct. The trust dimension (TRUST) shows a variation between 0.378 and 0.518, with a tendency for higher values in TRUST\_P2 and TRUST\_P3, indicating that interpersonal trust is a fairly strong element in building professional relationships. The decision-making dimension (DECISION) stands out with all values above 0.445, with most even above 0.5, indicating very good internal cohesion. The conflict dimension (CONFLICT) has a wider range, namely 0.355 to 0.519, which reflects variations in respondents' perceptions of conflict resolution capabilities, but remains within acceptable validity limits.

The absence of items with values below the  $r$  table indicates that the instrument used has strong construct quality and is empirically stable. All items are able to represent the measured variables without any distortion or deviation of the indicators. This pattern also indicates that the process of operationalizing the variables into measurable indicators has been carried out appropriately and is based on a solid theoretical framework. The even validity across all dimensions provides a solid methodological foundation for continuing the analysis to the next stage, including reliability testing and hypothesis testing, because the instrument has been proven to be able to

measure the concept of professional relationships accurately and consistently in the context of this study.

**Table 2.** Results of instrument reliability test

Reliability Statistics	
Cronbach's Alpha	N of Items
0.845	24

The reliability test results show that the professional relationship instrument has a Cronbach's Alpha value of 0.845, which significantly exceeds the minimum threshold of 0.70. This value places the instrument in the high reliability category, indicating that all 24 items have strong internal consistency in measuring the same construct. This level of reliability indicates that the resulting score variation is more influenced by real differences between respondents than by measurement error, so the data obtained can be considered stable and reliable for further analysis.

This high internal consistency also reflects good cohesion between the instrument's dimensions, namely communication, trust, decision-making, and conflict resolution. An alpha value approaching 0.85 indicates that the items are not only correlated but also collectively form a conceptually integrated construct. This demonstrates that each item contributes proportionally without creating excessive redundancy, thus maintaining a balance between indicator homogeneity and diversity within the instrument's structure.

This strong reliability provides important methodological implications for research, particularly in ensuring the accuracy and consistency of measurement results across similar contexts. A Cronbach's Alpha value of 0.845 indicates that the instrument has sufficient stability for use in various statistical analyses, including difference tests, correlations, and structural modeling. A high level of reliability also strengthens the overall validity of the study, as a consistent instrument will produce data that is more representative of the phenomenon of professional relationships in nursing education.

**Table 3.** Descriptive statistics of n-gain values

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Standard Deviation
Ngain_Scor	60	-.67	.60	.1964	.24468
Gain_Percent	60	-66.67	60.47	19.6353	24.46826
Valid (listwise)	N60				

The results of the descriptive statistical analysis of the N-Gain value indicate that the average increase in professional relationship skills is at 0.1964 or equivalent to 19.63%, which can generally be categorized as a low to moderate level of improvement. The maximum value of 0.60 (60.47%) indicates that some respondents experienced a significant increase after the training intervention, but the minimum value of -0.67 (-66.67%) indicates a decrease in some individuals. This variation indicates that the effectiveness of the training does not occur evenly across all respondents, but is influenced by complex individual factors.

The relatively wide data distribution is reflected in the standard deviation values of 0.24468 for the N-Gain Score and 24.46826 for the N-Gain Percent, indicating heterogeneity in response to the intervention. This condition shows that although there was an increase in aggregate, there was a

quite sharp disparity between respondents who obtained optimal benefits and those who experienced stagnation or even decline. The negative minimum score is an important indicator that some participants may have difficulty internalizing the training material or face obstacles in the process of adapting to the concept of a nursing care delivery system.

The average trend, which remains around 0.1964, indicates that the training intervention had a positive but suboptimal impact on improving professional relationships overall. This finding opens the possibility of interpreting that the training provided was able to trigger initial changes, but was not strong enough to produce consistent transformation across all participants. The complexity of learning dynamics, differences in clinical experience, and variations in individual readiness are factors that could potentially moderate these results, so strengthening the intervention design is necessary to produce more homogeneous and practically significant improvements.

**Table 4.** Results of paired sample t-test pretest and posttest

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pair					Lower	Upper			
1	PreTest_Score - PostTest_Score	-8,000	8,839	1,141	-10,283	-5,717	-7,010	59	.000

The results of the paired sample t-test showed a significant difference between the pretest and posttest scores on the professional relationship variable. The mean difference value of -8.000 indicates that the posttest scores were consistently higher than the pretest, indicating an improvement after the training intervention. The calculated t-value of -7.010 with 59 degrees of freedom ( $df = 59$ ) confirms that the difference did not occur by chance but rather reflects a statistically significant change.

The significance of the test results is strengthened by the Sig. (2-tailed) value of 0.000, which is far below the critical limit of 0.05. The 95% confidence interval ranging from -10.283 to -5.717 indicates that all interval limits are in the negative region, which consistently confirms an increase in scores after treatment. The interval range that does not cross zero provides strong inferential evidence that the training intervention has a stable effect and can be generalized to similar populations.

The large standard deviation of 8.839 indicates variation in individual responses to the intervention, but it is not strong enough to obscure the significance of the aggregate improvement. The combination of a high t-value, very strong significance, and a solid confidence interval indicates that nursing care delivery system training has significant effectiveness in improving the quality of professional relationships among nursing students. This finding confirms that the designed intervention not only has a statistical impact but also has practical relevance in strengthening relational competence in the context of clinical education.

## DISCUSSION

The results of the study showed that nursing care delivery system training had a significant impact on improving nursing students' professional relationships. The paired sample t-test value of  $t = -7.010$  with  $p = 0.000$  indicated a highly significant difference between pretest and posttest

scores. The average difference of -8.000 confirmed that there was an increase in scores after the intervention, indicating the effectiveness of the training in strengthening students' professional relationships (Vauhkonen, 2024). Instrument validity findings show that all items have calculated  $r$  values between 0.355 and 0.606, exceeding the table  $r$  value of 0.254, thus all indicators are declared valid. The instrument's internal consistency is also relatively high, with a Cronbach's Alpha value of 0.845, indicating that the instrument is able to measure the construct stably. This instrument quality strengthens the validity of the research results obtained (Almadani, 2024).

The N-Gain analysis results showed an average increase of 0.1964, or 19.63%, which falls into the low to moderate category. Significant variation was observed in the minimum value of -0.67 and the maximum value of 0.60, reflecting heterogeneity in the training response (Topal, 2024). This indicates that, despite the overall improvement, the effectiveness of the intervention was not uniform across all participants (Kõrgemaa, 2024).

The results of this study align with various previous studies confirming that systems-based training in nursing services can improve the quality of collaboration and professional communication. Research in the context of team nursing and primary nursing has shown that a clear work structure can strengthen team coordination and increase trust among members. This similarity strengthens the argument that a systemic approach significantly contributes to the formation of professional relationships (Almeida, 2024). Differences emerged in the level of effectiveness achieved, with this study showing a moderate increase with an N-Gain of 0.1964, while several other studies reported higher increases. This variation may be due to differences in training design, intervention duration, and respondent characteristics. This suggests that the implementation context plays a significant role in determining training success (Marriott, 2024).

The tendency for variation in individual responses in this study also reveals a complexity often overlooked in previous research. Most studies focus on aggregate results without exploring disparities between participants (Al-Noumani, 2024). These findings provide a novel contribution by demonstrating that training effectiveness is not homogeneous but is influenced by individual dynamics and clinical experience (Smith, 2024).

The results of this study indicate that professional relationship development cannot be achieved instantly through a single intervention. The improvements demonstrated a positive response to the training, but the suboptimal levels indicate that the process of building professional relationships is gradual and requires ongoing reinforcement (Lewis, 2025). This reflects the complexity of relational competency, which relies on more than just cognitive aspects (Song, 2024). The wide variation in N-Gain values indicates a gap in individual readiness to internalize learning. Respondents with more clinical experience tended to improve more significantly than those with limited experience. This pattern suggests that lived experience is a crucial factor in strengthening the understanding and practice of professional relationships (Jaastad, 2025).

These results also indicate that the integration of theory and practice in nursing education is still not fully optimal. Training can provide an initial stimulus, but it is not strong enough to transform behavior comprehensively. This situation indicates the need for a more contextual and experience-oriented learning approach (Ariburnu, 2024). These findings have important implications for developing nursing education curricula, particularly in strengthening professional relationships. The significant improvement in results confirms the merits of integrating nursing care delivery system-based training into learning strategies. This approach could be an alternative way to bridge the gap between theory and clinical practice (Piispanen, 2024).

Practical implications also arise from the need to design training that is more adaptive to participant characteristics. Variations in results indicate that a uniform approach is less effective in

generating equitable improvement. Developing a differentiation-based training model could be a solution to accommodate differences in individual experience and readiness (Garcia, 2024). This research also broadens the perspective that strengthening professional relationships is not solely the responsibility of clinical learning but needs to be systematically integrated into the entire educational process. Integrating simulation, reflection, and hands-on practice is crucial for developing sustainable relational competency (Rony, 2025).

The significant but suboptimal improvement results can be explained by the short-term nature of the intervention. The limited duration of the training tends to provide only conceptual understanding without in-depth internalization. The process of building professional relationships requires time and repeated experience in real-world contexts (Dias, 2024). Individual factors such as clinical experience, motivation to learn, and psychological readiness also play a role in determining training effectiveness. Respondents with more clinical experience were better able to relate the material to real-world practice. This difference led to significant variation in results between participants (Christidis, 2024).

The complexity of the professional relationship construct is also a major reason why improvements are not uniform. Dimensions such as communication, trust, and conflict resolution involve interacting cognitive, affective, and social aspects. Training that doesn't explicitly address all of these dimensions in depth tends to produce partial improvements (Khatatbeh, 2024). Developing more intensive and sustainable advanced training is essential to increase the effectiveness of interventions. Training programs should be designed as a learning cycle involving hands-on practice, feedback, and ongoing reflection. This approach is expected to strengthen the deeper internalization of relational competencies (Avilés, 2024).

Future research should examine moderating factors influencing training success, such as clinical experience, learning styles, and the practice environment. A mixed-methods approach can be used to explore qualitative dimensions not captured by quantitative analysis. This effort will provide a more comprehensive understanding of the dynamics of professional relationships (Cubelo, 2024). Implementing the findings of this study in the context of educational institutions requires policy support that encourages the integration of learning based on the nursing service system (H. Li, 2025). Collaboration between educational institutions and practice settings is key to creating an authentic learning environment. This step is expected to produce nursing graduates who are not only technically competent but also excel in building professional relationships (Fouladi, 2024).

## CONCLUSION

The main findings of this study indicate that nursing care delivery system training significantly improves the professional relationships of nursing students, with the results of the paired sample t-test ( $t = -7.010$ ;  $p = 0.000$ ) and a mean difference of  $-8.000$  indicating a significant increase after the intervention. The N-Gain value of  $0.1964$  (19.63%) indicates that the increase is in the low to moderate category, which confirms that the intervention has a positive impact but is not yet optimal across the board. The high instrument reliability value (Cronbach's Alpha =  $0.845$ ) and all valid items ( $r$  count  $0.355-0.606 > r$  table  $0.254$ ) strengthen that the research results have a strong and reliable measurement basis.

This research's contribution lies in the integration of the nursing care delivery system concept as a pedagogical approach to developing professional relationships, which have previously focused more on the managerial aspects of service. This approach offers methodological added value through a quasi-experimental design with N-Gain measurement as an indicator of learning

effectiveness. Limitations of the study include the relatively short duration of the intervention and the wide variation in the respondents' clinical experience, which impacted the homogeneity of the results. Further research is recommended to develop a continuous training model based on clinical practice and explore moderating factors such as experience, motivation, and the learning environment to achieve more optimal and consistent improvement.

## DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used Google Gemini to assist in improving grammar, language quality, and overall readability of the text. After using this tool, the author(s) Carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

## AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

## DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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