

ORIGINAL RESEARCH**A Narrative Review of Literature; Are Mind and Concept Maps Effective Methods to Teach Nursing Students?****¹Shanthi Ramasubramaniam, ²Vijayalakshmi Gopalan Nair, ³Priyanka Chaudhary**¹Clinical Practice Facilitator, Southmead Hospital, North Bristol, NHS Trust, England²Principal, Sardar Lal Singh Memorial Institute of Nursing, Desh Bahagt University, Punjab, India³Associate Professor, Faculty of Nursing, Desh Bhagat University, Mandi Gobindgarh, Punjab, India**Correspondence:**

Shanthi Ramasubramaniam

Clinical Practice Facilitator, Southmead Hospital, North Bristol, NHS Trust, England

Email: ramyahary@gmail.com**Abstract:**

Introduction: Both mind maps and concept maps serve as a comprehensive key to open the potentials of one's brain and stimulate critical thinking. Nurse educators struggle a lot to teach complex issues in nursing education. Mind maps and concept maps are innovative methods which can stimulate critical thinking, help understanding complex issues and make appropriate decisions related to patient care.

Objective: This review paper examined the use of mind maps and concept maps in nursing education.

Methods: A substantial literature review was done to obtain evidence regarding studies done on benefits on use of mind maps and concept maps to teach nursing students. A varied search of databases including Google scholar, PUBMED, CINAHL, science direct and SCOPUS were carried out using MESH terms mind maps/ concept maps in nursing education, innovative teaching learning methods in nursing education, mind mapping and critical thinking. A total of 15 articles which met the selection criteria were included in the review. The data collected were reviewed by two researchers based on extraction table.

Results: The review showed that concept maps as innovative method and was used more frequently than mind maps to teach nursing students. Its efficacy was proved to be significant from the studies reviewed.

Conclusion: Both Mind and concept maps helped in developing critical thinking among the nursing students when used in different occasions. The review reveals use of mind maps and concept maps in nursing education favored in developing a synergetic effect in the brain and enhanced memory recall and positive student satisfaction. The authors recommend further research to create new evidences for the new generation of nurses.

Key words: Concept maps and mind maps, mind mapping in nursing education, concept mapping in nursing, innovative teaching learning methods in nursing education, critical thinking

Introduction

Mind mapping is a robust visual teaching learning method invented by Prof. Tony Buzan. Whereas Concept maps were introduced by Novak and Govin in early 1980s. Concept map illustrates the suggested relationship between the field specific concepts. Nurse educators have been trying to use all possible strategies to explain complex issues to teach convoluted topics in nursing education. A combination of technology and media paves way for new and

novel methods of teaching in nursing education. Critical thinking is a vital human skill and nursing students are expected to critically think and make wise decisions related to patient care. The use of mind maps and concept maps has been proved as effective methods in isolation by earlier research. The difference between mind mapping and concept mapping is that the earlier focuses one concept whereas concept map connects multiple concepts. Mind maps takes a form of radial structure whereas concept maps are explained using a tree format with many branches. However, both tools (now available as software) use diagrammatic representation to explain various concepts but are used synonymously at times. Both the tools help the nursing students to develop critical thinking through meaningful learning. The advantage of these tools includes use of a picture or diagram rather than words to explain concepts or complex issues (Davies M 2011). The choice of tool depends on the topic to be imparted. In nursing education these tools can be used to collaborate theory and practice, manage individualized case studies, improve their academic writing and clinical skills. The author reported that nursing students who used concept maps developed self-confidence, a sense of achievement or accomplishing something and aided the development of critical thinking skills (Dorttepe et al 2019). Considering the benefits of these methods the authors reviewed the relevant articles to collect evidence on these two strategies in this paper.

Methodology adopted in the review

The review was conducted to answer the below mentioned questions.

1. Are Mind maps and concept maps effective methods to teach nursing students?

A literature search was done in databases such as Google Scholar, PUBMED, Science Direct, CINAHL (Cumulative Index for Nursing and Allied Health sciences) and SCOPUS. The following search terms were used to identify the relevant articles.

Search terms/MESH terms

Mind mapping and nursing education
Mind mapping and concept mapping in nursing education
Effectiveness of mind mapping or concept mapping
Critical thinking in nursing education
Innovative teaching methods in nursing education

Criteria for including studies in review

Articles published between 2003-2022 in related areas
Studies/articles published in English
Studies/articles with all kinds of research designs
Articles with full text/abstracts related to research question
Primary studies done related to research question

Quality check for studies included was done using EPHPP (Effective public health practice project) evaluation tool and the articles reviewed were overall moderate in all aspects. The review on quality of studies included were done by both the researchers.

Figure 1 PRISMA chart

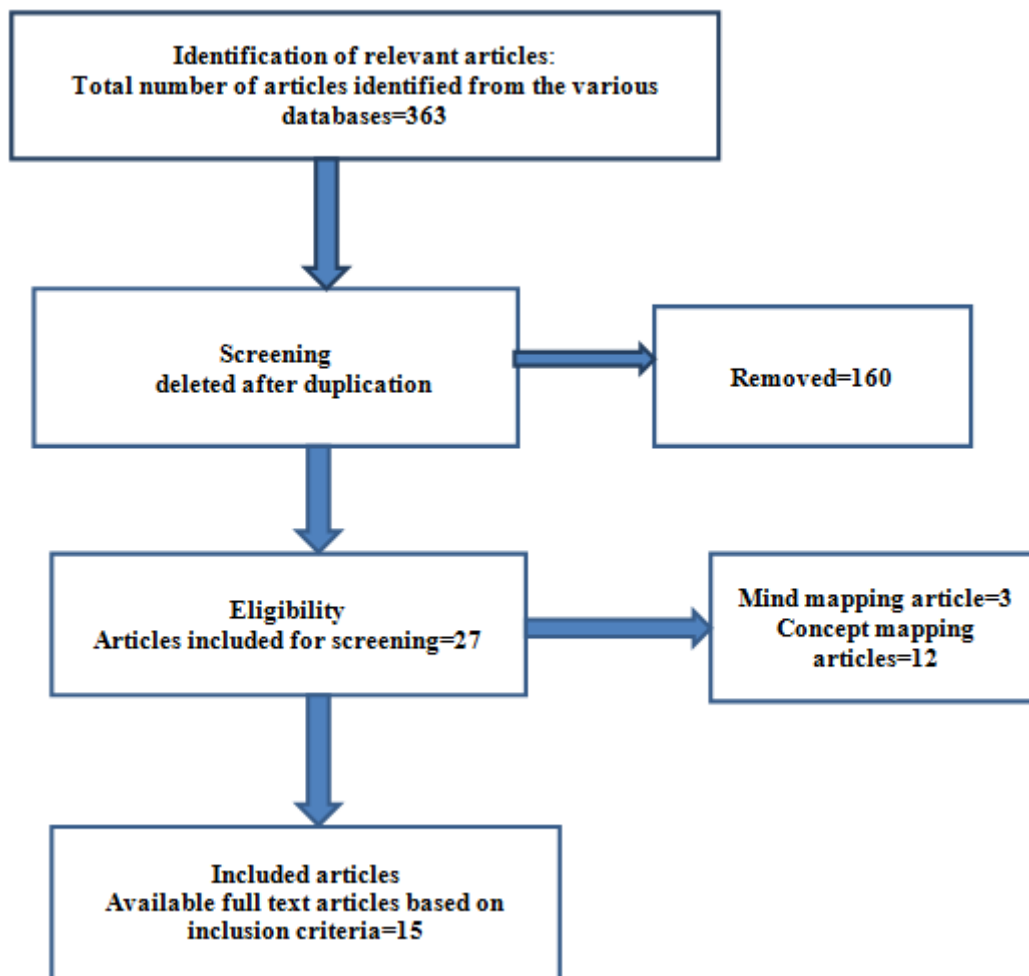


Table: 1 Summary of studies included in the review.

S #	Name of the author & year of study	Objectives of the study	Study design	Participants	Outcome of the study
1.	Wheeler LA et al (2003)	To evaluate the effectiveness of concept mapping in developing critical thinking among baccalaureate nursing students	Quasi experimental with pre-test post-test design	N=76 Baccalaureate nursing students, Atlanta	Concept mapping is effective in inducing critical thinking among the nursing students. The participants were taught nursing care plans using concept maps. Critical

					thinking was measured using the California critical thinking skills test. Each subscale had a significant difference.
2.	Hinck SM et al (2005)	To empirically test the effectiveness of student learning and satisfaction with use of concept mapping	Quasi experimental design	N=23 Junior level baccalaureate nursing students under community based mental health course USA	Study results reported that concept maps had increased the ability of students to observe the relationships and patterns to evaluate nursing care plans. This study recommended concept mapping as an additional strategy to improve critical thinking and satisfaction among nursing students
3.	Abel WM et al (2006)	To evaluate concept mapping use in clinical activity that promotes nonlinear relationship in nursing process	Observational research design	N=28 Associate degree nursing students from North Carolina	Use of concept map is effective and recommends this as an evidenced based educational activity
4.	Aein F et al (2006)	To compare	Experimental	N=60	Concept

		the effectiveness of concept mapping and the traditional linear nursing care plans in pediatric nursing course	Experimental design	Baccalaureate nursing students in Iran	maps can be used in clinical teaching to promote critical thinking among nursing students
5.	Maneval R E et al (2011)	To determine if concept mapping is superior to traditional care plan teaching methods in teaching nursing	Experimental design	Nursing students USA	Students who were taught using traditional method scored higher grades than who were taught using concept mapping
6.	Spencer J.,AndersonKM.,Ellis KK., (2013)	Radiant thinking and use of mind mapping in nurse practitioner education	Experimental	Nurse practitioner Washington DC	Mind maps are creative ways to engage students
7.	Kotcherlakota et al (2013)	To develop scholarly thinking with use of mind mapping	Action research	13 graduate nursing (PhD) Students Omaha	In addition to the traditional teaching methods mind maps combined with fish bowl technique enhances critical thinking among students.
8.	Moattari et al	To	Quasi	N=32	Clinical

	(2014)	determine the clinical concept mapping on discipline based critical thinking of nursing students	experimental only post-test design	4 th year Nursing students Shira, Iran	concept is a valuable strategy to develop critical thinking among nursing students. There was a significant difference in the overall critical thinking score and cognitive skills and mind habits. The control and the experimental group varied significantly in 11 out of 17 components of critical thinking.
9.	Rasoul Z et al (2015)	To compare the effect of concept mapping and conventional skills in developing practical skill of nursing students	Quasi experimental design	N=70 Nursing students enrolled in fundamentals of nursing course in Tehran	Concept mapping was superior to conventional methods in developing practical skills among nursing students.
10.	Kaddoura, M et al (2016)	To determine the impact	Two group experimental study	N=83. (n=41-group1) (n=42 group 2)	Students who used concept

		of concept mapping to teach nursing students		2 nd semester of Baccalaureate Nursing students in an American University	mapping to learn scored better than students who used traditional methods.
11.	Mohammadi F et al (2019)	To determine the effect of concept mapping on the critical thinking of nursing students	Quasi experimental case control study	N=81 Nursing students in the 4 th and 5 th semester at school of nursing in Shiraz , Iran	Concept mapping was found to be an effective method to improve scores on critical thinking.
12.	Khrais, H et al (2020)	To explore the effect of concept mapping in improving critical thinking skills among nursing students	Quasi experimental	N=115 Jordanian nursing students who had completed atleast 66 credit hours on the nursing degree program.	Use of concept mapping promoted critical thinking better than who were taught traditional methods.
13	Wu, HZ et al (2020)	To analyze the impact of mind mapping in developing critical thinking among nursing students	Descriptive study design	N=64 Nursing students in clinical placements at Grade A tertiary hospital, Fuzhou city, China.	Mind mapping was found to be conducive in improving critical thinking. The critical thinking disposition inventory Chinese version was used to test the critical thinking skills of

					students. A positive critical thinking inclination was seen after the intervention.
14	Bibilik O etal (2020)	To test the effectiveness of web-based concept making to improve critical thinking among nursing students	Double blind, randomized control experimental study	N=201 Second year nursing students at a State University in Turkey	Significant difference in critical thinking skills of students who were in the control group proving the effectiveness of concept maps in nursing education. Critical thinking motivation tool was used to evaluate the difference in the web-based education of concept maps pre and posttest.
15	Amanian S etal (2020)	To compare the effect of concept mapping and traditional lecture method on	Randomized control trail	N=160 With 40 Nursing students across 4 different learning styles	Concept map had a significant effect on the students who followed

		students based on VARK learning model			visual learning style in the Vark model. The nursing students were taught medical surgical topics using both traditional and the concept map methods.
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Discussion

This review included two teaching learning strategies mind maps and concept maps used in nursing education to enhance critical thinking, to connect with new knowledge and help the students to improve working with inter disciplinary team. The studies which used mind maps were only 3 published from 2003-2022 which showed there is very little evidence and the quality of studies included in the review was moderate. Whereas rest of the 12 research studies reported used the concept maps as their method of teaching mainly web based. Learners in nursing had definite benefits when they were used in various conditions of teaching and learning. Critical thinking among the nurses has been recognized as a daily routine in clinical practice (Yue M et al 2017). However, there is very little evidence to say that these two pedagogies have been effective in improving the critical thinking of the nursing students. The studies reviewed in this paper demonstrate that both concept mapping and mind mapping has been effective in promoting critical thinking and cognitive skills and affective dispositions. There had been difference in academic performance or clinical skills of nursing students who were exposed to mind maps and concept maps than other instructional methods in almost all the studies under the review. The indicators for critical thinking such as interpretation, analysis, evaluation, and summary were not tested in all the studies reviewed. However individual student differences in developing critical thinking skills would have affected the results in the studies analyzed. Majority of the studies which utilized concept maps were in clinical teaching. Nursing care plans were taught using the concept map or web-based method of learning. Khrais et al (2020) reported that students were taught using concept maps over 24 hours across 5 weeks and Ennis-Weir critical thinking scale was used to evaluate their CT (critical thinking) skills. This scale did not test their ability in writing or language but tested their ability to deal with complex situations using the critical thinking skills. However, this could have been one of the moderate evidence in testing critical thinking skills. One of the studies reviewed used The California critical thinking test (CCTS) form B to evaluate the critical thinking skills of students. The students were taught medical and surgical conditions using concept maps and were evaluated for the critical thinking skills. The post test showed marked difference in the scores of nursing students (Mohammadi F et al 2019). The concept maps were used to teach the pharmacology course and students were given a

training about how to use the concept maps. The outcome was measured using an exam which evaluated the critical thinking skills of students who used concept maps. The concept maps were found as a significant and predictive variable in the experimental group of a study done by Khaddoura M et al (2016) . This study used concept maps to teach theory to nursing students, however majority of the studies used concept maps to deal with clinical situations and tested how the nursing students used the knowledge to make decisions on patient care. The specific practical procedures were taught using web based free-mind software. The students in the control group of a study done by Rasoul Z et al (2015) were tested for effectiveness of concept maps over traditional teaching methods and found significant increase in the mean of post test scores. Among all the studies reviewed the study done by Kotcherlakota et al (2013) was quite interesting as the authors had combined both concept maps and fish bowl Socratic technique in a PhD level nursing program. The main idea behind the choice of mind map was to make the students aware of the big picture before moving on to specifics. Report from students were positive with use of both mind maps and Socratic fish bowl technique. This study shows concept maps can be beneficial in higher level of students and leads to positive student satisfaction. The table which summarizes the studies reviewed gives some details about the sample size and the place of study confirming that majority of the studies are from USA and middle eastern countries. Recent research after the year 2020 has not been reported or published to have more evidence on use of concept maps and mind maps in nursing education.

Conclusion

Both strategies concept maps and mind maps has shown impact on the critical thinking skills and academic and clinical performance of nursing students involved in the studies which were reviewed. Further research is recommended on use of concept maps and mind maps in the field of simulation. This will aid in evidence for improvement in clinical performance of nursing students.

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