Research article

Exploring the impact of collaborative learning on the development of critical thinking and clinical decision-making skills in nursing students: A quantitative descriptive design

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ABSTRACT

This study aims to introduce collaborative learning as a method in the Mental Health and Diseases Nursing course for actively enrolled fourth-year nursing students. The objective is to assess the impact of collaborative learning on critical thinking and clinical decision-making among nursing students. Collaborative learning involves the use of small groups to help students identify effective ways of working together to enhance their learning outcomes. A quantitative research methodology was employed in this study. To evaluate the effectiveness of the collaborative learning program, a within-subject repeated-measures design was implemented. This study was conducted in the nursing department of a university in Turkey. The study included 96 female students (92.3 %) and 8 male students (7.7 %). Data collection involved the sociodemographic data form, the California Critical Thinking Disposition Inventory (CCTDI), and the Clinical Decision-Making in Nursing Scale (CDMNS). The students' pre-program CDMNS median score was 146.00 (117.00–177.00), and the post-program CDMNS median score was 147.50 (115.00–175.00). While there was an increase in the students' clinical decision-making scores after the program, this increase was not statistically significant ($p > 0.05$). The pre-program median score for CCTDI was 223.26 (176.87–296.02), and the post-program median score was 227.88 (188.87–359.00). The students' critical thinking disposition scores showed a statistically significant increase after the program ($p < 0.05$). The study results revealed notable enhancements among students who participated in courses utilizing the collaborative learning method. These enhancements included heightened academic performance, elevated levels of critical thinking, increased self-confidence, and improved clinical decision-making abilities.

1. Introduction

In the nursing profession, the ability to think critically and make confident decisions is crucial for delivering effective patient care. Nursing education programs are meticulously designed to equip aspiring nurses with the competence and confidence needed for successful practice in diverse healthcare settings [1,2]. A vital component of undergraduate nursing curricula is the allocation of ample time for hands-on clinical experience [3].

Nursing education is evolving rapidly due to the expanding accessibility of information and dynamic shifts in both work and daily

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life. In this changing landscape, students are expected to develop a range of increasingly complex skills. These skills include innovative thinking, encompassing creativity, critical thinking, and adept problem-solving; effective collaboration and communication; and proficient management of digital tools, including information and communication technologies [4]. Developing these multifaceted skills requires exposure to robust collaborative problem-solving environments and navigating complex scenarios that directly leverage existing knowledge [5]. Notably, the theory that social processes guide individual learning underpins the concept of collaborative learning, which has proven instrumental in supporting nursing students. This collaborative approach encourages students to engage in collective thought with their peers, fostering a deeper understanding of knowledge and skills and propelling them toward enhanced comprehension [6].

2. Literature review and theoretical background

2.1. Collaborative learning

Collaborative learning is defined as an activity in which students work together in small groups to solve problems, complete tasks, or achieve goals [7]. In contrast, collaborative learning involves the educational use of small groups to help students identify effective ways of working together to enhance their learning outcomes [8]. The essence of these approaches lies not in enforcing uniformity of thought and understanding, but in the process of jointly exploring, discovering, and comprehending concepts through mutual and collaborative activities. Consequently, group work serves as a platform for unearthing both differences and shared conceptualizations [9]. In collaborative learning, students actively participate in the learning process and create new knowledge through social interaction. Lecturers should encourage students to participate in each other's learning rather than studying alone [10]. Since collaborative learning fosters socio-cognitive conflict when students are confronted with perspectives different from their own during group work, it encourages them to question and reorganize their own thinking by integrating others' ideas and perspectives. This process provides the appropriate context for a common approach to emerge [11].

In the context of learning, information and communication technologies play a crucial role in facilitating collaboration. Learning designs that enhance communication and information processing capabilities ensure meaningful engagement for all individuals in the learning process, regardless of their abilities or circumstances [12]. Collaborative learning focuses not only on individuals acquiring and applying knowledge and skills independently but also on their collective performance within the group dynamic [13].

2.2. Review studies on collaborative learning

In collaborative learning settings, the dynamics of decision-making, creative solution development, and knowledge sharing naturally unfold [14]. Nursing students need to develop fundamental critical thinking skills throughout their education programs, including critical analysis, distinguishing between facts and opinions, evaluating the reliability of information sources, explaining concepts, and recognizing conditions [15]. The clinical decision-making process involves analyzing and discriminating information to select and apply the most appropriate option among available choices [16]. Research suggests that collaborative learning experiences integrating academic and clinical perspectives are beneficial for enhancing both technical and assessment skills among nursing students [17]. Studies focusing on nursing education have shown that collaborative learning surpasses traditional methods in shaping learning attitudes and behaviors [18]. This approach offers significant educational advantages, particularly in improving critical thinking and group skills compared to conventional teaching methods [19]. Moreover, a study by Chen et al. (2022) indicates a clear enhancement in students' motivation levels, problem-solving abilities, and overall satisfaction with collaborative learning [20]. Collaborative learning-based practice has also proven effective in improving nursing students' clinical experiences, reducing learning anxiety, and increasing self-confidence [21].

Recent studies have highlighted collaborative learning's potential to enhance theoretical knowledge and practical skill performance, foster positive learning experiences, enhance professional competence, and refine interpersonal proficiencies in nurses [18,22, 23]. This study aims to investigate the impact of collaborative learning methods on students' critical thinking, clinical decision-making, and interpersonal skills. Grounded in a comprehensive review of existing literature and guided by researchers' insights, this study seeks to pioneer exploration into how collaborative learning methodologies influence students' critical thinking and decision-making processes. The advent of new technologies has brought about transformations in teaching and learning approaches. In this context, collaborative learning is expected to promote positive interdependence and cultivate a sense of responsibility among learners, fostering greater control over the learning process.

2.3. Research questions

- How does collaborative learning affect fourth-grade nursing students' critical thinking dispositions and clinical decision-making skills?

2.4. Research hypotheses

- There is a significant difference between the pre-test and post-test scores of critical thinking dispositions among fourth-grade nursing students participating in the collaborative learning program.

• There is a significant difference between the pre-test and post-test scores of clinical decision-making among fourth-grade nursing students participating in the collaborative learning program.

3. Methods

3.1. Study design

This study introduces collaborative learning as a method in the Mental Health and Diseases Nursing course for actively enrolled fourth-grade nursing students. The objective is to assess the impact of this collaborative learning approach on both the individual and professional growth of nursing students across various variables. For this investigation, a quantitative research methodology was employed. To evaluate the effectiveness of the collaborative learning program, a within-subject repeated-measures design was implemented. Participants were evaluated twice – once before the program's initiation and again upon its completion.

3.2. Sample and data collection

This study was conducted in the nursing department of a university located in Ankara, spanning from October 2022 to January 2023. The study population comprised fourth-year students (n = 141) enrolled in the Mental Health and Diseases Nursing course during the academic year 2022–2023. Out of this group, a total of 104 fourth-year nursing students actively participated in the study. A retrospective power analysis using the G*Power 3.1.9.2 software package indicated a robust result of 99.0 % (Type-1 error = .05, effect size d = .50) [24]. Students were selected for inclusion in the sample based on specific criteria, including active class attendance and voluntary willingness to participate in the study.
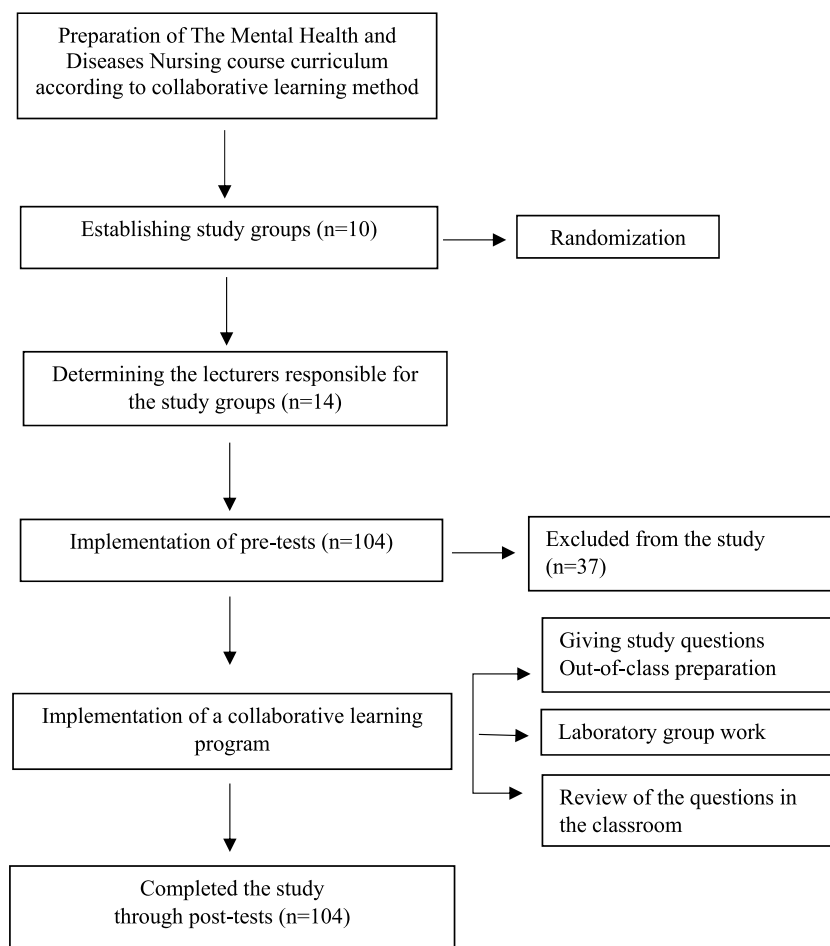

Fig. 1. Flow diagram of the study.

3.3. Implementation of the study

During the fall semester of the academic year, the Mental Health and Diseases Nursing course spans 15 weeks and is specifically designed for fourth-year students in the nursing department. This comprehensive course includes theoretical instruction, practical laboratory work, and hands-on clinical applications. Successful completion requires achieving a minimum grade of 2.00 (60 points).

In the 2022–2023 academic year, fourth-year nursing students participated in the Mental Health and Diseases Nursing course using the collaborative learning method. The course was led by the designated instructor and supported by staff. During the initial session of the course, the objectives, content, and implementation of the course were explained, along with instructions on working in study groups and their respective tasks.

For this study, the "learning together" technique, a component of collaborative learning, was implemented. In this approach, diverse student groups were provided with subject-relevant worksheets. Initially, students collaboratively explored the materials and worked together to solve challenges. If they encountered difficulties, they sought guidance from instructors. The primary goal of each group was to achieve a collective outcome [9,25]. Collaborative study questions encompassed all topics covered in the Mental Health and Diseases Nursing course. Specific study questions were prepared for each topic (Sample questions: Define the concept of anxiety. Explain treatment approaches for anxiety disorders. Describe the practice standards of psychiatric nurses caring for patients with anxiety).

As part of the course's laboratory component, students were organized into study groups consisting of 10–15 members, determined by randomization numbers generated through the https://www.random.org/website. Each group was mentored by a qualified lecturer specializing in mental health and diseases nursing. Within the framework of the collaborative learning approach, two modes were established: online platform groups and face-to-face groups. Unlike the random assignment used for study groups, the categorization into online or face-to-face groups was not randomized, as the Mental Health and Diseases Nursing course is a part of the students' educational curriculum. Students had autonomy in selecting their preferred group format based on their access to resources such as the internet and computers.

One week before each theoretical lesson was taught in the classroom, study questions related to the topic were distributed to the groups. During out-of-class study hours, group members prepared for these questions in preparation for the laboratory applications. Within their groups, students planned their approach to addressing the study questions. Throughout the lesson, students engaged in acquiring new knowledge, sharing it with their peers, and conducting independent research to deepen their understanding of the topics. They continuously developed their critical thinking and decision-making skills through active social interaction within their study groups. Under the guidance of their assigned instructor during laboratory sessions, student groups collaborated on the lesson's content, guided by the study questions, and aimed for collective learning. Feedback from instructors was integrated into their work as they refined their understanding and responses to the study questions. After the theoretical lecture in class, any remaining or unclear aspects of the topic were addressed by completing the study questions. Furthermore, students were provided with additional resources such as free concept/mind map platforms, relevant websites, and supplementary reading materials to enhance their preparation for each lesson.(see Fig. 1)

3.4. Data collection tools

In this study, data collection included the use of the Socio-Demographic Characteristics Data Form, the California Critical Thinking Disposition Inventory, and the Clinical Decision-Making in Nursing Scale. These forms were converted into online formats using "Google Forms" for ease and accessibility, facilitated by the researchers. The forms were then distributed to participants through social media groups (WhatsApp).

An informed consent form was integrated at the beginning of the online forms. Participants were informed of their right to decline participation or withdraw at any time after participating. Prior to initiating data collection, the researchers ensured the functionality of the online questionnaire. When sharing the link, the system was configured with features such as "edit answer" and "limit to 1 answer" to prevent potential data loss, requiring respondents to provide only one response per question.

3.4.1. Sociodemographic characteristics data form

A "Sociodemographic Characteristics Data Form," developed by the researchers based on relevant literature [7–9], was used to collect demographic information from nursing students participating in the study. This form consisted of seven questions aimed at gathering details about participants' age, gender, educational background, marital status, number of siblings, subjective socioeconomic status (rated on a ladder from 0 points for "very low" to 10 points for "very high"), residential location, and household composition.

3.4.2. California Critical Thinking Disposition Inventory (CCTDI)

The California Critical Thinking Disposition Inventory (CCTDI), originally developed by Facione in 1990, underwent a validity-reliability study for adaptation to Turkey by Kökdemir in 2003 [26]. The scale measures six sub-dimensions: analyticity, open-mindedness, curiosity, self-confidence, truth-seeking, and systematicity. Initially comprising 75 items across seven sub-dimensions, the scale was refined to 51 items across six sub-dimensions following item-total score correlation analysis in the Turkish study. The internal consistency coefficient (α) of the scale was determined to be .88.

CCTDI uses a six-point Likert scale for item assessment, ranging from "I strongly disagree" (1) to "I totally agree" (6). Scores for each sub-dimension are calculated by multiplying the sum of item scores by 10 and dividing by the number of items in that sub-dimension,

resulting in scores ranging from 10 to 60. A score below 40 in any sub-dimension indicates a low critical thinking disposition, while scores exceeding 50 indicate a high disposition. Overall, a total CCTDI score below 240 indicates a low general critical thinking disposition, while scores above 300 indicate a high disposition [26].

In the current study, the pre-test Cronbach's coefficient of the scale was .78, and the post-test Cronbach's coefficient was .87. The pre-test Spearman-Brown coefficient was .72, and the post-test Spearman-Brown coefficient was .80. Additionally, the pre-test Guttman Split-Half coefficient was .72, and the post-test Guttman Split-Half coefficient was .80.

3.4.3. Clinical decision-making in Nursing Scale (CDMNS)

The Clinical Decision-Making in Nursing Scale (CDMNS), originally developed by Jenkins for nursing students in the United States, assesses students' perceptions of clinical decision-making based on their own statements. The scale has been adapted for use in Turkey, with a reported Cronbach alpha reliability coefficient of .78 [27], which indicates good internal consistency.

CDMNS consists of 40 items organized into four subscales: "search for alternatives or options", "canvassing of objectives and values", "evaluation and reevaluation of consequences", and "search for information and unbiased assimilation of new information". Each subscale includes 10 items, contributing to a total scale score ranging from 40 to 200. Subscale scores range from 10 to 50, with no predefined cutoff points. A higher total score indicates a stronger perception of decision-making abilities, while a lower score suggests a weaker perception. Both subscale analysis and consideration of the overall scale score are used in evaluation [27].

In the current study, the pre-test Cronbach's coefficient of the CDMNS was .80, and the post-test Cronbach's coefficient was .85. The pre-test Spearman-Brown coefficient was .84, and the post-test Spearman-Brown coefficient was .88. Additionally, the pre-test Guttman Split-Half coefficient was .83, and the post-test Guttman Split-Half coefficient was .84. These coefficients indicate good reliability of the scale in measuring clinical decision-making perceptions among nursing students in this study.

3.5. Data collection and analysis

The scales used in this study were administered to participants at the beginning and end of the collaborative learning program. Statistical analysis and calculations were performed using IBM SPSS Statistics version 21.0 software (IBM Corp., Armonk, NY, USA). A p-value <.05 was considered statistically significant. Descriptive statistics including frequencies and percentages, as well as measures of central tendency (median, mean) and dispersion (standard deviation), were used to describe the data. The normality of the data was assessed using histograms and the Shapiro–Wilk test. Due to the non-normal distribution of the data, the Wilcoxon Signed Rank test was employed to compare pre-test and post-test measurements of the scales.

3.6. Ethical approval

The study obtained necessary ethical approval from the Non-Interventional Clinical Research Ethics Committee of a hospital (Date: October 06, 2022, No: 2022–1048). All participants were informed online about the study and provided their consent after reviewing and approving an informed consent form. The form adhered to principles of "Privacy and Confidentiality" and "Respect for

Table 1
Descriptive characteristics (n = 104).

Variable	n	%
Gender		
Female	96	%92.3
Male	8	%7.7
Marital status		
No romantic relationship	90	%86.5
Has a romantic relationship	13	%12.5
Married	1	%1.0
Residential area		
Student dormitory	48	%46.2
At home with family	33	%31.7
At home with friends	18	%17.3
Alone at home	4	%3.8
At home with relatives	1	%1.0
Subjective economic level (1-10)[a]		
1	2	%1.9
2	1	%1.0
3	4	%3.8
4	8	%7.7
5	41	%39.4
6	29	%27.9
7	17	%16.3
8	2	%1.9

[a] The level is scored from 1 to 10, with 1 being those who perceive they have the least amount of money, and 10 being those with the perception of having the most money.

Autonomy." Participation in the study was voluntary, and participants were assured that their involvement would not impact their course evaluation. They were fully informed about the study's purpose, potential benefits, their responsibilities, and the voluntary nature of their participation. Participants were explicitly informed of their right to withdraw from the study at any time without facing any consequences.

4. Results

In your study, 96 female students (92.3 %) and 8 male students (7.7 %) participated, with a mean age of 21.50 ± 2.53 years. The students' academic achievement average was $3.18 \pm .32$. Additionally, 86.5 % of the students reported not being in a romantic relationship. About 46.2 % of the students reside in student dormitories, and they have a mean number of 2.76 ± 2.03 siblings. Furthermore, 39.4 % of the students (n = 41) indicated their economic level as 5 out of 10 points (Table 1). In the academic year 2022–2023, the average class grade for Mental Health and Diseases Nursing was 73.33, with 97.2 % of the students achieving passing grades.

The class educated with collaborative learning showed a higher average score compared to the class receiving traditional education ($z = -1.447$, $p > 0.05$). To assess the impact of collaborative learning on students' critical thinking, clinical decision-making, and interpersonal skills, the Clinical Decision-Making in Nursing Scale (CDMNS) and the California Critical Thinking Disposition Inventory (CCTDI) were employed. The distribution of scores for the CCTDI scale and its sub-dimensions, along with the CDMNS, is detailed in Table 2. Prior to the program, students had a median CDMNS score of 146.00 (117.00–177.00), which increased to 147.50 (115.00–175.00) post-program. However, this increase in clinical decision-making scores was not statistically significant ($p > 0.05$). For CCTDI, the pre-program median score was 223.26 (176.87–296.02), rising to 227.88 (188.87–359.00) post-program. There was a statistically significant increase in students' critical thinking disposition scores after the program ($p < 0.05$). Specifically, the sub-dimensions of curiosity and self-confidence within the CCTDI also showed significant improvement post-program ($p < 0.05$) (Table 2) (Fig. 2).

5. Discussion

This study aimed to evaluate the impact of collaborative learning on the critical thinking and clinical decision-making skills of fourth-year nursing students. Implementing a collaborative learning approach fostered a group-oriented lesson preparation environment. Our findings indicate that this method significantly contributed to students' professional development by enhancing their learning processes, social skills, and self-confidence. Students participating in courses using collaborative learning demonstrated notable improvements, including enhanced critical thinking abilities, increased self-confidence, and improved clinical decision-making skills.

Table 2
Within-group change of CDMNS and CCTDI (n = 104).

Scale and Subscale	Pretest		Posttest		
	Mean±SD	Min-Max (medyan)	Mean±SD	Min-Max (medyan)	Statistical analysis[a]
Clinical Decision-Making in Nursing Scale (CDMNS)	144.96 ± 11.64	117.00–177.00 (146.00)	145.20 ± 13.52	115.00–175.00 (147.50)	z = −.212 p = 0.832
Investigating options and ideas	38.12 ± 3.94	26.00–49.00 (38.00)	38.63 ± 4.50	26.00–48.00 (39.00)	z = −.684 p = 0.494
Investigating aims and values	34.68 ± 3.07	24.00–42.00 (35.00)	35.01 ± 3.45	28.00–43.00 (36.00)	z = −.762 p = 0.446
Evaluating results	38.77 ± 4.74	28.00–49.00 (39.00)	38.19 ± 5.12	25.00–50.00 (39.00)	z = −.709 p = 0.479
Investigating knowledge, and adopting new ideas without bias	33.37 ± 2.81	26.00–42.00 (33.00)	33.35 ± 2.87	25.00–41.00 (33.50)	z = −.042 p = 0.967
California Critical Thinking Disposition Inventory (CCTDI)	223.11 ± 19.59	176.87–296.02 (223.26)	231.42 ± 23.49	188.87–359.00 (227.88)	z = −2.662 **p=0.008**
Analyticity	45.81 ± 4.55	33.00–59.00 (46.00)	46.86 ± 4.43	35.00–59.00 (47.50)	z = −1.796 p = 0.073
Open-mindedness	28.61 ± 5.50	16.67–50.00 (28.33)	30.06 ± 7.15	18.33–60.00 (29.16)	z = −1.258 p = 0.208
Inquisitiveness	42.63 ± 6.29	23.33–60.00 (43.33)	44.72 ± 6.21	28.89–60.00 (44.44)	z = −2.739 **p=0.006**
Self-confidence	39.43 ± 6.61	22.86–58.57 (40.00)	41.22 ± 6.25	24.29–60.00 (41.42)	z = −2.291 **p=0.022**
Truth seeking	32.19 ± 6.14	17.14–50.00 (31.42)	33.61 ± 6.82	20.00–60.00 (32.85)	z = −1.259 p = 0.208
Systematicity	34.40 ± 5.88	23.33–48.33 (33.33)	34.93 ± 5.69	23.33–6.00 (33.33)	z = −.632 p = 0.527

[a] Wilcoxon Signed Rank Test ($p < 0.05$). SD: Standard Deviation p: Significance * Significant ($p \leq 0.05$).
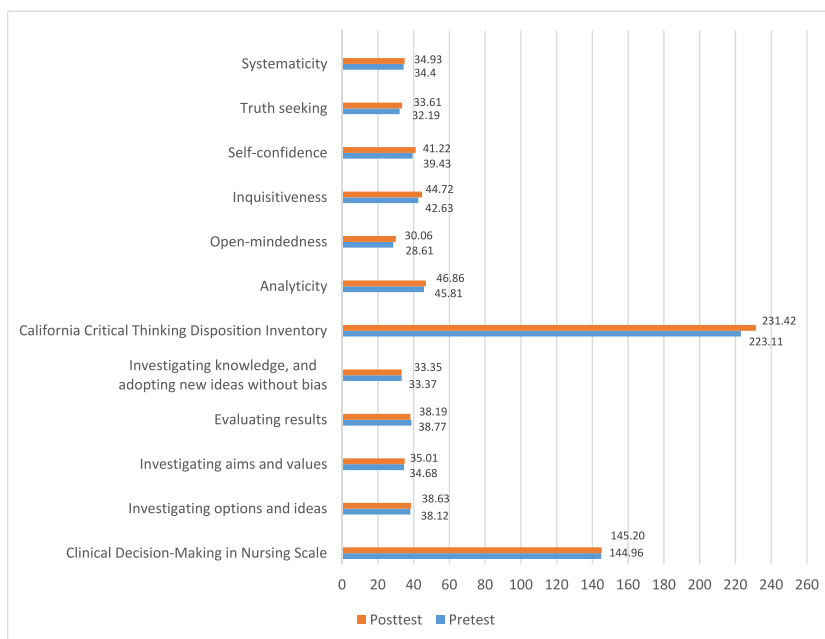
Fig. 2. Within-group change of CDMNS and CCTDI (n = 104).

5.1. The impact of collaborative learning on student critical thinking

Collaborative learning has proven to be an effective method for nursing students to integrate knowledge and skills across various subjects, leading to proficient decision-making abilities crucial for clinical practice [28]. Zhang and Cui (2018) conducted a systematic study highlighting the benefits of collaborative learning, emphasizing its role in enhancing nursing knowledge and skill performance, improving clinical competence, fostering learning motivation and self-assurance, and promoting group dynamics and learning behavior [29]. In a study by Ignacio and Chen (2020), first-year nursing students who underwent collaborative learning before clinical practice reported that cognitive integration interventions helped them effectively apply theoretical knowledge to real-world clinical scenarios [30]. Similarly, Zhang and Chen (2021) found that nursing students engaged in clinical practice through collaborative learning showed significantly increased critical thinking dispositions compared to those in individual clinical practice settings. This suggests that collaborative learning-based clinical exposure contributes to the development of students' critical thinking abilities [31]. Hasanpour-Dehkordi and Solati's (2016) study underscored the benefits of collaborative learning, highlighting its role in developing nursing students' attributes such as respect, responsibility, self-awareness, communication skills, and critical thinking skills [18]. Consistent with previous research, our study affirms the effectiveness of the collaborative learning method in enhancing critical thinking skills among nursing students. However, within our country's context, nursing students undergoing traditional education have shown lower levels of critical thinking disposition [32,33]. This underscores the value of small collaborative learning groups, which provide a platform for students to engage in content discussions, exchange ideas, and participate in problem-solving activities. Collaborative tasks such as discussing search and share activities, elaborating information, and co-constructing arguments and knowledge foster critical thinking among students [34,35]. Collaborative interactions encourage active engagement in discussions and enrich discourse with substantial contributions. By sharing information and discussing differences and similarities, collaborative learning cultivates students' ability to think critically, take responsibility for their learning, and apply knowledge effectively in clinical settings [36].

5.2. The impact of collaborative learning on student clinical decision-making

Clinical decision-making involves a nurse's thorough assessment of patient data, which includes careful observation, exploration of causal factors, and the rapid and accurate identification of appropriate patient interventions, considering multiple factors. It also involves the skilled application of nursing actions [37]. To achieve high-quality and effective care outcomes, nursing education must emphasize the development of professional skills such as critical thinking, problem-solving, and clinical reasoning [38].

In nursing education, a variety of approaches—from case studies to concept maps—are employed to foster student skills [39]. Collaborative learning has emerged as an effective method for developing nursing students' clinical decision-making abilities [40–43]. This approach encourages students to challenge each other's ideas in group settings, promoting interactive discussions, resource exchange, and higher-level decision-making [44]. It emphasizes the integration of knowledge, linking ideas to create coherence and meaningful learning experiences [45]. According to Nouhi et al. (2021), nursing students found collaborative learning effective in solving care issues across all stages of the nursing process in clinical practice [42]. However, results may vary across studies using

different instructional methods. Şen et al. (2022) demonstrated that nursing students in traditional education exhibited below-average levels of clinical decision-making [33]. Similarly, Koraş and Karabulut (2021) reported that clinical decision-making levels among traditionally educated students remained average [32]. Jahanpour et al. (2010) highlighted through focus group interviews with senior nursing students the challenges associated with independent clinical decision-making [46]. In our study, students' pre-collaborative learning clinical decision-making scores were moderate. While post-training scores showed improvement, the increase was not statistically significant. Factors such as the shift to online education during the pandemic, limited clinical practice opportunities, students' prior exposure to traditional education in vocational courses, and differences in mental health course content, clinical practice settings, and patient profiles compared to other vocational courses may have influenced these results. Traditional teaching methods often involve passive learning, with limited collaboration and student responsibility for their learning outcomes. In contrast, collaborative learning encourages active participation, interaction, and collaboration among students. Compared to traditional methods, collaborative learning better equips students with critical thinking and group skills essential in today's society [47].

6. Limitations

This study was conducted at a single center and focused exclusively on one vocational course. While the collaborative learning method was implemented across the entire class, not all students participated in the study. The use of a single sample and a small sample size limits the generalizability of the results. Furthermore, due to the absence of a control group, it was not possible to determine whether the collaborative learning method was more effective than traditional learning methods. Additionally, the study only conducted pre-test and post-test analyses without follow-up analyses. The sample structure of the study included individuals from diverse sociodemographic backgrounds (e.g., gender, educational background), which may have influenced the outcomes of collaborative learning.

7. Conclusion

This study underscores the positive impact of collaborative learning on students' critical thinking, self-confidence, and clinical decision-making skills. These findings indicate that adopting collaborative learning can significantly enhance students' professional competencies before graduation. As an active learning approach, collaborative learning enables students to develop multiple skills, including clinical decision-making and critical thinking. By effectively preparing future nursing graduates to navigate complex clinical environments, collaborative learning proves invaluable. It is recommended that teaching techniques be enriched to better achieve the learning outcomes of nursing education and foster the development of both individual and professional skills among students. This model can improve group learning skills with or without the use of simulation, web-based, and artificial intelligence-enhanced methods. It is recommended that this method be used in classes as it can make it easier to achieve nursing education program goals.

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Data availability

Data will be made available on request.

CRediT authorship contribution statement

Reyhan Eskiyurt: Writing – review & editing, Writing – original draft, Resources, Methodology, Formal analysis, Data curation, Conceptualization. **Birgül Özkan:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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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