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Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol

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Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol

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ABSTRACT

Introduction

Applying critical thinking is essential for nursing students both in an academic and clinical context. Particularly, as critical thinking is a vital part of nurses´ everyday problem solving and decision-making processes. Therefore, regardless of the topic taught or the setting in which it is taught, it requires teaching strategies especially targeting students‘ critical thinking skills and abilities. One challenge with the latter, is the difficulties to assess and evaluate the impact of such teaching strategies on the students´ critical thinking disposition. Hence, our objectives will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities.

Methods and Analysis

Our scoping review will be conducted in accordance with Arksey and O´Malley's framework for scoping studies. Search strategies will be developed in cooperation with an experienced librarian, and adjusted to each individual database e.g. CINAHL, PubMed, PsycINFO, ERIC and ERC. Peer-reviewed published studies conducted with a qualitative, quantitative or mixed method design and focusing our objectives, will be eligible for inclusion. Included studies will be quality assessed in accordance with their study design. Data will be charted using a standardised extraction form. The qualitative data will be presented through a thematic analyses, and the quantitative data by descriptive numerical analysis. Lastly, nurse educators and nursing students will be consulted for validation of the findings from the scoping review.

Ethics and Dissemination

Under the Swedish Ethical Review Act (2003:460) this study does not need ethical clearance by a Regional Ethical Review Board as it not includes any primary empirical data on biological material or private information. The findings will be used to inform the design of a future study aiming to develop an, and subsequently evaluate it, educational intervention targeting teaching strategies focusing on nursing students´ critical thinking skills and abilities.

Keywords

Critical thinking abilities, critical thinking skills, descriptive numerical analysis, nurse educators, thematic analysis

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STRENGTH AND LIMITATIONS OF THIS STUDY

- To ensure rigor and transparency the upcoming scoping review will be based on 1) a solid methodological framework for scoping studies and 2) the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-Sc) checklist.
- A minimum of two members of the review team will independently assess study eligibility.
- Eligible studies will be quality assessed in accordance with their study design.
- To achieve a comprehensive picture of the existing research both qualitative, quantitative and mixed methods designs will be included in this scoping review.
- Despite a potential risk for publication bias, grey literature will not be included, as this will facilitate charting of teaching strategies and outcome assessments targeting critical thinking skills and abilities as described solely in published research.

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INTRODUCTION

Applying critical thinking is essential for bachelor nursing students (hereafter nursing students). Particularly, considering the complex care situations they regularly will find themselves in after graduation.[1] Care situations that amongst others require them to work in accordance with established standards[2] to be able to contribute to a safe, evidence based and optimal clinical practice. Given that nursing is based on scientific knowledge, critical thinking is the reasonable reflection to justify nursing actions based on evidence. Skills and abilities in critical thinking have consequently been found to predict nursing competence together with working years, position, title and educational level i.e. Bachelor or Master in Nursing.[3] Critical thinking is, therefore, a crucial component of every registered nurse´s daily activities, aiding problem solving and decision-making processes.[4]

According to Scheffer and Rubenfeld the ability to execute critical thinking in nursing could be seen from two perspectives; habits of the mind (cognition), and skills employed by the critical thinker.[5] Critical thinking can also be seen as a consecutive process including i) gathering information ii) questioning iii) analysis and evaluation and iv) problem solving and application of theory i.e. the nursing process.[6] This consecutive process of critical thinking needs to be applied both in the clinical area and in the classroom.[7] However, to develop this ability among nursing students is a complex process. To apply critical thinking, the necessary skills and abilities need to be taught and developed during both the students´ clinical placements as well as during their theory courses throughout the nursing education.[4]

One challenge with the concept of critical thinking, often highlighted in the literature, and despite its priority within the nursing education, is the interchangeable use of the concepts of critical thinking, clinical reasoning and clinical judgement.[7-9] Concepts that Victor-Chmil describe as; 'they are not one and the same' (p 34). It needs to be acknowledged, as the authors of this current protocol do, that critical thinking often is used as a broader term which includes the concepts of clinical reasoning and clinical judgement.[8] According to Alfaro-LeFevre clinical reasoning refers to the process used to solve clinical issues and clinical judgement refers to the outcome or conclusion of this process.[7] Therefore, regardless of the topic taught or the setting in which it is taught, requires teaching strategies especially targeting nursing students´ critical thinking skills and abilities. For these strategies to be favourable, it requires implementation throughout the nursing education, and thereby reflected in all parts of the nursing programs´ learning objectives and curricula.[10] It has been outlined that teaching

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strategies such as, problem-based learning, concept-mapping, case-based learning interventions and reflective writing are often used in nursing programs to support critical thinking.[6,10,11] However, another challenge with critical thinking, besides the interchangeable use of concepts, is the difficulty to assess and evaluate the impact of different teaching strategies on the students´ critical thinking disposition (i.e. skills and abilities) as well as the assessment of the different components in the critical thinking process.[8] Hence, our overarching objectives will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities.

METHODS AND ANALYSIS

The upcoming scoping review will address a broad topic (i.e. teaching strategies targeting nursing students' critical thinking skills and abilities, as well as outcome assessments of such skills and abilities), where a diverse range of study designs can be considered relevant in answering our additionally wide review questions. Our scoping review will therefore be designed in accordance with Arksey and O´Malley's methodological framework for scoping studies.[12] However, our design will also be informed by other more recent methodological accounts. [13, 14] The framework will enable us to identify existing gaps in the literature as well as to summarise, evaluate and disseminate the overall state of research activities within the field.[12] The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews checklist (PRISMA-ScR) was used to prepare this protocol.[15] PRISMA-ScR will also form the base for the upcoming scoping review as standardised reporting guidelines can according to Colquhoun et al. support the critical appraisals of published reviews by expanding on their transparency and reproducibility.[16]

Stage 1: Identifying the research question

The research questions for the upcoming scoping review aims for comprehensiveness i.e. they will be broad to cover the breadth of research evidence in our field of focus. As scoping is an iterative methodological process,[12] it is possible for us to decide to add supplementary questions based on the findings emerging during the review process. A modified [17] PICOS (Population, Intervention, Comparison, Outcome and Study Setting) framework will aid us in determining the appropriateness of the research questions, as well as guide us in our database searches (Table 1).

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Table 1. Framework (PICOS) for determination of eligibility of review questions

Criteria	Determinants
Population	Nursing students and/or nurse educators at any semester of study/educational year.
Intervention	Teaching strategies Educational strategies Learning strategies
Comparison	*NA*
Outcome	Critical thinking, and/or critical thinking skills, abilities, dispositions. Outcome assessments for critical thinking, and/or critical thinking skills, abilities or disposition
Study setting	Nursing programmes leading to a Bachelor of Nursing offered worldwide at any higher educational institutions [HEI] Academic context (i.e. during theoretical studies) and clinical context (i.e. during clinical placement)

Since the subsequent goal of the upcoming scoping review is to further the knowledge and understanding about how nurse educators via teaching strategies can target the development of nursing students´ critical thinking skills and abilities we will additionally engage in findings of relevance to this. The following tentative research questions were developed to capture the objectives of the upcoming study:

- Which are the teaching strategies described in the literature as targeting critical thinking skills and abilities among nursing students?
- How are these teaching strategies conceptualised, described and experienced by students and/or nurse educators e.g. pros and cons?
- Which outcomes are described in the literature as used to assess critical thinking skills and abilities?

Stage 2: Identifying relevant studies

The upcoming scoping review will include primary studies utilising both qualitative, quantitative and mixed methods, published in peer-reviewed journals. This strategy will support us to achieve a comprehensive picture of the existing research focusing peer-reviewed studies on teaching strategies targeting critical thinking skills and abilities among nursing students, as well as on existing research focusing on outcome assessments of such skills and abilities. No limits will be applied concerning publication year, since we aim at conducting a comprehensive

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overview of published studies. Studies will be excluded if the population is not identifiable, qualitative and quantitative data is not possible to extract in case of mixed method design or published in other languages than English. All reasons for exclusion will be documented.

In our upcoming scoping review the term ´teaching strategies´ will be used. Thus, our focus is not the overall educational organisation of teaching (i.e. educational strategies) or the students´ individual general learning process (i.e. learning strategies). However, as we are aware of the commonly interchangeable use in the literature of the terms; teaching strategies, educational strategies and learning strategies, they will all be included in our searches. Here the term teaching strategies are operationalised in accordance with Banning, and as encompassing three different perspectives; i) the didactic perspective, which is teacher centred and mainly involves lectures; ii) the facilitative perspective, focusing on self-directed learning making the students articulate their knowledge; and lastly iii) the Socratic perspective which is emphasising student-centeredness and use objective questioning from the teacher. [18]

The following databases; CINAHL, PubMed, PsychInfo, ERIC and ERC will be used to search for eligible studies. These databases are chosen to cover a comprehensive sample of literature from health care science and education. A search strategy for each database will be developed by the review team with assistance from an experienced librarian. Our strategies will include both database specific heading i.e. Medical Subject Headings (MeSH), key words and synonyms. All specific headings and key words will be combined using the Boolean operators OR as well as AND. To ensure comprehensiveness, included studies reference lists will be manually searched. As outlined by Arksey and O´Malley the search strategy should be an iterative process and the search terms could be adjusted while an increased familiarity with the literature is achieved. For this reason, a preliminary pilot search strategy will be applied to the databases and the first 100 search results will be reviewed by the review team to assess validity.[12] During the review team meetings, adjustments will be applied to the search strategy and search terms until full agreement is reached. Grey literature (i.e. literature that is not formally published in sources such as journal articles or books) will not, as described elsewhere, be included in our upcoming scoping study.[19] This will support us to focus on and to chart how teaching strategies targeting skills and abilities such as critical thinking is described in published peer-reviewed research. A draft of a preliminary search in CINAHL is attached in Supplementary file 1.

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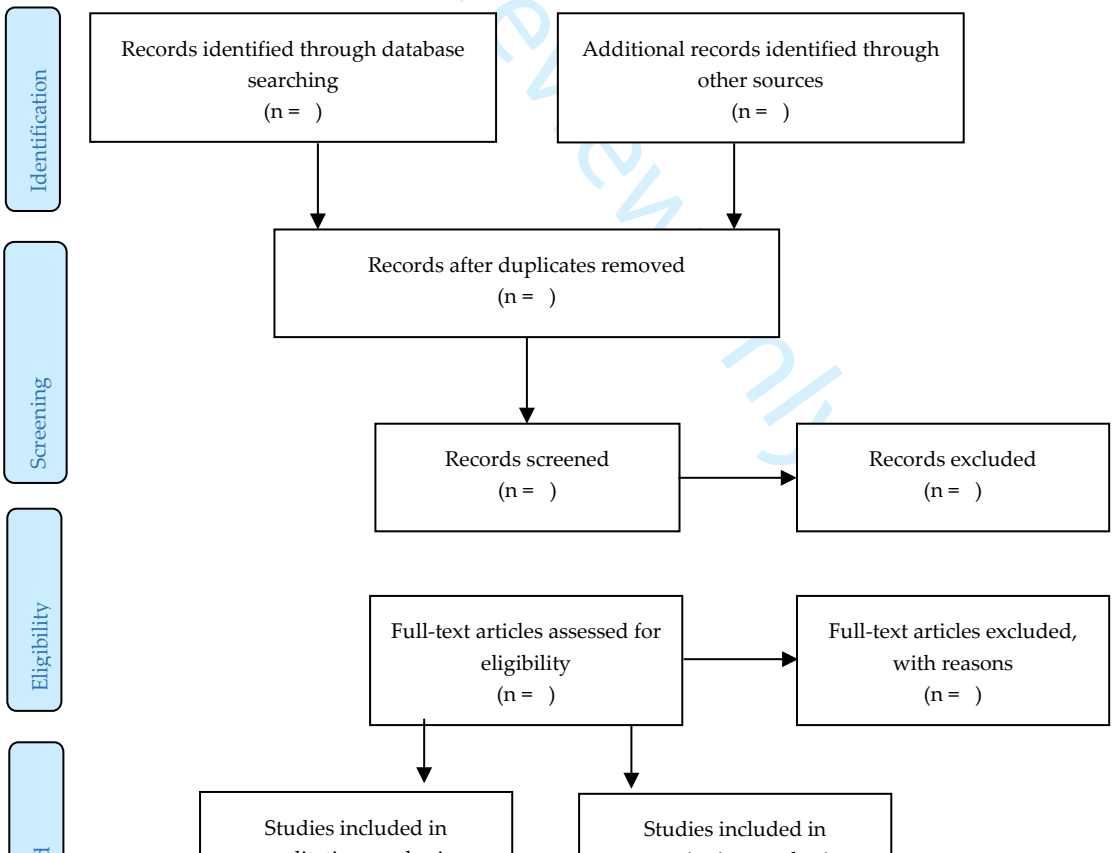
Stage 3: Study selection

The study selection will firstly consist of a title and abstract scan. If the title and abstract are in line with the scoping review´s objectives and questions to the literature or if the relevance of the study is unclear a full-text review will follow. Retrieved studies from each database are going to be divided equally among a minimum of two reviewers, who independently will conduct the selection process.[13] To facilitate the process, we are going to use the data program Rayyan. The program is a mobile and web app developed to facilitate the screening of title and/or abstract as well as the collaboration between the reviewers.[20] During the study selection process, the first reviewer [FW] will be responsible for regularly convoking the review team for discussions concerning uncertainties and to refine the study selection process.[13] Criteria for inclusion can also be applied *ad hoc* during the process when acquaintance with the field of research is increased.[12] If any disagreements on study inclusion occur, an additional reviewer will be consulted to determine the final inclusion.[13] The study selection process (Figure 1) are going to be accounted for by the Prisma flow diagram.[21]

Figure 1. Overview study selection process



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Contrary to Arksey and O´Malley's methodological framework,[12] studies eligible for inclusion in our scoping review are going to be quality assessed. The assessment of the included studies´ quality will allow us to identify where the research itself is of poor quality i.e. identifying gaps in the existing literature review. According to Grant and Booth the lack of quality assessments in scoping reviews are likely to limit the uptake of the findings.[22] Their sentiment is supported by both Levac, Colquhoun and O´Brien [13] and Daudt, van Mossel and Scott [14] who state that a quality assessment of included studies will likely result in findings more useful for practice. The quality assessment will be conducted by a minimum of two reviewers, who will use the relevant study design checklists from the Critical Appraisal Skills Programme (CASP).[23] As, CASP lack a checklist for mixed methods studies, the Mixed Method Appraisal Tool (MMAT) will be applied.[24] In the case of any ambiguity concerning a study´s quality assessment, an additional reviewer is going to be consulted. No exclusion of eligible studies will be made on behalf of the quality assessment as studies with limited quality nevertheless can provide a valid rationale as guidance as to where more research is required.

Stage 4: Charting data

A data charting form would be developed, and piloted on the first five to ten included studies in this review. The piloting will support the team to reach an agreement on extraction consistency. The latter is especially important, as the extraction will be conducted individually and independently by a minimum of two reviewers.[13] A systematic and analytical approach will be utilised to extract the relevant information of each included study. The variables and themes to include in order to answer the reviews´ objective and questions to the literature will be established iteratively (Table 2). Thus, the data charting form will be updated throughout the review by one of the reviewers [FW] who will also hold regular discussion with the others in the review team.[13]

Table 2. Tentative data charting form

Author and date.
Study title.
Journal full reference.
Aim, objective and/or research questions.
Study and recruitment context (e.g. in what country and where people were recruited).
Participant characteristic (e.g. age, gender, education year/semester of study, course (i.e. theoretical or clinical placement).
Sampling method.

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Number of study participants.
Study design.
Data collection (e.g. what data collection methods were used?).
Data analysis (e.g. how was the data analysed?
Described ethical approval and/or considerations. [25]
Described teaching strategies and/or interventions targeting review focus.
Described outcomes and assessments.
Most relevant findings.
Study quality appraisal. [23-24]

Influenced by Weingarten, Paul and Leibovici´s substantial contribution to raise the ethical awareness in reviews, an ethical assess form (Box 1) was developed for the upcoming scoping review including five requirements.[25] Included studies valued by the review team as not adhering to the ethical requirements will be excluded at this stage of the scoping review process.

Box 1. Tentative ethical requirements influenced by Weingarten, Paul and Leibovici.[25]

- Was the study approved by a research ethical committee? (Yes/No)
- Was informed consent obtained? (Yes/No)
- Were adequate measurements taken to protect personal data? (Yes/No)
- Is there a declaration on financial support? (Yes/No)
- Is there a declaration on potential conflict of interest? (Yes/No)

Stage 5: Collating, summarising, and reporting the results

In the fifth stage, an overview and narrative account of variables and information extracted in stage 4 will be presented, and as highlighted by Arksey and O´Malley no evidence grading will be executed.[12] Levac, Colquhoun and O´Brien [13] and Daudt, Van Mossel and Scott [14] suggest that the extracted qualitative data should be presented through thematic analysis, since no synthesis of data is required.[12] For this purpose, the thematic analysis by Braun and Clarke will be applied which is a flexible method suitable when the data is broad and allowing for a wide range of analytical options.[26] This cohere with the upcoming scoping review, which will include studies with a wide range of research questions and methods. Quantitative data will be reviewed through basic descriptive numerical analysis and presented in tables and charts to highlight the range of data.[12] If studies with a mixed method design are included in stage 3,

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the qualitative and quantitative data will be extracted and analysed separately. A minimum of two reviewers will be responsible for this stage of the scoping review process. During the process, meetings with the entire review team will be schedule by the first reviewer [FW] to discuss and come to agreement concerning analysis and presentation of extracted data.

Stage 6: Consultation stage

To validate the findings of this scoping study and make it more useful for practice the optional stage consultation will be applied. For this purpose, the findings from the scoping review will be presented to a group of educators and students connected to a nursing program as a means to contribute with valuable insights on issues connected to the application and implementation of the findings.

ETHICS AND DISSEMINATION

Under the Swedish Ethical Review Act (2003:460) [27] this study does not need ethical clearance by a Regional Ethical Review Board as it not includes any primary empirical data on biological material or private information. However, the issue of ethical consideration in the execution of reviews is raised by Vergnes et al. [28] as well as by Weingarten, Paul and Leibovici.[25] They state that without an ethical judgement of the included studies it could result in establishing clinical practise and guidelines based on studies with poor ethical quality and even unethical studies. It could further be seen as a way of increasing the awareness and necessity of high ethical standards in research. To meet these requirements one variable in the charting form will be ethical consideration and for that purpose a tentative checklist for ethical requirements was developed (Box 1). The checklist will be tested on a minimum of ten publications, and revised accordingly if necessary.

The upcoming scoping review will contribute to the advancement of research concerning teaching strategies targeting nursing students´ skills and abilities in critical thinking and the outcome assessment of it. It will also provide an indication of the maturity of the literature by identifying research gaps. Gaining more knowledge of the targeted research area can act as a benchmark to implement new teaching strategies facilitating students´ critical thinking disposition within the nursing education. This will better prepare future nurses for the complex care situations they will approach. Our findings will be used to inform the design of a future study aiming to develop and evaluate an educational intervention targeting teaching strategies

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focusing on nursing students´ critical thinking skills and abilities. The upcoming scoping review will be published in a peer-reviewed journal. We expect to report in late spring 2020.

Patient and public involvement

To conduct a study targeting teaching strategies for critical thinking in nursing education will eventually benefit patients since education is the foundation for raising future nurses and improve patient care. Therefore, no patients have been involved in the design of this study hence patient consent for publication is not required.

Author contributions

FW, EC, AW and GB were responsible for the initial design of this study. FW conceptualised the review approach and led the writing of the manuscript. FW, EC, AW and GB contributed to the protocols development and approved the final version of this protocol. GB, EC and AW led the supervision of the manuscript preparation.

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Competing interest

None declared.

Provenance and peer-review

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Supplementary file 1

CINAHL

Date: 17th of July 2019

No	Search block: Population	No of items found
1	(MH "Students, Nursing+")	32,982
2	"nursing student*"	18,177
3	″nurse educator*″	4,552
4	1 OR 2 OR 3	41,441

No	Search block: Intervention	No of items found
5	(MH "Learning+")	95,801
6	"learning"	125,757
7	(MH "Teaching+")	209,450
8	"teaching"	90,316
9	(MH "Education+")	798,268
10	"education*"	631,663
11	5 OR 6 OR 7 OR 8 OR 9 OR 10	1,066,661

No	Search block: Outcome	No of items found
12	(MH "Critical Thinking")	4,903
13	"critical think*"	6,597
14	12 OR 13	6,597
15	4 AND 11 AND 14	1,599

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol Title page
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Applying critical thinking is essential for Bachelor nursing students, particularly considering the complex care situations they will find themselves in after graduation. Critical thinking is also a vital part of nurses´ daily activities and have been found to be connected to nursing competence. Consequently, nursing education requires teaching strategies designed to facilitate critical thinking however; a challenge with critical thinking is the difficulty to assess the individual cognitive abilities and skills required by the students. Scoping review was selected for this study since it aims at summarizing the range of research findings and identify gaps in the literature. Page #4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	The overarching objectives will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities Page #5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address);	Not applicable

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Include studies on teaching strategies used by faculty staff to facilitate critical thinking in nursing students undergoing a Bachelor nursing program. No limits will be applied concerning publication year. Studies will be excluded if the population is not identifiable, qualitative and quantitative data is not possible to extract in case of mixed method design or published in other languages than English. Page #6-7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	CINAHL, PubMed, PsychInfo, ERIC and ERC. 17th July 2019. Page #7
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	A preliminary search in CINAHL is attached in Supplementary file 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	The study selection will firstly consist of a title and abstract scan. If the title and abstract are in line with the scoping review´s objectives and questions to the literature or if the relevance of the study is unclear a full-text review will follow. Retrieved studies from each database are going to be divided equally among a minimum of two reviewers, who independently will conduct the selection process Page #8
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	A data charting form would be developed, and piloted on the first five to ten included studies in this review. The piloting will support the team to reach an agreement on extraction consistency. The latter is especially important, as the extraction will be conducted individually and independently by a minimum of two reviewers Page #9-10

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Author and date. Study title. Journal full reference. Aim, objective and/or research questions. Study and recruitment context (e.g. in what country and where people were recruited). Participant characteristic (e.g. age, gender, education year/semester of study, course (i.e. theoretical or clinical placement). Sampling method. Number of study participants. Study design. Data collection (e.g. what data collection methods were used?). Data analysis (e.g. how was the data analysed? Described ethical approval and/or considerations. Described teaching strategies and/or interventions targeting review focus. Described outcomes and assessments. Most relevant findings. Study quality appraisal. Page#9
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical Appraisal Skills Programme (CASP) and Mixed Method Appraisal Tool (MMAT) Page #9
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Basic numerical analysis and thematic analysis by Braun and Clarke Page #10-11
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not applicable
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not applicable
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not applicable
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not applicable
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not applicable
Limitations	20	Discuss the limitations of the scoping review process.	Not applicable
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not applicable
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors Page #12

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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BMJ Open

Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol

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Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol

Word count: 3003

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ABSTRACT

Introduction

Applying critical thinking is essential for nursing students both in an academic and clinical context. Particularly, as critical thinking is a vital part of nurses´ everyday problem solving and decision-making processes. Therefore, regardless of the topic taught or the setting in which it is taught, it requires teaching strategies especially targeting students‘ critical thinking skills and abilities. One challenge with the latter, is the difficulties to assess and evaluate the impact of such teaching strategies on the students´ critical thinking disposition. Hence, our objective will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities.

Methods and Analysis

Our scoping review will be conducted in accordance with Arksey and O´Malley's framework for scoping studies. Search strategies will be developed in cooperation with an experienced librarian, and adjusted to each individual database e.g. CINAHL, PubMed, PsycINFO, ERIC and ERC. A preliminary search in CINAHL was conducted on the 17th of July. Peer-reviewed published studies conducted with a qualitative, quantitative or mixed method design and focusing our objectives, will be eligible for inclusion. Included studies will be quality assessed in accordance with their study design. Data will be charted using a standardised extraction form. The qualitative data will be presented through a thematic analyses, and the quantitative data by descriptive numerical analysis. Lastly, nurse educators and nursing students will be consulted for validation of the findings from the scoping review.

Ethics and Dissemination

Under the Swedish Ethical Review Act (2003:460) this study does not need ethical clearance by a Regional Ethical Review Authority as it not includes any primary empirical data on biological material or sensitive information. The findings will be used to inform the design of a future study aiming to develop an, and subsequently evaluate it, educational intervention targeting teaching strategies focusing on nursing students´ critical thinking skills and abilities.

Keywords

Critical thinking abilities, critical thinking skills, descriptive numerical analysis, nurse educators, thematic analysis

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- To ensure rigor and transparency the upcoming scoping review will be based on 1) a solid methodological framework for scoping studies and 2) the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-Sc) checklist.
- A minimum of two members of the review team will independently assess study eligibility.
- Eligible studies will be quality assessed in accordance with their study design.
- To achieve a comprehensive picture of the existing research qualitative, quantitative and mixed methods designs will be included in this scoping review.
- One limitation might be the potential risk for publication bias since grey literature will not be included, as this will facilitate charting of teaching strategies and outcome assessments targeting critical thinking skills and abilities as described solely in published research.

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INTRODUCTION

Applying critical thinking is essential for bachelor nursing students (hereafter nursing students). Particularly, considering the complex care situations they regularly will find themselves in after graduation.[1] Care situations that amongst others require them to work in accordance with established standards[2] to be able to contribute to a safe, evidence based and optimal clinical practice. Given that nursing is based on scientific knowledge, critical thinking is the reasonable reflection to justify nursing actions based on evidence. Skills and abilities in critical thinking have consequently been found to predict nursing competence together with working years, position, title and educational level i.e. Bachelor or Master in Nursing.[3] Critical thinking is, therefore, a crucial component of every registered nurse´s daily activities, aiding problem solving and decision-making processes.[4]

According to Scheffer and Rubenfeld the ability to execute critical thinking in nursing could be seen from two perspectives; habits of the mind (cognition), and skills employed by the critical thinker.[5] Critical thinking can also be seen as a consecutive process including i) gathering information ii) questioning iii) analysis and evaluation and iv) problem solving and application of theory i.e. the nursing process.[6] This consecutive process of critical thinking needs to be applied both in the clinical area and in the classroom.[7] However, to develop this ability among nursing students is a complex process. To apply critical thinking, the necessary skills and abilities need to be taught and developed during both the students´ clinical placements as well as during their theory courses throughout the nursing education.[4]

One challenge with the concept of critical thinking, often highlighted in the literature, and despite its priority within the nursing education, is the interchangeable use of the concepts of critical thinking, clinical reasoning and clinical judgement.[7-9] Concepts that Victor-Chmil describe as; ‘they are not one and the same‘ (p 34). It needs to be acknowledged, as the authors of this current protocol do, that critical thinking often is used as a broader term which includes the concepts of clinical reasoning and clinical judgement.[8] According to Alfaro-LeFevre clinical reasoning refers to the process used to solve clinical issues and clinical judgement refers to the outcome or conclusion of this process.[7] Therefore, regardless of the topic taught or the setting in which it is taught, requires teaching strategies especially targeting nursing students´ critical thinking skills and abilities. For these strategies to be favourable, it requires implementation throughout the nursing education, and thereby reflected in all parts of the

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nursing programs´ learning objectives and curricula.[10] It has been outlined that teaching strategies such as, problem-based learning, concept-mapping, case-based learning interventions and reflective writing are often used in nursing programs to support critical thinking.[6,10,11] However, another challenge with critical thinking, besides the interchangeable use of concepts, is the difficulty to assess and evaluate the impact of different teaching strategies on the students´ critical thinking disposition (i.e. skills and abilities) as well as the assessment of the different components in the critical thinking process.[8] Previous reviews in the current research area have only included either experimental studies[12] or randomized clinical trials[13] measuring the effectiveness of teaching strategies. Further, other reviews have involved mixed populations including not only nursing students, but also working nurses and nursing managers[14] and midwifery students[15]. Since critical thinking is a vital part of registered nurses´ problem solving and decision-making, this ability needs to be taught already during the nursing education. It is therefore necessary to focus the educational context of undergraduate nursing taking an extended approach on how teaching strategies targeting critical thinking are described, experienced and assessed. Hence, our overarching objective will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities.

METHODS AND ANALYSIS

The upcoming scoping review will address a broad topic (i.e. teaching strategies targeting nursing students' critical thinking skills and abilities, as well as outcome assessments of such skills and abilities), where a diverse range of study designs can be considered relevant in answering our additionally wide review questions. Our scoping review will therefore be designed in accordance with Arksey and O´Malley's methodological framework for scoping studies.[16] However, our design will also be informed by other more recent methodological accounts. [17, 18] The framework will enable us to identify existing gaps in the literature as well as to summarise, evaluate and disseminate the overall state of research activities within the field.[16] The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews checklist (PRISMA-ScR) was used to prepare this protocol.[19] PRISMA-ScR will also form the base for the upcoming scoping review as standardised reporting guidelines can according to Colquhoun et al. support the critical appraisals of published reviews by expanding on their transparency and reproducibility.[20]

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Stage 1: Identifying the research question

The research questions for the upcoming scoping review aims for comprehensiveness i.e. they will be broad to cover the breadth of research evidence in our field of focus. As scoping is an iterative methodological process,[16] it is possible for us to decide to add supplementary questions based on the findings emerging during the review process. A modified [21] PICOS (Population, Intervention, Comparison, Outcome and Study Setting) framework will aid us in determining the appropriateness of the research questions, as well as guide us in our database searches (Table 1).

Table 1. Framework (PICOS) for determination of eligibility of review questions

Criteria	Determinants
Population	Nursing students and/or nurse educators at any semester of study/educational year.
Intervention	Teaching strategies Educational strategies Learning strategies
Comparison	*NA*
Outcome	Critical thinking, and/or critical thinking skills, abilities, dispositions. Outcome assessments for critical thinking, and/or critical thinking skills, abilities or disposition
Study setting	Nursing programmes leading to a Bachelor of Nursing offered worldwide at any higher educational institutions [HEI] Academic context (i.e. during theoretical studies) and clinical context (i.e. during clinical placement)

Since the subsequent goal of the upcoming scoping review is to further the knowledge and understanding about how nurse educators via teaching strategies can target the development of nursing students´ critical thinking skills and abilities we will additionally engage in findings of relevance to this. The following tentative research questions were developed to capture the objectives of the upcoming study:

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- Which are the teaching strategies described in the literature as targeting critical thinking skills and abilities among nursing students?
- How are these teaching strategies conceptualised, described and experienced by students and/or nurse educators e.g. pros and cons?
- Which outcomes are described in the literature as used to assess critical thinking skills and abilities?

Stage 2: Identifying relevant studies

The upcoming scoping review will include primary studies utilising qualitative, quantitative and mixed methods, published in peer-reviewed journals. This strategy will support us to achieve a comprehensive picture of the existing research focusing peer-reviewed studies on teaching strategies targeting critical thinking skills and abilities among nursing students, as well as on existing research focusing on outcome assessments of such skills and abilities. No limits will be applied concerning publication year, since we aim at conducting a comprehensive overview of published studies. Studies will be excluded if the population is not identifiable, qualitative and quantitative data is not possible to extract in case of mixed method design or published in other languages than English. All reasons for exclusion will be documented.

In our upcoming scoping review the term ´teaching strategies´ will be used. Thus, our focus is not the overall educational organisation of teaching (i.e. educational strategies) or the students´ individual general learning process (i.e. learning strategies). However, as we are aware of the commonly interchangeable use in the literature of the terms; teaching strategies, educational strategies and learning strategies, they will all be included in our searches. Here the term teaching strategies are operationalised in accordance with Banning, and as encompassing three different perspectives; i) the didactic perspective, which is teacher centred and mainly involves lectures; ii) the facilitative perspective, focusing on self-directed learning making the students articulate their knowledge; and lastly iii) the Socratic perspective which is emphasising student-centeredness and use objective questioning from the teacher. [22]

The following databases; CINAHL, PubMed, PsychInfo, ERIC and ERC will be used to search for eligible studies. These databases are chosen to cover a comprehensive sample of literature from health care science and education. A search strategy for each database will be developed by the review team with assistance from an experienced librarian. Our strategies will include both database specific heading i.e. Medical Subject Headings (MeSH), key words and

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synonyms. All specific headings and key words will be combined using the Boolean operators OR as well as AND. To ensure comprehensiveness, included studies reference lists will be manually searched. As outlined by Arksey and O´Malley the search strategy should be an iterative process and the search terms could be adjusted while an increased familiarity with the literature is achieved. For this reason, a preliminary pilot search strategy will be applied to the databases and the first 100 search results will be reviewed by the review team to assess validity.[16] During the review team meetings, adjustments will be applied to the search strategy and search terms until full agreement is reached. Grey literature (i.e. literature that is not formally published in sources such as journal articles or books) will not, as described elsewhere, be included in our upcoming scoping study.[23] This will support us to focus on and to chart how teaching strategies targeting skills and abilities such as critical thinking is described in published peer-reviewed research. A draft of a preliminary search in CINAHL conducted on the 17th of July 2019 is attached in Supplementary file 1.

Stage 3: Study selection

The study selection will firstly consist of a title and abstract scan. If the title and abstract are in line with the scoping review´s objectives and questions to the literature or if the relevance of the study is unclear a full-text review will follow. Retrieved studies from each database are going to be divided equally among a minimum of two reviewers, who independently will conduct the selection process.[17] To facilitate the process, we are going to use the data program Rayyan. The program is a mobile and web app developed to facilitate the screening of title and/or abstract as well as the collaboration between the reviewers.[24] During the study selection process, the first reviewer [FW] will be responsible for regularly convoking the review team for discussions concerning uncertainties and to refine the study selection process.[17] Criteria for inclusion can also be applied *ad hoc* during the process when acquaintance with the field of research is increased.[16] If any disagreements on study inclusion occur, an additional reviewer will be consulted to determine the final inclusion.[17] The study selection process (Figure 1) will be accounted for by the Prisma flow diagram.[25]

Insert figure 1 about here

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Contrary to Arksey and O´Malley's methodological framework,[16] studies eligible for inclusion in our scoping review are going to be quality assessed. The assessment of the included studies´ quality will allow us to identify where the research itself is of poor quality i.e. identifying gaps in the existing literature review. According to Grant and Booth the lack of quality assessments in scoping reviews are likely to limit the uptake of the findings.[26] Their sentiment is supported by both Levac, Colquhoun and O´Brien [17] and Daudt, van Mossel and Scott [18] who state that a quality assessment of included studies will likely result in findings more useful for practice. The quality assessment will be conducted by a minimum of two reviewers, who will use the relevant study design checklists from the Critical Appraisal Skills Programme (CASP).[27] As, CASP lack a checklist for mixed methods studies, the Mixed Method Appraisal Tool (MMAT) will be applied.[28] In the case of any ambiguity concerning a study´s quality assessment, an additional reviewer is going to be consulted. No exclusion of eligible studies will be made on behalf of the quality assessment as studies with limited quality nevertheless can provide a valid rationale as guidance as to where more research is required.

Stage 4: Charting data

A data charting form would be developed, and piloted on the first five to ten included studies in this review. The piloting will support the team to reach an agreement on extraction consistency. The latter is especially important, as the extraction will be conducted individually and independently by a minimum of two reviewers.[17] A systematic and analytical approach will be utilised to extract the relevant information of each included study. The variables and themes to be include in order to answer the review´s objective and questions to the literature will be established iteratively (Table 2). Thus, the data charting form will be updated throughout the review by one of the reviewers [FW] who will also hold regular discussion with the others in the review team.[17]

Table 2. Tentative data charting form

Author and date.
Study title.
Journal full reference.
Aim, objective and/or research questions.

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Study and recruitment context (e.g. in what country and where people were recruited).
Participant characteristics (e.g. age, gender, education year/semester of study, course (i.e. theoretical or clinical placement).
Sampling method.
Number of study participants.
Study design.
Data collection (e.g. what data collection methods were used?).
Data analysis (e.g. how was the data analysed?
Described ethical approval and/or considerations. [29]
Described teaching strategies and/or interventions targeting review focus.
Described outcomes and assessments.
Most relevant findings.
Study quality appraisal. [27-28]

Influenced by Weingarten, Paul and Leibovici´s substantial contribution to raise the ethical awareness in reviews, an ethical assess form (Box 1) was developed for the upcoming scoping review including five requirements.[29] Included studies valued by the review team as not adhering to the ethical requirements will be excluded at this stage of the scoping review process.

Box 1. Tentative ethical requirements influenced by Weingarten, Paul and Leibovici.

- Was the study approved by a research ethical committee? (Yes/No)
- Was informed consent obtained? (Yes/No)
- Were adequate measurements taken to protect personal data? (Yes/No)
- Is there a declaration on financial support? (Yes/No)
- Is there a declaration on potential conflict of interest? (Yes/No)

Stage 5: Collating, summarising, and reporting the results

In the fifth stage, an overview and narrative account of variables and information extracted in stage 4 will be presented, and as highlighted by Arksey and O´Malley no evidence grading will be executed.[16] Levac, Colquhoun and O´Brien [17] and Daudt, Van Mossel and Scott [18] suggest that the extracted qualitative data should be presented through thematic analysis, since no synthesis of data is required.[16] For this purpose, the thematic analysis by Braun and Clarke will be applied which is a flexible method suitable when the data is broad and allowing for a wide range of analytical options.[30] This cohere with the upcoming scoping review, which

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will include studies with a wide range of research questions and methods. Quantitative data will be reviewed through basic descriptive numerical analysis and presented in tables and charts to highlight the range of data.[16] If studies with a mixed method design are included in stage 3, the qualitative and quantitative data will be extracted and analysed separately. A minimum of two reviewers will be responsible for this stage of the scoping review process. During the process, meetings with the entire review team will be scheduled by the first reviewer [FW] to discuss and come to agreement concerning analysis and presentation of extracted data.

Stage 6: Consultation stage

To validate the findings of this scoping study and make it more useful for practice the optional stage consultation will be applied. For this purpose, the findings from the scoping review will be presented to a group of educators and students connected to a nursing program as a means to contribute with valuable insights on issues connected to the application and implementation of the findings.

Patient and public involvement

No patients have been involved in the design of this study. However, to conduct a study targeting teaching strategies for critical thinking in nursing education will eventually benefit patients since education is the foundation for raising future nurses and improve patient care.

ETHICS AND DISSEMINATION

Under the Swedish Ethical Review Act (2003:460)[31] this study does not need ethical clearance by a Regional Ethical Review Authority as it does not include any primary empirical data on biological material or sensitive information (e. g. ethnicity, political or sexual orientation). However, the issue of ethical consideration in the execution of reviews is raised by Vergnes et al.[32] as well as by Weingarten, Paul and Leibovici.[29] They state that without an ethical judgement of the included studies it could result in establishing clinical practise and guidelines based on studies with poor ethical quality and even unethical studies. It could further be seen as a way of increasing the awareness and necessity of high ethical standards in research. To meet these requirements one variable in the charting form will be ethical consideration and for that purpose a tentative checklist for ethical requirements was developed (Box 1). The checklist will be tested on a minimum of ten publications, and revised accordingly if necessary.

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The upcoming scoping review will contribute to the advancement of research concerning teaching strategies targeting nursing students´ skills and abilities in critical thinking and the outcome assessment of it. It will also provide an indication of the maturity of the literature by identifying research gaps. Gaining more knowledge of the targeted research area can act as a benchmark to implement new teaching strategies facilitating students´ critical thinking disposition within the nursing education. This will better prepare future nurses for the complex care situations they will approach. Our findings will be used to inform the design of a future study aiming to develop and evaluate an educational intervention targeting teaching strategies focusing on nursing students´ critical thinking skills and abilities. The upcoming scoping review will be published in a peer-reviewed journal. We expect to report in late spring 2020.

Author contributions

FW, EC, AW and GB were responsible for the initial design of this study. FW conceptualised the review approach and led the writing of the manuscript. FW, EC, AW and GB contributed to the protocol's development and approved the final version of this protocol. GB, EC and AW led the supervision of the manuscript preparation.

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Competing interest

None declared.

Provenance and peer-review

Not commissioned; externally peer reviewed.

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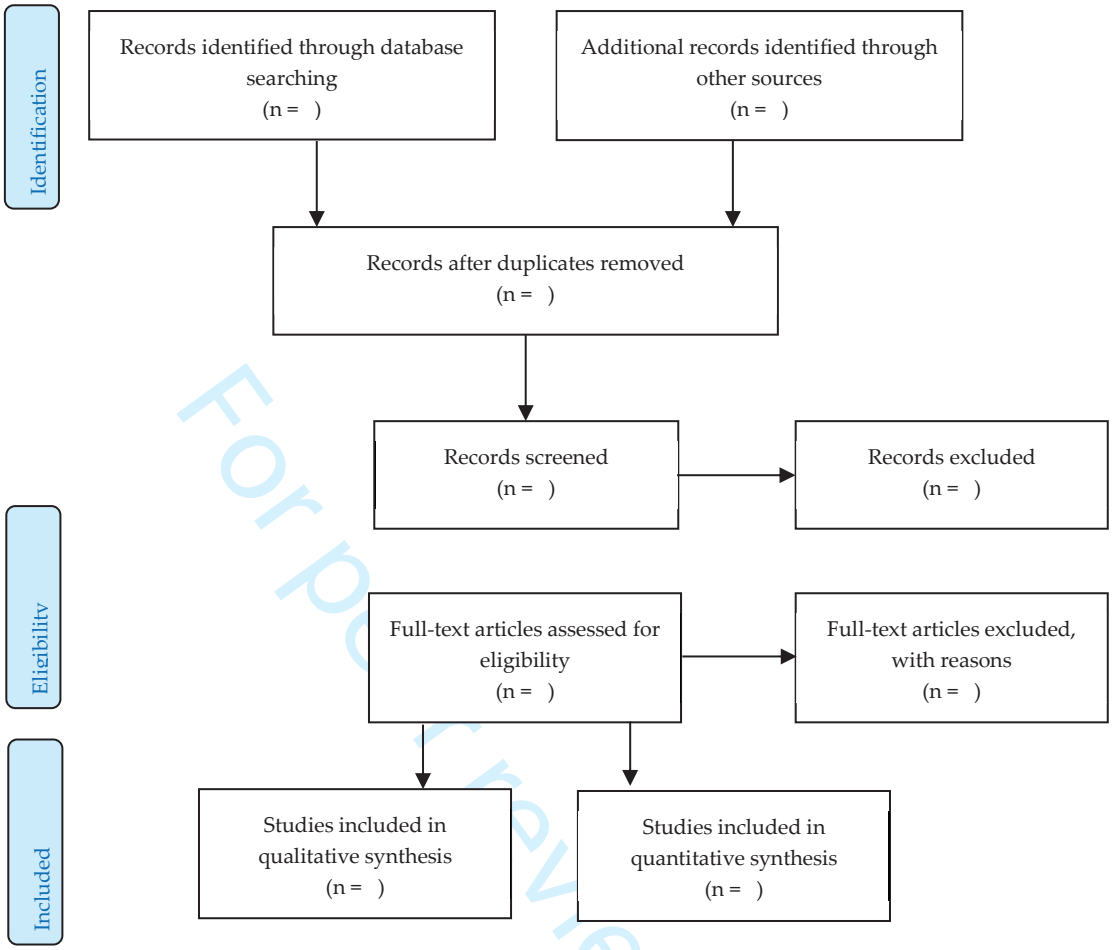
Figure 1. Overview study selection process



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Supplementary file 1

CINAHL

Date: 17th of July 2019

No	Search block: Population	No of items found
1	(MH "Students, Nursing+")	32,982
2	"nursing student*"	18,177
3	″nurse educator*″	4,552
4	1 OR 2 OR 3	41,441

No	Search block: Intervention	No of items found
5	(MH "Learning+")	95,801
6	"learning"	125,757
7	(MH "Teaching+")	209,450
8	"teaching"	90,316
9	(MH "Education+")	798,268
10	"education*"	631,663
11	5 OR 6 OR 7 OR 8 OR 9 OR 10	1,066,661

No	Search block: Outcome	No of items found
12	(MH "Critical Thinking")	4,903
13	"critical think*"	6,597
14	12 OR 13	6,597
15	4 AND 11 AND 14	1,599

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Teaching Strategies and Outcome Assessments Targeting Critical Thinking in Bachelor Nursing Students: a Scoping Review Protocol Title page
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Applying critical thinking is essential for Bachelor nursing students, particularly considering the complex care situations they will find themselves in after graduation. Critical thinking is also a vital part of nurses´ daily activities and have been found to be connected to nursing competence. Consequently, nursing education requires teaching strategies designed to facilitate critical thinking however; a challenge with critical thinking is the difficulty to assess the individual cognitive abilities and skills required by the students. Scoping review was selected for this study since it aims at summarizing the range of research findings and identify gaps in the literature. Page #4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	The overarching objective will be to review published literature on; existing teaching strategies and outcomes assessments targeting nursing students´ critical thinking skills and abilities Page #5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address);	Not applicable

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Include studies on teaching strategies used by faculty staff to facilitate critical thinking in nursing students undergoing a Bachelor nursing program. No limits will be applied concerning publication year. Studies will be excluded if the population is not identifiable, qualitative and quantitative data is not possible to extract in case of mixed method design or published in other languages than English. Page #6-7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	CINAHL, PubMed, PsychInfo, ERIC and ERC. 17th July 2019. Page #7
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	A preliminary search in CINAHL is attached in Supplementary file 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	The study selection will firstly consist of a title and abstract scan. If the title and abstract are in line with the scoping review´s objectives and questions to the literature or if the relevance of the study is unclear a full-text review will follow. Retrieved studies from each database are going to be divided equally among a minimum of two reviewers, who independently will conduct the selection process Page #8
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	A data charting form would be developed, and piloted on the first five to ten included studies in this review. The piloting will support the team to reach an agreement on extraction consistency. The latter is especially important, as the extraction will be conducted individually and independently by a minimum of two reviewers Page #9-10

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Author and date. Study title. Journal full reference. Aim, objective and/or research questions. Study and recruitment context (e.g. in what country and where people were recruited). Participant characteristic (e.g. age, gender, education year/semester of study, course (i.e. theoretical or clinical placement). Sampling method. Number of study participants. Study design. Data collection (e.g. what data collection methods were used?). Data analysis (e.g. how was the data analysed? Described ethical approval and/or considerations. Described teaching strategies and/or interventions targeting review focus. Described outcomes and assessments. Most relevant findings. Study quality appraisal. Page#9
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical Appraisal Skills Programme (CASP) and Mixed Method Appraisal Tool (MMAT) Page #9
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Basic numerical analysis and thematic analysis by Braun and Clarke Page #10-11
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not applicable
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not applicable
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not applicable
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not applicable
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not applicable
Limitations	20	Discuss the limitations of the scoping review process.	Not applicable
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not applicable
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors Page #12

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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