

Critical thinking of nursing students in clinical teaching: an integrative review

Pensamento crítico dos estudantes de enfermagem em ensino clínico: uma revisão integrativa

Pensamiento crítico de los estudiantes de enfermería en la enseñanza clínica: una revisión integradora

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Abstract

Theoretical Framework: Future nurses need to be prepared to develop critical thinking skills due to the diversity and complexity in clinical practice.

Objectives: To explore the current state of scientific knowledge on nursing students' critical thinking, namely in clinical teaching settings.

Methodology: An integrative literature review was conducted in 3 online databases, according to the recommendations of the Joanna Briggs Institute for scoping reviews.

Results: Of a total of 277 articles published between January 2010 and November 2015, 28 were included in this review. Critical thinking is a complex process involving intellectual ability, ability to combine experience, knowledge, and reasoning, and an attitudinal component. Some educational strategies effectively promote the development of these skills in nursing students.

Conclusion: Enabling environments should be created to stimulate students' reflection, creativity, and confidence, as well as to develop and implement innovative strategies that promote critical thinking skills.

Keywords: nursing; students; nursing; education; nursing; clinical clerkship; thinking

Resumo

Enquadramento: Face à diversidade e complexidade da prática é essencial preparar os futuros enfermeiros para desenvolver habilidades de pensamento crítico.

Objetivos: Explorar o estado atual do conhecimento científico sobre o pensamento crítico em estudantes de enfermagem, nomeadamente no contexto do ensino clínico.

Metodologia: Revisão integrativa da literatura em 3 bases de dados eletrónicas, de acordo com as recomendações do Joanna Briggs Institute para a realização de uma *scoping review*.

Resultados: De um total de 277 artigos publicados entre janeiro de 2010 e novembro de 2015, 28 foram incluídos nesta revisão. O pensamento crítico é um processo complexo que envolve habilidade intelectual, capacidade para conjugar a experiência, o conhecimento e o raciocínio e uma componente atitudinal. Existem estratégias educativas que promovem eficazmente o desenvolvimento desta capacidade nos estudantes de enfermagem.

Conclusão: É importante criar ambientes propícios para estimular a reflexão, a criatividade e a confiança dos estudantes e desenvolver e implementarem estratégias inovadoras que promovam as habilidades dos mesmos para pensar criticamente.

Palavras-chave: enfermagem; estudantes de enfermagem; educação em enfermagem; estágio clínico; pensamento

Resumen

Marco contextual: Frente a la diversidad y complejidad de la práctica es esencial preparar a los futuros enfermeros para desarrollar habilidades de pensamiento crítico.

Objetivos: Explorar el estado actual del conocimiento científico sobre el pensamiento crítico en estudiantes de enfermería, en concreto en el contexto de la enseñanza clínica.

Metodología: Revisión integradora de la literatura en 3 bases de datos electrónicas, de acuerdo con las recomendaciones del Joanna Briggs Institute para la realización de un estudio de evaluación *scoping review*.

Resultados: De un total de 277 artículos publicados entre enero de 2010 y noviembre de 2015, se incluyeron 28 en esta revisión. El pensamiento crítico es un proceso complejo que implica habilidad intelectual, capacidad para conjugar la experiencia, el conocimiento y el raciocinio, y un componente actitudinal. Existen estrategias educativas que promueven eficazmente el desarrollo de esta capacidad en los estudiantes de enfermería.

Conclusión: Es importante crear ambientes propicios para estimular la reflexión, la creatividad y la confianza de los estudiantes, así como desarrollar y aplicar estrategias innovadoras que promuevan las habilidades de los mismos para pensar críticamente.

Palabras clave: enfermería; estudiantes de enfermeira; educación en enfermeira; prácticas clínicas; pensamiento

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Introduction

Over the past 30 years, health organizations have gone through multiple changes concerning the demands related to care delivery because of the rapid technological development and production and dissemination of scientific knowledge. In this complex and changeable care environment, nursing professionals need to think permanently and develop skills that will enable them to solve current or potential problems through an effective clinical judgment and an effective decision-making (Higgs & Jones, 2000).

The increasing problematization of critical thinking in nursing has been driven by the response to the constant changes in the healthcare environment to which nurses should be aware of. At the beginning of the 1990s, this issue was already a concern for nursing teachers, as can be seen in Schank's *Wanted: nurses with critical thinking skills* (1990) which was published in *The Journal of Continuing Education in Nursing*.

In recent years, the need to prepare future nurses to acquire and master thinking skills has been identified based on the fact that reasoning and criticism, when inserted into the thinking process, are key thinking tools for understanding reality and adjusting knowledge. Enders, Brito, and Monteiro (2004) advocate the acquisition of critical thinking skills in nursing for three reasons. First, nurses' need to use independent judgment, that is, intervene based on a rational assessment of the situation rather than on a prejudiced assessment or unquestioning submission to the impositions of other professionals and institutions. Second, the *liberation of the individual*, in which professionals move away from the control of unjustified beliefs and attitudes and act in accordance with their own ideas, while always taking the ideas of others into consideration. Third, the need to develop rationality in the clinical and scientific judgment inherent to the nursing process for the patient's benefit.

Critical thinking has been addressed by several schools of thought, namely philosophy,

psychology, and education (Lewis & Smith, 1993). Although there is no universally accepted definition of critical thinking, critical thinking seems to be widely defined as the intentional and self-regulatory judgment that results in the interpretation, analysis, evaluation, and inference of a particular aspect of reality; it includes an explanation of the evidential, conceptual, methodological, and criteriological considerations on which judgment is based; and it does not admit statements without recognizing legitimacy, in which the more trained these skills are, the higher is the likelihood of a desirable outcome (Alfaro-LeFevre, 1999; Facione, 1990).

The classical *The Delphi Report* by Facione (1990) and published by the *American Philosophical Association* describes the ideal critical thinker as the individual who is usually inquisitive, well-informed, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, cautious in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit.

Critical thinking in nursing can be defined as the process of intentional and reflective judgment about nursing problems, where the focus is on clinical decision-making, in order to provide safe and effective care (Watson & Glaser, 1991). In the development of critical thinking skills, clinical teaching is particularly important because it is the place where students not only make the initial contact with clinical practice, but also begin the process of professional socialization, and because it is rich in unpredictability and requires the mobilization of theoretical knowledge to the practical reality (Abreu, 2003, 2007).

In 1992, the National League for Nursing in the United States announced that all nursing curricula should stimulate critical thinking and, in 1997, the Royal College of Nursing in Australia stated that the quality of nurs-

ing practice depends on nurses' educational preparation to critically analyze and modify nursing interventions.

This review aims at exploring the current state of scientific knowledge related to nursing students' critical thinking and describing this evidence by developing a conceptual map on how nursing students develop their critical thinking during clinical practice, with an emphasis on critical thinking promotion strategies. Such data are relevant because they may contribute towards the analysis, assessment, reflection, and research on nursing students' teaching-learning process. In accordance with the recommendations of the Joanna Briggs Institute (JBI) for scoping reviews (JBI, 2015), the formulation of the research question was based on the PCC mnemonic (Population, Concept, and Con-

text): What is known in the scientific literature about the critical thinking of nursing students in clinical teaching?

The goals, inclusion criteria, and methods established for this review were specified and documented in a protocol, which was previously drawn up but not published.

Methodological procedures of integrative review

We performed a literature review on the critical thinking of nursing students in clinical teaching and its underlying concepts following the guidelines of the JBI methodology for scoping reviews (2015).

The inclusion criteria of articles are shown in Table 1 and were defined according to the population, context, type of study, language and date of publication.

Table 1
Inclusion criteria of the studies

Population	Concepts	Context
Studies including adults (aged > 18)	Studies addressing critical thinking:	Studies addressing clinical teaching:
Studies including 1 st -cycle nursing students <i>Students, nursing</i>	<i>Thinking</i> <i>Critical thinking</i> <i>Judgment</i> <i>Decision making</i> <i>Problem solving</i>	<i>Clinical practice</i> <i>Clinical teaching</i> <i>Clinical placement</i> <i>Clinical learning</i>
		No geographic or ethnic limitations
Types of study All primary and secondary, quantitative or qualitative studies		
Language of publication Studies published in Portuguese or English		
Date of publication Studies published between 1 January 2010 and 30 November 2015		

The identification of articles to be included in this literature review went through a thorough and systematic selection process. Initially, we performed exploratory searches in the selected online databases, using some of the above-mentioned keywords in order to provide a better framework to the topic of nursing students' critical thinking. Subsequently, and after reading and analyzing the most relevant scientific articles, we iden-

tified the major keywords and search terms used, in order to create the Boolean expressions for the search.

Thus, the scientific articles included in this review were selected through a search conducted in three online databases with important data on the topic (MEDLINE with full text[®], CINAHL plus with full text[®], and Cochrane Library Plus[®]) using three Boolean expressions that combine free

terms with indexed terms (Medical subject headings or Headings), combined with the Boolean operators “OR” and “AND” and the tool “*”.

The search strategy (Boolean search expression and activated filters) used in the online database searching is shown below:

MEDLINE with full text® - ((MH “Students, Nursing”) AND ((MH “Thinking”) OR (“Critical Think*”) OR (MH “Judgment”) OR (MH “Decision Making”) OR (MH “Problem Solving”) OR (MH “Problem-Based Learning”) AND ((MH “Education, Nursing”) OR (Clinica* Practice) OR (MH “Teaching”) OR (Clinical Teaching) OR (Clinica* Placement) OR (Clinica* Learning))); Activated filter: Limiters: Full-text; Publication date: 2010/01/01-2015/11/30; Expanders: Also search in full text; Search modes: Boolean/Expression; Language: Portuguese and English.

CINAHL plus with full text® - (((MH “Students, Nursing, Baccalaureate”) OR (MH “Students, Nursing”) OR (MH “Students, Nursing, Practical”)) AND ((MH “Critical Thinking”) OR (MH “Decision Making, Clinical”) OR (MH “Thinking”)) AND ((MH “Education, Nursing”) OR (MH “Teaching Methods, Clinical”) OR (MH “Clinical Competence”) OR (Clinica* Practice) OR (Clinica* Teaching) OR (Clinica* Placement) OR (MH “Student Placement”) OR (Clinica* Learning) OR (MH “Learning Environment, Clinical”))); Activated filter: Limiters: Full-text; Publication date: 2010/01/01-2015/11/30; Expanders: Also search in full text; Search modes: Boolean/Expression; Language: Portuguese and English.

Cochrane Library Plus® - ((“Students, Nursing”) AND ((“Critical Thinking”) OR (“Decision Making”) OR (“Problem Solving”)) AND ((“Clinica* Practice”) OR (“Student Placement”) OR (“Clinica* Competence”) OR (“Clinica* Placement”) OR (“Clinica* Learning”))); Activated filter: Limiters: Full-text; Publication date: 2010/01/01-2015/11/30.

With the purpose of incorporating gray literature in the analysis and discussion of the topic, it is important to mention that, in addition to the scientific articles identified through the above-mentioned search, other studies that met the inclusion criteria were added from other free searches. Then, duplicate records were excluded.

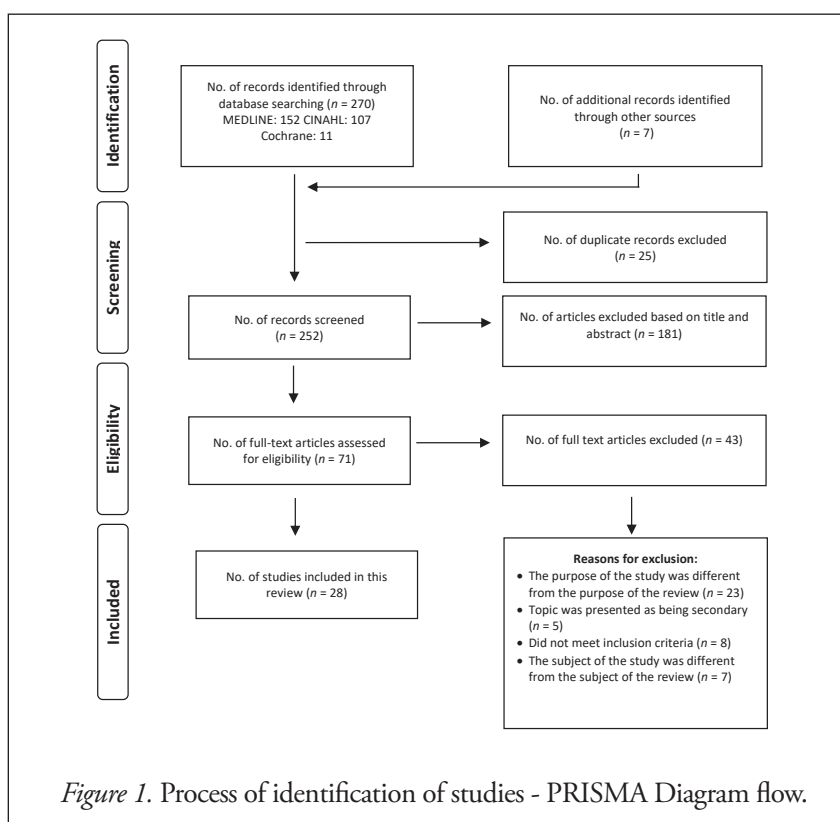
Although the search was conducted in English, scientific articles written in English or Portuguese could be included.

Studies published between 1 January 2010 and 30 November 2015 (when the search was conducted) were eligible for inclusion. No restrictions were made concerning the type of study.

Results and interpretation

Of the 277 articles identified, 25 were excluded for being duplicates. The process of article selection started with the application of two screening tests. The first test - Screening Test I - was applied to 252 studies. After this test, which consisted of the analysis of the title and abstract of each article eligible for inclusion in this review, 181 studies were excluded. The second test - Screening Test II - was applied to the 71 remaining articles. This test consisted of the full-text reading of each article and analysis of the population, concepts, and contexts which were previously set for this review, and resulted in the exclusion of 43 articles.

The reasons for exclusion included: the objective of the study was different from the topic of this review (23), the issue of critical thinking was presented as a secondary or additional topic and provided little information for the discussion (5), the study did not meet the inclusion criteria (8), the subject of the study was different from the subject of the review (7). Finally, we included 28 studies in this review.



The articles included in this review were analyzed in two phases. In the first phase, a descriptive analysis was performed concerning the productivity characteristics (number of publications per year and country where the study was conducted) and the methodological characteristics (type of study design; sample type and size; and study objectives) of the studies. In the second phase, a content analysis was performed to the studies, which was divided into two key areas: the conceptualization of critical thinking, and strategies for promoting critical thinking.

In what concerns the distribution of studies by year of publication, of the 28 articles included in this review, most of the relevant studies were published in 2010 (nine), six were published in 2013, six in 2014, three in 2011, and only one study was published in 2015.

With regard to the country of publication of the included studies, 12 relevant studies on this topic were published in the United States of America, three studies were published in Portugal, two studies were published in Korea, China, and Iran, and one study was published in each of the following countries:

Brazil, Canada, United Kingdom, Sweden, Spain, Turkey, and Singapore.

With regard to the study methodology, namely the type of study of the articles included in this review, the studies of analysis were the most common (11, of which four were literature reviews), followed by qualitative (six) and descriptive (five) studies on the topic of critical thinking among nursing students. On the other hand, experimental studies (two), quasi-experimental studies (two), and mixed-method studies (two) were less common.

With regard to the type of sample, 18 studies (64.3%) used exclusively undergraduate nursing students; six studies had no sample (justified by the research design); one study used baccalaureate and accelerated second-degree nursing students; another one used senior nursing students; another one used students and teachers of the nursing undergraduate degree; and, finally, another one used undergraduate students of different health areas, including the nursing undergraduate degree. As to the size of the sample, nine of the 28 studies had a sample composed of more than

50 participants, five studies had a sample composed of 20 to 50 participants, and three studies had a sample composed of less than 20 participants.

As for the objectives of the studies included in this review (Table 2), 15 articles focused on the analysis and assessment of strategies for promoting critical thinking, 11 on the

analysis and assessment of critical thinking, 11 on the skills and dispositions for critical thinking, seven on the context that influences critical thinking, three on the relationship between critical thinking and the nursing process, three on the conceptualization of critical thinking and, finally, three on the factors that interfere with critical thinking.

Table 2

Studies included in this review and their main objectives

Study	Main objective
S1 Mun, M. S. (2010). An analysis of narratives to identify critical thinking contexts in psychiatric clinical practice. <i>International Journal of Nursing Practice</i> , 16(1), 75-80. doi: 10.1111/j.1440-172X.2009.01803.x	To identify the critical thinking contexts that nursing students face in psychiatric clinical practices.
S2 Vivien, W. X., Tham, L. K., Lau, S. T., Mei, T.-T., & Kiat, T. K. (2010). An exploration of the critical thinking dispositions of students and their relationship with the preference for simulation as a learning style. <i>Singapore Nursing Journal</i> , 37(2), 25-33.	To explore and analyze seven aspects of the critical thinking disposition.
S3 Atay, S., & Karabacak, U. (2012). Care plans using concept maps and their effects on the critical thinking dispositions of nursing students. <i>International Journal of Nursing Practice</i> , 18(3), 233-239. doi: 10.1111/j.1440-172X.2012.02034.x	To analyze the effects of care plans prepared using concept maps on the critical thinking dispositions of students.
S4 Raurell-Torredà, M., Olivet-Pujol, J., Romero-Collado, À., Malagon-Aguilera, M. C., Patiño-Masó, J., & Baltasar-Bagué, A. (2015). Case-based learning and simulation: Useful tools to enhance nurses' education?: Nonrandomized controlled trial. <i>Journal of Nursing Scholarship</i> , 47(1), 34-42. doi: 10.1111/jnu.12113	To compare the communication and critical thinking skills of nursing students in the control group with those of students in the intervention group, and to compare the communication and critical thinking skills of nursing students with those of nurses with clinical experience in continuing professional education.
S5 Mann, J. (2010). <i>Promoting curriculum choices: Critical thinking and clinical judgment skill development in baccalaureate nursing students</i> (Master's dissertation). Retrieved from https://kuscholarworks.ku.edu/handle/1808/6742	To evaluate the effectiveness of an educational strategy (grand rounds) to develop critical thinking and clinical judgment skills in nursing students.
S6 Salsali, M., Tajvidi, M., & Ghiyasvandian, S. (2013). Critical thinking dispositions of nursing students in Asian and non-Asian countries: A literature review. <i>Global Journal of Health Science</i> , 5(6), 172-178. doi: 10.5539/gjhs.v5n6p172	To compare nursing students' critical thinking dispositions in Asian and non-Asian countries.
S7 Brudvig, T., Dirkes, A., Dutta, P., & Rane, K. (2013). Critical thinking skills in health care professional students: A systematic review. <i>Journal of Physical Therapy Education</i> , 27(3), 12-25.	To determine if health students' critical-thinking skills change as a result of participating in a health care professional education program, and to assess the quality of the evidence evaluating this change.

S8

Fero, L., O'Donnell, J., Zullo, T., Dabbs, A., Kitutu, J., Samosky, J., & Hoffman, L. (2010). Critical thinking skills in nursing students: Comparison of simulation-based performance with metrics. *Journal of Advanced Nursing*, 66(10), 2182–2193. doi: 10.1111/j.1365-2648.2010.05385.x

To examine the relationship between critical thinking skills and performance in simulated clinical scenarios.

S9

Newton, S., & Moore, G. (2013). Critical thinking skills of basic baccalaureate and accelerated second-degree nursing students. *Nursing Education Perspectives*, 34(3), 154-158. doi: 10.5480/1536-5026-34.3.154

To describe baccalaureate and accelerated second-degree nursing students' critical thinking skills and analyze the educational implications.

S10

Marchigiano, G., Eduljee, N., & Harvey, K. (2011). Developing critical thinking skills from clinical assignments: A pilot study on nursing students' self-reported perceptions. *Journal Of Nursing Management*, 19(1), 143-152. doi: 10.1111/j.1365-2834.2010.01191.x

To describe students' perceived levels of confidence for using thinking skills when creating a care plan and a narrative, and to determine whether students noted any difference between the two formats in relation to promoting critical thinking skills.

S11

Morey, D. (2012). Development and evaluation of web-based animated pedagogical agents for facilitating critical thinking in nursing. *Nursing Education Perspectives*, 33(2), 116-120. doi: 10.5480/1536-5026-33.2.116

To evaluate the effectiveness of animated pedagogical agents on critical thinking among nursing students.

S12

Gazarian, P. (2010). Digital stories: Incorporating narrative pedagogy. *The Journal Of Nursing Education*, 49(5), 287-290. doi: 10.3928/01484834-20100115-07

To describe the use of digital narratives as a strategy to enhance critical thinking skills in nursing students.

S13

Head, B., & Bays, C. (2010). Engaging nursing students and community partners in the development of decision cases. *Journal Of Nursing Education*, 49(6), 346-350. doi: 10.3928/01484834-20100217-06

To describe how senior nursing students partnered with community health professionals to develop and use case studies in teaching activities with other students.

S14

Forsgren, S., Christensen, T., & Hedemalm, A. (2014). Evaluation of the case method in nursing education. *Nurse Education In Practice*, 14(2), 164-169. doi: 10.1016/j.nepr.2013.08.003

To understand nursing students' experiences of case-based learning as an educational tool in order to find out if it supports their learning.

S15

Chan, Z. (2013). Exploring creativity and critical thinking in traditional and innovative problem-based learning groups. *Journal of Clinical Nursing*, 22(15-16), 2298-2307. doi: 10.1111/jocn.12186

To explore students' attitudes towards problem-based learning, creativity, and critical thinking, and the relevance to nursing education in clinical practice.

S16

Tschannen, D., & Aebbersold, M. (2010). Improving student critical thinking skills through a root cause analysis pilot project. *Journal of Nursing Education*, 49(8), 475-478. doi: 10.3928/01484834-20100524-02

To analyze the effectiveness of a pilot project in improving critical thinking skills.

S17

Lisko, S., & O'Dell, V. (2010). Integration of theory and practice: Experiential learning theory and nursing education. *Nursing Education Perspectives*, 31(2), 106-108.

To discuss the integration of Kolb's theory of experiential learning based on the practical integration of a model aimed to provide critical thinking skills for nursing students,

S18

Lechasseur, K., Lazure, G., & Guilbert, L. (2011). Knowledge mobilized by a critical thinking process deployed by nursing students in practical care situations: A qualitative study. *Journal of Advanced Nursing*, 67(9), 1930-1940. doi: 10.1111/j.1365-2648.2011.05637.x

To describe the mobilization of knowledge within the critical thinking process deployed by female undergraduate nursing students in practical care situations.

S19

Whiffin, C., & Hasselder, A. (2013). Making the link between critical appraisal, thinking, and analysis. *British Journal of Nursing*, 22(14), 831-835. doi: 10.12968/bjon.2013.22.14.831

To analyze how the critical appraisal of research can be an opportunity for students to develop transferable critical thinking skills.

S20

Ahn, S., & Yeom, H. (2014). Moral sensitivity and critical thinking disposition of nursing students in Korea. *International Journal of Nursing Practice*, 20(5), 482-489. doi: 10.1111/ijn.12185

To examine the level of moral sensitivity and critical thinking disposition among nursing students.

S21

Tajvidi, M., Ghiyasvandin, S., & Salsali, M. (2014). Probing concept of critical thinking in nursing education in Iran: A concept analysis. *Asian Nursing Research*, 8(2), 158-164. doi: 10.1016/j.anr.2014.02.005

To analyze and clarify the concept of critical thinking in nursing education in Iran.

S22

Romeo, E. (2010). Quantitative research on critical thinking and predicting nursing students' NCLEX-RN performance. *Journal of Nursing Education*, 49(7), 378-386. doi: 10.3928/01484834-20100331-05

To review and analyze quantitative research findings relevant to the measurement of nursing students' critical thinking skills.

S23

Kong, L., Qin, B., Zhou, Y., Mou, S., & Gao, H. (2014). The effectiveness of problem-based learning on development of nursing students' critical thinking: A systematic review and meta-analysis. *International Journal of Nursing Studies*, 51(3), 458-469. doi: 10.1016/j.ijnurstu.2013.06.009

To estimate the effectiveness of problem-based learning in developing nursing students' critical thinking.

S24

Gerdeman, J., Lux, K., & Jacko, J. (2013). Using concept mapping to build clinical judgment skills. *Nurse Education In Practice*, 13(1), 11-17. doi: 10.1016/j.nepr.2012.05.009

To describe the use of concept mapping as a teaching strategy in the development of critical thinking skills.

S25

Spínola, A., & Amendoeira, J. (2012). *O estudante de enfermagem no processo de cuidados: Uma reflexão*. Retrieved from <http://hdl.handle.net/10400.15/613>

To identify dimensions related to the care process valued by students in clinical practice.

S26

Godinho, C., & Amendoeira, J. (2012). *A importância de ambientes de aprendizagem crítica*. Retrieved from <http://hdl.handle.net/10400.15/614>

To understand how students learn how to use critical thinking skills in clinical judgment for decision-making in care learning contexts.

S27

Spínola, A., & Amendoeira, J. (2014). O processo de cuidados: Análise da concepção dos estudantes de enfermagem. *Revista de Enfermagem Referência*, 4(2), 163-170. doi: 10.12707/RIV14006

To analyze the perception of the care process in clinical practice using a specific computer strategy.

S28

Oliveira, S. (2014). *Simulação clínica com participação de atores no ensino da consulta de enfermagem: Uma pesquisa-ação* (Master's dissertation). Retrieved from <https://repositorio.ufsc.br/xmlui/handle/123456789/123331>

To understand how clinical simulation involving actors contributes to the experiential learning of nursing consultation.

Conceptualization of critical thinking

Given the variability of concepts found in the literature, researchers face major challenges in this area. Based on the analysis of the studies included in this review, we realized that there is an attempt to associate alternative terms to critical thinking, such as: clinical decision-making, analytical thinking, clinical judgment, critical judgment, creative thinking, problem-solving, reflective thinking, and diagnostic reasoning (Brudvig, Dirkes, Dutta, & Rane, 2013; Gerdeman, Lux, & Jacko, 2013; Mann, 2010; Whiffin & Hasselder, 2013). However, this strategy does not seem appropriate given the high variability of related concepts. For this reason, it is imperative to clarify the concept of critical thinking.

The analysis of the studies conducted during the timeframe established for this review showed that only a few studies aimed to provide or update the definition for the concept of critical thinking, and that authors used preexisting concepts, with the exception of Tajvidi, Ghiyasvandin, and Salsali (2014) who conducted their study in Iran where the knowledge produced on this topic was scarce. Although there is no universally accepted definition, we believe that the concepts put forward by Facione (1990) and Facione, Facione, and Sanchez (1994) are the most consensual ones, with various references throughout the literature reviewed, namely the studies of Brudvig et al. (2013), Fero et al. (2010), Mann (2010), Marchigiano, Eduljee, and Harvey (2011), Salsali, Tajvidi and Ghiyasvandian (2013). Thus, the first concept, obtained after a study of expert consensus, conceptualizes critical thinking as the intentional and self-regulatory judgment that results in the interpretation, analysis, evaluation, and inference of reality and an explanation of the evidential, conceptual, methodological, and criteriological considerations on which judgment is based. The second concept adds that critical thinking is a complex process that involves cognitive abilities (such as interpretation, clarification, deduction, and inference), scientific knowledge, intellectual honesty, and an attitudinal willingness that can be developed.

In the latest definitions found, critical thinking emerges as metacognition, that is, think-

ing about thinking in order to systematize, rationalize, and clarify the cognitive process that focuses on decision-making (Loving & Wilson; Paul; Turner, as cited in Tajvidi et al., 2014), as a trend characterized by an inner motivation to solve problems and make decisions by thinking (Huan & Vickie, as cited in Salsali et al., 2013) and also as a reasonable and reflective thinking about the decision to be made, including the ability to compare and contrast several alternatives (Landis & Michael, as cited in Fero et al., 2010).

Due to the multiple changes in health systems and the increasing demand for healthcare delivery, some authors argue that nurses should incorporate and develop critical thinking skills, not only because evidence shows that such ability is likely to influence clinical judgment, decision-making and problem-solving, but also because it is an essential component in nurses' professional practice (American Association of Colleges of Nursing, 2008; National League for Nursing, 2006; Simpson & Courtney, as cited in Godinho & Amendoeira, 2010 and Mann, 2010).

According to the studies included in this review, many authors emphasize the importance of critical thinking in nursing, considering it as an essential component of professional responsibility and quality. Tajvidi et al. (2014) mentioned that the definition of Watson and Glaser (1980), despite being old, continues to be widely accepted in the scientific community. For these authors, critical thinking is a composite of attitude, knowledge, and skills, such as the ability to define a problem, choose information to be used in the solution, recognize explicit and implicit assumptions, formulate and select relevant and promising hypotheses, and draw conclusions after the validation of inferences (Watson & Glaser, 1980).

However, some researchers from developing countries are still interested in clarifying the concept of critical thinking in nursing. On the one hand, Tajvidi et al. (2014) concluded that the definition of critical thinking is still changing and is related to the context where it takes place, and that nursing teachers and students are responsible for the development of this logical, situational, purposive, and outcome-oriented thinking process. On the oth-

er hand, Scheffer and Rubenfeld (as cited in Mann, 2010), using same method as Facione (1990) in a community of nurses, concluded that the definition of critical thinking was limited to a cognitive component (composed of confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection) and a component related to the critical thinking ability (composed of analysis, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge). Based on the analysis of the multiple definitions, we believe that critical thinking encompasses three key elements: the individual's intellectual ability to seek, identify, and

challenge relevant assumptions of reasoning for decision-making; the ability to combine experience, knowledge, and reasoning in the identification and analysis of alternative frameworks taking into account the context; and an attitudinal component that incorporates the affective domains, which are capable of influencing the logical, situational, purposive, and outcome-oriented thinking process.

Strategies for promoting critical thinking

After the analysis of all articles, we divided the strategies for promoting critical thinking in nursing students into eleven domains/topics. Table 3 shows in detail the characteristics and evidence of these strategies.

Table 3
Strategies for promoting nursing students' critical thinking

Strategies	Evidence and their characteristics	Author/s
Written or oral narratives	Writing about a critical situation, describing the actions, thoughts and emotions during the contact with the patient and interaction with the health professionals' team, offers an opportunity for students to reflect and think critically about the experience, develop critical thinking and communicative skills, and promote a reflection-based nursing practice.	Mun (2010)
	Describing and reflecting on their first and most important priority of care is a strategy that improves students' levels of confidence for using critical thinking skills.	Marchigiano et al. (2011)
Case-based learning	It improves nursing students' patient evaluation skills. They can be developed in various learning environments, should be planned, and require teachers' training.	Raurell-Torredà et al. (2015)
	The collaboration and discussion between students and professionals in the selection of cases enable the development of critical thinking skills, creativity, and appreciation of group work.	Head and Bays (2010)
	It offers nursing students an opportunity to enhance their judgment and critical thinking skills by applying theory in practice. Students acquire knowledge about patient care in the real context, thus obtaining a holistic understanding of the uniqueness of each health problem. Reflections and discussions in seminars widen students' perspectives, improve their capacity for cooperation, help them to achieve long-lasting knowledge, and bring them closer to professional practice.	Forsgren, Christensen, and Hedemalm, (2014)

	Case studies integrated into online simulations allow students to analyze their own critical thinking and become aware of the importance of critical thinking for an appropriate clinical judgment. Students believe that this strategy is essential for the development of skills to deal with complex situations, reducing errors in clinical decision-making.	Guhde (as cited in Godinho & Amendoeira, 2012)
Case studies based on clinical simulations	Problem-based learning in simulation, using pictures, movies, or human simulation can improve the identification and recognition of the problem and the communication of essential information, and promote appropriate, logical, and prioritized nursing interventions. This strategy can support the development of nursing students' critical thinking skills, thus improving their performance.	Fero et al. (2010)
	In laboratory classes, using a simulator in a recreated scenario fosters the development of critical thinking, exposing students to critical situations in a non-threatening environment. Teachers need to receive training for the development of these strategies.	Horan (as cited in Godinho & Amendoeira, 2012)
	Simulation strategies have a major potential for the development of critical thinking and reflective skills when used under a pedagogical constructivist theory. Experiencing a nursing intervention in a simulated environment allows students to reflect on practice and attitudes in a real context, providing a meaningful learning that does not occur simply by the presence in the context, but by the reflection on the context, providing it a meaning.	Oliveira (2014)
Scenario-based learning	Scenario-based learning makes the bridge between the classroom and the real clinical environment. Although some students have reported that they do not like to be involved in this type of role-playing, evidence shows that it enhances critical thinking skills. This strategy can be developed in various learning settings, should be planned, and requires teacher's training.	Vivien, Tham, Lau, Mei, and Kiat (2010)
	This strategy integrates learning and promotes critical thinking. It allows students to combine theoretical knowledge and skills learned in laboratory and clinical practice. Context-related learning promotes the development of critical thinking skills.	Lisko and O'Dell (2010); Godinho and Amendoeira (2012)
Care plans with or without concept mapping	The development of care plans is an effective strategy to promote critical thinking. In addition, it is possible to argue that designing care plans using the strategy of concept mapping provides a greater contribution to the development of critical thinking skills in students when compared to conventional care plans.	Atay and Karabacak (2012)
	In the design of care plans, students have to analyze information, determine relevance, make connections, set priorities, select appropriate information, apply pertinent knowledge, and evaluate the outcomes of an intervention, and such activity improves their levels of confidence for using critical thinking skills.	Marchigiano et al. (2011)
Grand rounds	Although there is no significant relationship in the assessment of critical thinking before and after the implementation of a teaching program based on the grand rounds learning strategy, the results of the second assessment showed a greater increase in critical thinking skills in the intervention group than in the control group. The qualitative analysis showed that students value the potential of this strategy to help them to solve problems in clinical practice since it promotes joint analysis, discussion, and reflection.	Mann (2010)
Interactive and multimedia learning technology	This strategy is an innovative tool for critical thinking through active engagement of students, asking questions and providing feedback on a series of nursing case studies. Although the results were not fully enlightening, the cognitive and social effects of animated pedagogical agents seem to facilitate critical thinking in nursing students.	Morey (2012)
Problem-based learning	The traditional method of problem-based learning can be effective in the development of problem-solving and critical thinking skills in nursing students. However, the inclusion of innovative activities (e.g., role-playing) can positively influence students' perceptions of creativity and critical thinking in nursing care.	Chan (2013)
	Problem-based learning is an effective learning approach that encourages students to learn autonomously. The evidence in this review and meta-analysis shows that the use of this strategy can improve nursing students' critical thinking when compared with traditional lectures.	Kong, Qin, Zhou, Mou, and Gao (2014)

Research and analysis of publications	Nursing students must demonstrate academic skills consistent with higher education. The structured critical appraisal of publications requires students to think critically about the results before applying their findings. These transferable skills, including critical thinking and objective reasoning, are necessary for students to think critically and creatively about complex problems in clinical practice.	Whiffin and Hasselder (2013)
Concept mapping	Concept maps provide students with a tool to understand the relationships between client data in the clinical setting. This strategy is an interactive way to promote self-directed learning while fostering the growth of crucial clinical judgment skills in nursing students. It also helps students to organize their thoughts, plan and prioritize patient care, and think critically.	Gerdeman et al. (2013)
Promotion of self-accountability through training/learning	Strategies for the promotion of self-training enable students to integrate the care process into clinical teaching. The pedagogical process should focus on strategies that promote students' responsibility for their training/learning. This strategy encourages reflection and promotes the acquisition of critical thinking skills. In addition, students value the process of learning about the care process with a focus on reflection and responsibility and emphasizes knowledge acquisition based on the integration and implementation of knowledge into the daily practice in clinical teaching.	Spínola and Amendoeira (2012)

Two studies included in this literature review, S1 and S10, showed that the narrative is a valid strategy for promoting critical thinking in nursing students. Written or oral narratives allow for an effective communication between students and teachers by enabling the identification of situations in clinical practice where critical thinking is needed, shedding a light on the guidance provided by the supervisor/tutor. In addition to encouraging the development of communication skills, this strategy enables the students to develop an appreciation of their inner resources for thinking and learning, grow intellectually and morally, and develop their ability to understand the complexity of each situation, adapting strategies that are available to them for solving conflicts (Mun, 2010).

Case-based learning (S4, S13, and S14), case studies based on clinical simulations (S8, S26, and S28), scenario-based learning (S2, S17, and S26) and problem-based learning (S15) are simultaneously the most common and most studied strategies used by teachers/clinical supervisors to promote critical thinking. These strategies can help students to be critically reflective, giving them an opportunity to analyze problems, phenomena, and real clinical situations, and linking the classroom to the real clinical environment (Vivien et al., 2010).

According to the literature, another valid strategy for the development of critical thinking skills in nursing students is the development of care plans in combination with con-

cept mapping (S3 and S10) or only concept mapping (S26). Within the nursing process, care plans are an essential tool for solving problems with autonomy and professionalism. They are also crucial in nursing training not only because they allow applying theoretical knowledge into clinical practice, but also because they allow students to think critically about the necessary clinical judgements (Marchigiano et al., 2011).

In the literature analyzed, we found references to other effective strategies for promoting critical thinking in nursing students, including: grand rounds (S5), which is characterized by the creation of discussion groups with professionals, students, and teachers, providing a forum where critical thinking and clinical judgement skills are developed in the clinical environment (Mann, 2010); interactive and multimedia learning technology (S11), which is an innovative tool for critical thinking through online activities (Morey, 2012); research and analysis of scientific publications (S19); and promotion of self-training (S25) using the reflective process for the analysis of responsibility, interpersonal and multiprofessional relationships, and critical/reflective thinking (Spínola & Amendoeira, 2012).

With regard to the limitations of this review, it should be noted that it was impossible to include every existing scientific study. For this reason, searches were limited to three online databases (MEDLINE® with full text, CINAHL Plus with full text, and Cochrane) to include studies available in full-text and open

access, published within a limited timeframe, and with restrictions related to the language of publication (Portuguese and English).

Conclusion

This study allowed us to understand that the concept of critical thinking in nursing is a complex and multidimensional process that encompasses the individual's intellectual ability to seek, identify, and challenge relevant assumptions of reasoning for decision-making; the ability to combine experience, knowledge, and reasoning in the identification and analysis of alternative frameworks taking the context into account; and an attitudinal component that incorporates the affective domains, which are capable of influencing the logical, situational, purposive, and outcome-oriented thinking process.

With regard to the promotion of critical thinking in nursing students, nurses are very concerned with the identification and analysis of the teaching methods that will lead to better results in future professionals' training. In clinical teaching, we point out the strategies used to develop written or oral narratives, case-based learning, case studies based on clinical simulations, scenario-based learning, the development of care plans with or without conceptual mapping, the creation of discussion groups with professionals, students, and teachers, the use of interactive and multimedia learning technology, problem-based learning, the performance of searches and analysis of publications, the development of conceptual maps, and, finally, the promotion of self-accountability in training/learning.

With this study, we expect to provide a set of relevant information for nurses who assume teaching roles, especially nurse teachers, to be able to understand that critical thinking is a key element in nursing students' teaching-learning process and that the quality of nursing practice depends on the nurses' educational preparation to think critically.

Taking the limitations inherent to this type of study into account, and although effective strategies for the development of critical thinking in nursing students were presented throughout this article, we concluded that

further studies, namely quantitative and experimental studies, should be developed on the creation, implementation, and development of these strategies, as well as on the assessment of their effectiveness.

Finally, it can be concluded that the education of professionals oriented to think critically about their daily performance should begin in initial training. Schools and nursing teachers/supervisors are responsible for creating environments conducive to students' reflection, creativity, and confidence, and for identifying, developing, and implementing innovative strategies that encourage the development of critical thinking skills. In this way, it will be possible to achieve a transforming effect on the meaning of the profession in society.

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