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Strategies used for the Development of Critical Thinking Skills in Nursing Students: A Scoping Review

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Abstract

Backgrounds and Aims: Critical thinking (CT) is one of the important skills that is used both in nursing education and practice. Many studies show that nursing students have poor CT skills. Since different strategies have been suggested for the development of CT in nursing students, the review and comparison of these strategies can help us to select an appropriate strategy in different situations and close the knowledge gap in this area.

Materials and methods: In this scoping review article, keywords such as nursing education, critical thinking, teaching strategies, skill development, nursing students as well as their related terms were used to search for relevant articles published between 2013 and 2024 in renowned databases, including SID, PubMed, Web of Science, CINAHL, Scopus and ERIC.

Results: A total of 412 studies were identified after the search, which were examined for inclusion/exclusion criteria. Finally, 28 studies that met the entry criteria were selected for the analysis. The results of analysis showed that most of the studies had been conducted on methods that increase the nursing students' CT score or their tendency towards CT. The results of present study can be summarized in four categories of effective factors in education, suggested strategies, effectiveness of strategies and comparison of strategies.

Conclusion: The findings showed that the use of different strategies is effective in increasing the nursing students' CT score or their tendency towards it. However, paying attention to effective factors in education, as well as updating and combining strategies are important in developing CT skills in nursing students.

Keywords: Nursing Education, Critical Thinking, Teaching Strategies, Review literature.

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Introduction

The rapid development of health system requires nurses to have skills beyond their clinical and technical skills. Critical thinking (CT) is one of the fundamental aspects of nursing practice, which enables nurses to examine complex clinical scenarios, evaluate extensive information, and make informed decisions that have direct impact on patient's health outcomes. Nurses with advanced CT skills can effectively assess patient needs, identify potential problems, provide evidence-based care and provide care plans as needed [1]. Critical evaluation of available information and making rational decisions are significantly important in clinical environment, which today is characterized by rapid advances of medical technology and promotion of patient-centered care [2]. The nursing education system plays a vital role in preparing students with essential CT skills. Traditional methods of education, which depend only on memorization and passive learning, are often insufficient in developing CT skills needed in modern nursing practice [3]. There is a growing acknowledgment on the necessity of innovative teaching techniques that actively involve students, encourage self-directed learning, and nurture CT capability which is indispensable for the safe and effective patient care [4].

The concept of CT refers to the multifaceted interaction of cognitive skills. Benner's novice-to-expert model chart refers to the gradual progression of nursing skill and emphasizes on the increasing importance of CT for nurses as they progress in their careers [5]. CT can be broadly defined as the ability to objectively analyze information, identify hypotheses, evaluate evidence, and formulate logical judgments [6]. It also encompasses competencies such as problem-solving, decision-making, critical evaluation, and clinical reasoning [7].

The development of CT skills in students is a complex issue, because it first requires the development of a set of cognitive skills, including the ability to analyze and process information, the desire to ask questions and reflect on assumptions, and also engage in face-to-face arguments with an open mind [8]. Moreover, to develop effective CT skills, students need to have substantial knowledge, proper communication skills, and efficient collaboration with healthcare teams [9]. The advantages of well-developed CT skills in nurses have been widely documented. Nurses with effective CT skills have a better clinical judgment and a higher confidence in their decision-making. Research shows a positive correlation between CT and patient outcomes, including reduced medication errors and improved adherence to evidence-based practice guidelines [10].

Despite the importance of CT in nursing, traditional methods of education often insufficiently develop CT skills in students. These methods usually emphasize on memorization through repetition and passive learning, which limits the students' engagement in actively analyzing information and applying knowledge in real-world clinical scenarios [11]. The purpose of this scoping review is to summarize the existing studies conducted on the methods of improving nursing students' CT skills. It also aims to find the most successful pedagogical strategies, clarify the mechanisms by which these strategies promote CT skills, and underscore potential areas for further exploration. This scoping review is designed to find and assess the current educational approaches used for the development of CT skills in nursing students, and also investigate the

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mechanisms by which these strategies promote CT skills in nursing students.

Methods

This is a scoping review that was conducted to summarize studies conducted on strategies used to develop CT skills in nursing students, and close the knowledge gap in this regard. For this purpose, a search was conducted to find related studies published between 01.01.2013 and 01.06.2024, using keywords such as nursing education, critical thinking, teaching strategies, skill development, and nursing students as well as their equivalents (critical reasoning, critical reasoning and nursing curriculum, nursing education, pedagogical approaches and educational interventions). Valid databases, such as SID, PubMed, Web of Science, CINAHL, Scopus and ERIC, were used to search for the related studies. Inclusion criteria for the studies included; being related to the study topic, being published between 2013 and 2024. Exclusion criteria also included; lack of access to the article's full text, review studies and unclear outcomes. Search strategy in PubMed was: (("CT"[tiab] OR "critical reasoning[tiab]" OR "clinical reasoning"[tiab]) AND ("nursing education"[tiab] OR "nursing curriculum"[tiab] OR "nursing students"[tiab]) AND ("teaching strategies"[tiab] OR "educational interventions" [tiab] OR "pedagogical approaches"[tiab]) AND 2013/1/1:2024/6/1[dp]).

After the search, a total of 412 studies were found, which were later reduced to 350 studies after removing the duplicates. The process of examining and selecting the studies can be seen in Figure (1).

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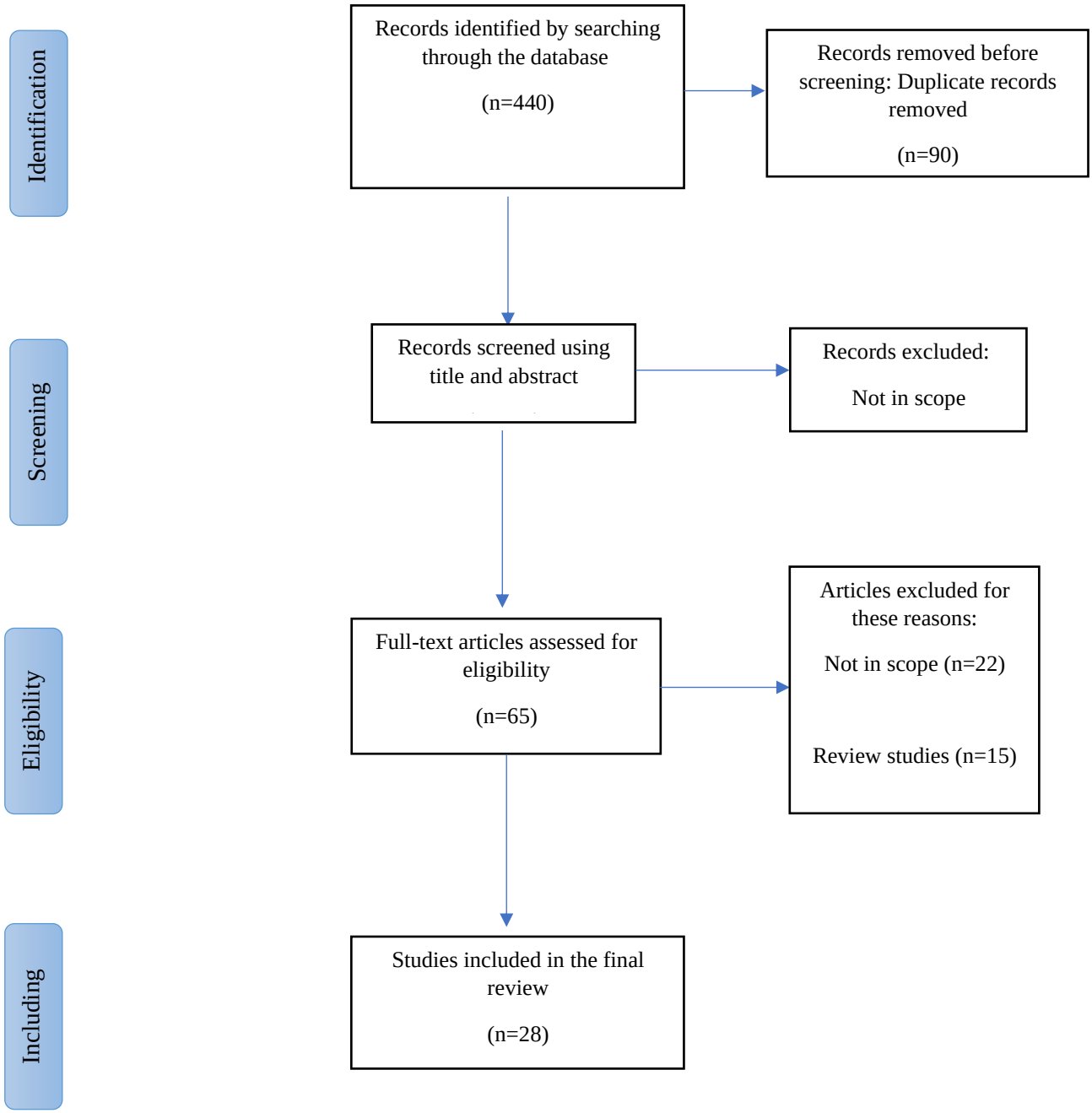
Figure 1. Assessment process



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Results

In total, 28 studies were selected for final review in this study, which were divided into 4 categories in terms of content. Some studies had examined the effectiveness of a specific strategy (10 studies), some had compared two strategies (7 studies), others had proposed a specific strategy (4 studies), and finally, some studies examined effective factors in the development of CT skills (7 studies).

The selected studies were also divided into two groups in terms of performance: “strategies that help to develop these skills” and “strategies that increase students' tendency towards critical thinking”. It seems that due to the diversity of studies (a greater number of interventional and descriptive studies), more strategies can still be found and their effectiveness can be examined. The selected studies and a summary of their results can be seen in Table 2. Some of the strategies mentioned in these studies were education-based strategy to develop problem-solving skills, context-based training strategy, education-based strategy for simulation, training strategy with conceptual mapping, and team-based training strategy. Some other strategies were related to evidence-based education or CT training in workshop, and some were related to education-based class discussions or teaching of the nursing process. According to these studies, there are different factors in education that affect the development of CT, such as interpersonal skills, emotional intelligence, learning styles, teacher's awareness and attitude towards the importance of CT, creative atmosphere, learner’s personality, support of the faculty, and novelty of teachers' strategies.

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Table 2. Summary of the studies

Name of authors and year of publication	Country	Sample characteristic	Sample size	Study design	Result
Jiménez-Gómez et al,2019 [7]	Bolivia, Colombia, Ecuador, Peru, and Venezuela	Nursing programs across the Andean region, which included both public and private institutions, indicate a diverse sample of educational settings	76	Cross-sectional	The findings suggest that nursing curricula in the Andean region are increasingly incorporating CT as an essential cognitive and personal skills for effective communication and professional practice
Nurakhir et al,2020[12]	Indonesia	Undergraduate students	12	Qualitative	This study investigated the effect of class discussion educational strategy in improving the level of CT in students and showed that the students believed that with class discussion, in addition to better learning, they gain more CT skills.
Makhene ,2019[13]	Brazil	Nurse educators	15	Qualitative	Socratic inquiry is a useful tool for encouraging the use of CT abilities in problem-solving in both practice and educational contexts.
Dehghanzadeh et al. ,2018[14]	Iran	Nursing students in Rasht who had taken the movement disorders course	43	Quasi-experimental	This study showed that the educational strategy of the flipped classroom had a positive effect on the tendency of students towards critical thinking.
Noohi and Abaszadeh,2013[15]	Iran	5th semester nursing students	60	Quasi-experimental	It was proved that patient-centered study, in addition to increasing the score of students in clinical education, increased their CT skills.
Firdous et al., 2023[16]	Pakistan	The student of the general nursing school DHQ Hospital Jhang	150	Descriptive	This study showed that nursing instructors can promote CT in students by revising their teaching materials and using methods such as evidence-based education. This study also showed that both the learner and the teacher affect the quality of education and CT is an important part of nursing education.
Zhang and Chen,2021 [17]	China	Nursing students	54	Quasi-experimental	This study demonstrated that nursing students' CT dispositions were significantly impacted by a cooperative clinical practicum.
Jimenez et al., 2021[18]	Spain	First-year,second-year,third-year and fourth-year undergraduate nursing students.	215	Descriptive	CT skills were satisfactory in the aspect of content compared to the conversational aspect. Also, the final-year students had higher scores in CT than the freshman students, which showed the effectiveness of educational strategy that prioritizes the development of CT.
El Yazidi,2023 [4]	Morocco	Nursing students	160	Experimental	The results showed that different strategies can be used individually or in combination, but cooperative education performs better in developing CT among students.

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Ebrahem et al., 2020 [19]	Egypt	Nursing students	80	Descriptive	In this study, the instructors' level of awareness of CT and their strategies to develop this skill in students were investigated. The result showed that the nursing process writing and small group discussions were the teaching strategies of instructors to increase students' CT. However, the researcher recommends other methods to be used by teachers.
Mahafuie Boso et al.,2020 [20]	South Africa	Nursing students	10	Qualitative	The results showed that three important factors are involved in education; the behavior of instructors, the characteristics of students, and factors related to the university itself. By affecting a wide range of characteristics that develop CT, these factors can hinder or develop it.
Zarifsanaiey et al., 2016 [21]	Iran	Nursing students	40	Quasi-experimental	This study compared the students' CT skills and performance in OSCE tests before and after the training with a simulation strategy.
Sari et al.,2021 [22]	Indonesia	Nursing students	206	Quasi-experimental	The results of this study demonstrated that, while utilizing an inquiry mind map tool, there were variations in students' CT skills and enthusiasm towards learning. The findings also looked at how learning motivation and CT abilities differed based on gender and educational attainment. The study's findings showed the influence of the inquiry mind map tool on improving learning motivation and CT abilities. To strengthen CT abilities, new learning models and other learning tools were suggested to be developed. The article also had some implications...
Kang et al.,2020 [23]	South Korea	Nursing students	47	Quasi-experimental	In this study, the level of CT and self-directed learning abilities were compared before and after the virtual simulation, showing no statistically significant changes. Nonetheless, the capacity to acquire resources for learning—a subscale of self-directed learning—showed statistical relevance.
Hosseini et al.,2014 [24]	Iran	Final year nursing students	60	Quasi-experimental	This study showed that the active educational method (using evidence-based questions in the form of group discussion) in the clinical environment increased CT scores after the intervention and led to the development of CT skills in students.
Lotfi et al.,2020 [25]	Iran	Nursing students	169	Descriptive	This study examined whether educational atmosphere has an important effect on the occurrence of creativity and consequently CT, and concluded that a creative educational atmosphere facilitates the development of CT skills.
Hassanpour Dehkordi and Masoudi,2015 [26]	Iran	Nursing students	48	Quasi-experimental	The mean scores of behavior, attitude and CT skill of CBL group students increased after the intervention, but in the traditional group, no statistically significant relationship was found between the variables before and after the intervention.
Bahador et al.,2018 [27]	Iran	Nursing students	40	Quasi-experimental	This study showed that teaching the nursing process through workshops has increased the scores of CT as well as the quality of nursing care in nursing students.
Cheng et al.,2024 [28]	China	Students from three universities	300	Descriptive	The study found a significant and positive correlation between social media usage (SMU) and critical thinking ability (CTA) among the university students, indicating that increased SMU is linked to improved CTA performance. However, social media dependence (SMD) negatively impacted CTA, suggesting that higher levels of dependence can hinder critical thinking skills.

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Noohi et al.,2014 [29]	Iran	Nursing student	90	Descriptive	This study showed a relationship between educational styles and CT. It also showed that a convergent style leads to the higher development of CT compared to the adaptive one.
Momeni et al.,2017 [30]	Iran	Nursing students	32	Quasi - experimental	The study found that the portfolio group showed a significant improvement in critical thinking after the assessment, while the direct observation group showed a smaller increase. The difference between the two groups was statistically significant, with the portfolio group demonstrating a greater improvement. Additionally, there were notable changes in various aspects of critical thinking, including truth-seeking, critique, analytical power, organizational skills, self-confidence, curiosity, and progress.
Raoufi et al.,2014 [31]	Iran	First semester nursing students of Khorramabad School of Nursing and Midwifery	52	Quasi-experimental	This study showed that the use of the team efficiency method in education strategy increased CT score after the intervention.
Sadeghi-Gandomani et al. ,2017[32]	Iran	Nursing students	70	Quasi-experimental	This study compared common teaching methods with concept mapping, and concluded that concept mapping promotes CT skills in students more effectively.
Adib et al.,2017 [33]	Iran	Nursing students	32	Quasi-experimental	This study revealed that holding a CT training workshop for nursing students increased their CT scores and improved their skills.
Ostadhassanloo et al.,2022 [34]	Iran	All valid scientific studies related to the subject	80	Qualitative	This study showed that education-based simulation can empower many skills including CT.
Kuhpayehzadeh Isfahani et al., 2017 [35]	Iran	Nursing students	80	Quasi-experimental	This study introduced the educational strategy of team-based learning as an effective method for improving CT skills.
Shahjooi et al.,2014 [36]	Iran	Nursing students	300	Descriptive	This study showed that students with lower interpersonal communication skills have lower levels of CT.
Bagheri et al., 2019 [37]	Iran	Nursing students	100	Descriptive	This study showed that emotional intelligence, as an important and significant component in education, has a strong relationship with CT. As a result, this study suggested that CT should be integrated with cognitive and emotional approaches.

Discussion

In general, the studies found in this review were classified into four groups in terms of content; assessment of strategy's effectiveness, comparison of strategies, suggested strategies, and effective factors in education.

At first, we discuss the studies related to the assessment of strategies' effectiveness. Firdous et al. (2023) in a study showed that a traditional teaching strategy adopted by a university in Pakistan was unsuccessful in helping students to develop CT skills, and students obtained low CT scores [16]. On the contrary, Jimenez et al. (2021) showed that the new method adopted by the

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universities of Spain was effective in developing students' CT [18]. Jiménez-Gómez et al. (2019) expressed that CT is becoming more and more important in nursing courses throughout the Andean area, as a necessary cognitive and interpersonal ability for professional practice and efficient communication [7]. Studies related to the effective training factors in the field of CT have proven that the novelty of teachers' strategies and their attitudes toward CT significantly affect the development of students' CT.

Four studies found in this review addressed the effectiveness of collaborative learning and teamwork-based teaching strategies in the development of CT. Al-Yazidi (2023) believed that this method can develop CT skills in a short time, but its effect in the long run and on other concepts of education needs to be examined in future studies [4]. In two separate studies, Raoufi et al. (2014) and Kuhpayehzadeh Isfahani et al. (2017) referred to cooperative and team-based education as a new method that can be combined with other strategies to develop CT skills in students [31, 35]. Noohi and Abaszadeh (2013) considered patient-centered cooperative education as an effective method for improving CT skills in nursing students [15]. Nurakhir et al. (2020) discussed the effectiveness of class discussion in the development of CT and found that class discussion can encourage students to develop CT skills and improve their verbal communication, if added to the educational curriculum [12]. The flipped classroom is a hybrid educational method that combines the traditional classroom with online and out-of-classroom education. Dehghanzadeh et al. (2018), by examining the effect of this method on CT development, found that this method has a positive effect on the students' tendency towards CT development [14]. However, it should be noted that the interest of students in this learning method should be investigated as an important factor in their tendency towards CT. Adib et al. (2017) in a study showed that holding a CT training workshop can significantly increase the students' score of CT skills. To examine the durability of this effect, the students' scores were checked one month after the training, showing a significantly higher score in the intervention group compared to the control group [33]. Bahador et al. (2018) conducted an intervention and found that teaching a CT-based nursing process, in addition to increasing the quality of care provided by students, helps them to develop their CT skills [27].

Some studies found in this review compared two or more educational strategies for developing CT skills. In a study by Makhene (2019), the results showed that, in both practical and educational settings, Socratic inquiry is a helpful technique for promoting the use of CT skills in problem-solving[13]. Zarifsanaiey et al. (2016) found that an integrated strategy that includes simulation and group discussion is much more effective in CT development than a strategy that is based on simulation alone [21]. Sadeghi-Gandomani et al. (2017) made a comparative study between a traditional method and an education that is based on a conceptual map and found that education through mapping is more effective in CT development than the traditional method [32]. However, in another study conducted by Momeni et al. (2017), the results showed that the problem-solving method helped students to have higher CT grades compared to conceptual mapping [30]. In another comparison between the traditional method and other strategies, Hasanpour Dehkordi and Masoudi (2015) found that context-based education is more effective in CT development among students than traditional methods [26]. In a study,

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Momeni et al. (2021) compared two teaching methods in the clinic and found that a guideline-based assessment is a more suitable method than an assessment that is based on direct observation [38]. In a study conducted by Kang et al. (2020), no statistically significant differences were found between the CT score and self-directed learning before and after the virtual simulation intervention. However, a significant difference was observed between the subscales of self-directed learning and the ability to obtain learning materials [23].

In this section, the review of proposed strategies is discussed. Some studies included new strategies that had been designed and presented by researchers. Hosseini et al. (2014) presented a hybrid method as an active educational method, which challenges students by presenting evidence-based questions in the form of group discussion. This method was able to increase the CT scores of students [24]. In another study conducted by Ostadhasanloo et al. (2021), a rationale was sought for the framework of a simulation-based educational program in order to fill the gap between theoretical and clinical education [34]. Among the studies, some had modified a strategy by changing, adding, or reducing a feature. A study by Zhang et al. (2021) showed that a cooperative clinical practicum has a major influence on nursing students' CT dispositions. Students in the cooperative practice group scored significantly higher on the overall CT attitudes compared to those in the solo practicum (367.95 versus 312.35) after the intervention[17]. However, in a comparative study by Sari et al. (2021), the students' CT skills and motivation to learn varied when using an inquiry mind mapping tool. This study also examined the differences in learning motivation and CT skills according to educational achievement and gender, showing how the inquiry mind mapping tool was able to enhance both learning motivation and CT skills. So, they suggested new learning models and other learning tools to be created in order to develop CT skills in students [22].

In this section, factors that are effective in education and the improvement of CT skills are discussed. The study of Noohi et al. (2014) found that learning styles have a significant relationship with CT development, and among them, the convergent style has the most effect on increasing CT skills. As a result, they pointed to the need to revise educational strategies according to the learning styles of learners [29]. Another study by Shahjooie et al. (2014) found that students who have good interpersonal skills tend to think critically better than others. As a result, they stated that, it is worth paying attention to interpersonal skills in choosing an educational method to develop CT skills [36]. Lotfi et al. (2020), in a study pointed out that a creative educational atmosphere can increase the tendency of students towards thinking critically. They referred to the educational atmosphere as an effective parameter in the development of CT skills, adding that the creativity of educational atmosphere has a positive effect on this variable [25]. In the study of Bagheri et al. (2017), emotional intelligence was introduced as an effective intrapersonal factor in the development of students' CT skills. Among the components of emotional intelligence, stress management as an important cognitive skill, played an important role in the development of CT. Thus, they argued that paying attention to emotional intelligence is a necessity in educational strategies [37]. Ebrahem et al. (2020) in a study investigated the knowledge and attitude of nursing instructors regarding the importance of CT in students, as well as the educational

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strategies used by them to develop this skill. They found that the knowledge and attitudes of nursing educators in this field are adequate and their main strategy includes teaching the nursing process and holding small group discussions [19]. However, they recommended that teachers should use newer and mixed strategies, because having knowledge and a positive attitude towards CT is a necessary but not sufficient factor in the development of students' CT skills. In 2019, Mahafuie Boso and his colleagues found three important factors that affect the development of students' CT skills. These factors included teachers' behavior, students' personality, and the faculty's environment (management support) [20]. Cheng et al (2024) showed that the use of social networks has a positive correlation with high CT scores, but virtual dependence has a negative effect on this variable [28].

To adhere to ethical principles, an attempt was made in the present study to use the names of individuals in the studies. One of the limitations of this study was the lack of access to the full text of some articles. Also, some studies were in different languages that we could not use.

Conclusion

The review of selected studies showed that CT is one of the most important skills that enables nursing students to provide rational and safe care both during their education and their work as qualified nurses. One of the best times to develop this skill is during nursing education at universities. Using different strategies can help to increase CT skills or the tendency towards CT in students. But first, it is important to pay attention to the effective factors in education, such as learning styles and educational atmospheres (creative atmosphere, etc.) when choosing an educational strategy. Secondly, updating and combining strategies is also important in developing students' CT skills. The studies revealed an increase in CT scores and the tendency towards CT, by applying some strategies but the long-term effect of these educational strategies was investigated in only three studies. Therefore, it can be recommended to assess the long-term effectiveness of teaching strategies on CT scores.

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Conflicts of interest

The authors declare no conflict of interest in this review.

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