



Effect Of Concept Mapping Strategy On Knowledge, Attitude, and Academic Achievement Of Nursing Students At Nursing College, ABHA, King Khalid University

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Abstract

Background: Concept mapping one of the new innovative teaching strategies which is very important and critical to integrate into nursing education that improve students' decision-making, clinical judgment, and academic achievement of students. **The aim of this study** was to assess the effect of concept mapping on knowledge, attitude, and academic achievement of nursing students. **Methods:** The study was conducted at the College of Nursing, ABHA, King Khalid University, Kingdom of Saudi Arabia, using a quasi-experimental design. Simple random sample from 2nd year nursing students (n=60). Four tools were used to collect the data: knowledge questionnaire sheet, rubric for assessing concept map, attitude assessment tool, and students' achievement test. **Results:** The study findings indicate that **there** is improvement in the concept map knowledge of nursing students after awareness sessions, the highest percentage of nursing students achieve high level in final written exam and had a positive attitude towards concept mapping as learning tool. **Conclusion and Recommendation:** The study findings add to the literature supporting the use of concept map in nursing education. The approach is beneficial for enhancing nursing students' knowledge about concept map and academic achievement. Therefore, the study recommends that the nursing educational programs should introduce this innovative teaching learning strategy in different nursing courses.

Keywords: Academic Achievement, Attitude, Concept Mapping strategy, Nursing Students

Introduction:

The education of nursing students has always been a challenge for governments, health educators, health managers, and the students themselves to ensure the quality and safety of learning and clinical practice. An active and constructive educational environment based on challenges and learning objectives will promote deeper learning, emphasizing understanding and

the application of knowledge over memorization and recall (1,2).

The implementation of modern teaching methods can help nursing students to develop their clinical competencies (3). Simultaneously, application of innovative teaching strategies will help to bridge the gap between theoretical background and actual practice such that newly graduated nursing students struggle to meet workplace requirements (4).

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Concept mapping one of the new innovative teaching strategies which is very important and critical to integrate into nursing education (5). A concept map is a visual mapping method that follows these principles, as it is arranged in a treelike layout. It consists of concepts with a direction from general to the specific, as the central concept appears at the top of the diagram. While the concept map users read the map from top to bottom, they proceed to the more specific concepts, with less explanatory strength (6).

To promote meaningful, as opposed to rote learning, concept maps require the following preconditions: They should be relevant and at the learners' cognitive level, the learners should have adequate relevant prerequisite knowledge and the learners should actively engage with the material by putting effort into their learning (7).

Spider maps; these maps feature a main topic at the center and sub-elements grouped around it, **Hierarchical maps** these maps outline concepts from top to bottom, with the main topic at the top and more specific concepts below, **Flow charts** are simple diagrams that outline a workflow and represent the nursing process in sequential order, and **System maps** like flow charts, these maps organize the workflow in sequential order, the difference between the two is that system maps add inputs and outputs to the main diagram (8).

The concept mapping requires students to assume an active role in their learning. This method challenges the traditional strategies of rote memorization and passive learning (9,10). Students should be instructed to reflect structurally on conceptual maps to strengthen the links of theoretical practice by allowing them to organize, connect, and assimilate

knowledge in different ways, which promotes understanding of important issues in a profession (11,12).

As a learning strategy, nursing concept maps have proven effective in improving students' decision-making, clinical judgment, and ability to see the big picture regarding the steps required to provide the best health care to the patient that reflect on academic achievement of students. Academic achievement can be defined in terms of gaining knowledge; acquiring skills and competencies; securing high grades and similar academic achievements; securing a progressive career; and intention and persistence towards education (13).

Academic achievement can be measured in many ways. These include specific test performances (e.g., exams), overall class performances (e.g., grades), or composite performance metrics that are aggregated across classes (e.g., grade point average or GPA). These measures allow educators to evaluate the competencies of students in relation to specific learning objectives (14).

The predictors of academic achievement are varied and complex that include Personal (e.g., student), social (e.g., teacher), and environmental (e.g., school) factors have all been found to play a part. In particular, constructs such as cognitive ability, social support, effort, deliberate practice, intelligence, motivation, conscientiousness, teacher clarity, feedback, and homework show large positive associations with academic achievement (15).

Significance of the study

Due to the rapid changes in science, meaningful learning skills are becoming more important for nursing students who will need to keep abreast of these changes

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as they relate to the practice of nursing. Thus, to remain professionally competent, today's nursing students must be encouraged to become life-long meaningful learners. Concept mapping helps meaningful learning in several ways. It is an activity that provides the student with an opportunity to organize, summarize, analyze, and evaluate many different ideas. Thus, it promotes the development of critical thinking skills, which can then be used for other meaningful learning activities. So the researchers integrated the concept in nursing education.

Aim of the study:

The aim of this study was to assess the effect of concept mapping on knowledge, attitude, and academic achievement of nursing students.

Research hypothesis

- 1-The knowledge level of nursing students regarding concept mapping will be significantly better after awareness sessions
- 2-Most of the nursing students will perceive concept mapping positively as a learning tool.
- 3-The concept mapping will improve nursing students' academic achievements in fundamental of nursing course

Subject and methods

Research design:

A quasi-experimental design was used to achieve the aim of the study.

Setting:

This study was conducted at the College of Nursing, ABHA, King Khalid University, Kingdom of Saudi Arabia.

Subjects:

Simple random sample from 2nd year nursing students (n=60) out from 62 in the level four they enrolled in the Fundamental nursing course in the academic year 2022/2023, and who agreed to participate in the study. The highest percentage of nursing students were in the age group more than 20 years old with mean age 21 years (78%), and all nursing students were female and single.

Tools of data collection:

Four tools were used to collect the data for this study.

Tool (I): Knowledge questionnaire sheet It was comprised of two parts: Part one: Socio-demographic characteristics of nursing students which includes: students' name, age, and marital status. Part two: students' knowledge assessment sheet regarding concept mapping: It was developed by the researchers after reviewing of the related literatures (16,17,18,19) to assess students' knowledge before and after implementation of concept mapping. It included the following: general knowledge about concept mapping as definition, importance, benefits, characteristics of concept mapping (12 questions), knowledge about building of concept map as steps and design of concept map (11 questions). The scoring system of the knowledge: Two levels of scoring for questions were as follows: Correct answer scored (1) Don't know or incorrect answer scored (0) The total scoring system of student's knowledge was 23, classified as follows: satisfactory $\geq 70\%$ of the total score and unsatisfactory $< 70\%$ of the total score.

Tool II: Rubric for assessing concept map:

This rubric adopted by (19) and was used to evaluate students' progress and effectiveness of using concept maps to ensure their understanding for the lectures and organize the data of the lectures by themselves. Grading of these concept maps was not calculated for the course evaluation but was used to assess students' progress and effectiveness of using concept maps. It consisted of 6 statements that cover following points: arrangement of concept, links and linking line, hierarchical structure, content, depth of coverage and design. The scoring system: It consisted of three points categorical score (1-3) were offered for each statement, the total scores ranged from 6 to 18. The total scoring system was 24, classified as follows: • high 75% of the total score • moderate concept map $\geq 60\%$ - $<75\%$ of the total score • low concept map $< 60\%$ of the total score.

Tool III: Attitude assessment tool:

This was used to assess the nursing students' attitude towards the application of concept mapping as a teaching strategy. The scale was developed by (20), it consists of three levels of response "disagree", "uncertain." or "agree". The scale consists of ten statements. The scoring system was as the follows; positive attitude was considered if score were more than 20, uncertain attitude was considered if score were 20, and negative attitude was considered if score were less than 20.

Tool: Students' achievement test (final written exam):

This test was designed by the researcher to test the cognitive learning of the students in the fundamental nursing course. The test included two parts and had 50 questions. The first 25 questions assessed the domain of knowledge

understanding. Questions 25 to 50 measured the meaningful learning domain (level of perception, application, analysis, evaluation and innovation or creativity according to the Bloom's classification of cognitive objectives). In designing achievement test, the researcher first reviewed all the course intended learning outcomes (ILOS) knowledge and intellectual parts. Based on those (ILOS) the researcher made test questions. Point (1) was assigned for correct answer to each question and point zero for each incorrect answer. The total score for this test was 50 It was divided into three levels as follow; a. Low score level: ranged (24 – 25.5) b. Moderate score level: ranged (26-29.5). c. High score level: ranged (30-50).

Content validity and reliability:

For all tools of data collection: content validity was established by a jury of experts who assessed the tools of data collection for clarity, relevance, comprehensiveness, applicability, and understanding. Internal consistency reliability was established with Cronbach's alpha to assess the consistency of results across items within a test. Cronbach's alpha coefficients were 0.76, 0.82, 0.7, and 0.8 for knowledge questionnaire sheet, attitude assessment tool, students' achievement test, and Rubric for assessing concept map.

Procedure

The field work of this study was executed in one year. Data collection began on February 2023 in 2nd semester. The researcher started to assess students' knowledge about concept mapping using the knowledge questionnaire sheet. The time needed to fulfill the questionnaire format was (25-35) minutes then, a pre-test was taken before beginning of the classes by all the students. After that awareness sessions started for the students about

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concept mapping. The researchers then taught from the textbook using concept mapping for the students. The researchers gave the students three assignments using concept mapping in them to ensure that the students were well understood concept mapping. Then corrected students-constructed concept maps according to rubric system. At the end of the semester a post-test was taken by all the students to evaluate their achievements. Finally, students were asked to fill out the attitude assessment tool to rate their attitude towards their experiences of using concept mapping. They were also assured that their responses to the questionnaires had no effect on their scores, and that they were free to respond anonymously.

Pilot study:

A pilot study was carried out on 10% of nursing students (6) to test the clarity of the questions, and determine the time needed to fill the tools of data collection. No modification were done so the students were included in the main study sample.

Results:

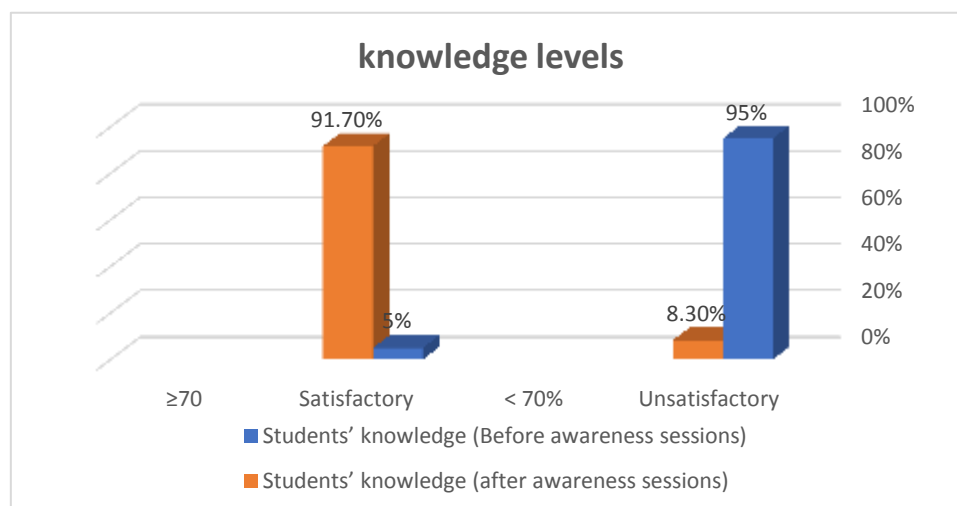


Figure (1): knowledge levels of nursing students regarding concept mapping before and after awareness sessions (n=60)

Administrative and ethical considerations:

Permission to conduct the study was Permissions obtained after explaining the nature of the study from the Dean of Nursing college, King Khloid University, ABA and the ethical committee from King Khloid University, approval No: ECM#2021-5610.

Written explanation of the nature and aim of the study have been explained to all nursing students included in the study. They were given an opportunity to refuse or to participate, and they were notified that they could withdraw at any stage of the study.

Statistical Analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 19, SPSS Inc. Chicago, IL, USA).

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Figure (1): shows that before awareness sessions about concept map the highest percentages of nursing students had unsatisfactory level of knowledge (95%), while 91.7% of them had a satisfactory level of knowledge after awareness sessions.

Table (1): Application of Concept Map Scoring Rubric for nursing students Assignments(n=60)

Score	1 st assignment		2 nd assignment		3 rd assignment	
	No	%	No	%	No	%
High score 75%	20	33.3%	42	70%	57	95%
Moderate score $\geq 60\%$ -75%	40	66.7%	18	30%	3	5%
Low score $< 60\%$	0	0	0	0	0	0

Regarding application of concept map scoring rubric for nursing students **table (1)** shows that the majority (66.7%) of the students had moderate score in the 1st assignment and only (33.3%) had high score, while, in the 2nd assignment (70%) of them had high score and only (30%) had moderate score, as well as , in the 3rd assignment (95%) of students had high score and only (5%) had moderate score. On the other hand, no one in three assignments had low score

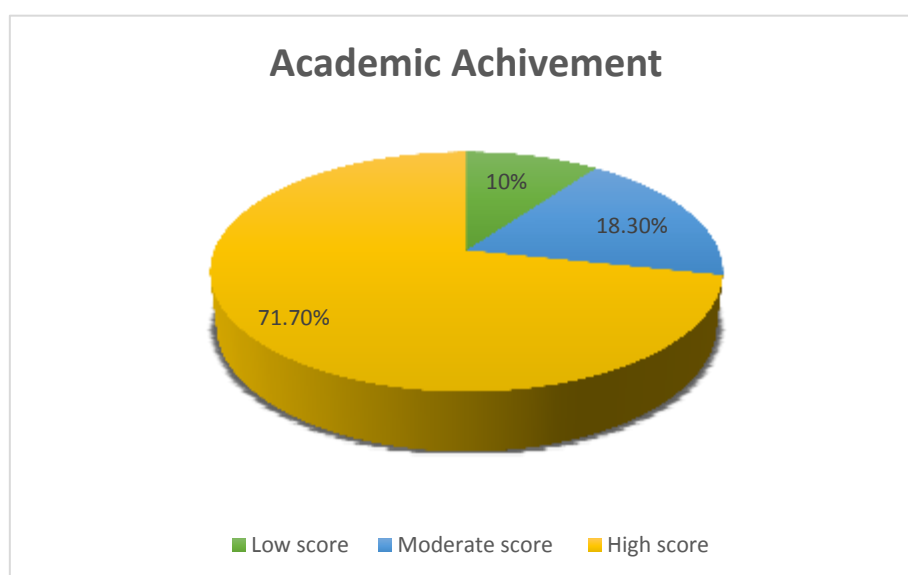


Figure (2): Academic achievement of nursing students in final written exam before and after awareness sessions (n=60)

Figure (2) Show that the highest percentage of nursing students achieve high level in final written exam (71.7%), while the lowest percentage of students achieve a low level (10%).

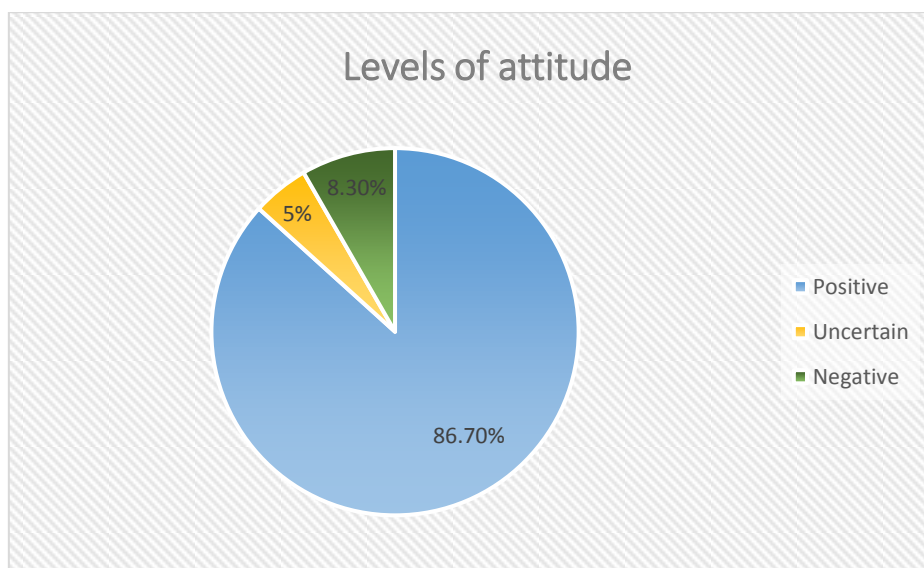


Figure (2): Attitudes levels of nursing students toward adopting concept mapping to learn fundamental nursing course (n=60).

Figure (3): Show that the highest percentage of nursing students had a positive attitude (86.7%), while the lowest percentage of students had a uncertain attitude (5%).

Table (3): Correlation between knowledge, attitude scores toward concept mapping teaching strategy and academic achievement of nursing students(n=60)

Variables	knowledge score		Attitude score	
	(r)	p	(r)	p
Attitude score	0.118	0.321	-	-
achievement score	0.234*	0.034	0.065	0.431

It's clear from the table there is statistically significant correlation between knowledge scores of nursing students and their achievement .

Discussion

Nursing education is facing sensational changes with changing priorities of the rapidly changing society. The goal of nursing education is to prepare nurses who are competent and caring. But the nurse educators cannot continue always teaching with the methods of the 19th century and hope to prepare the nursing students for 21st century. Rote

memorization has been an accepted learning method in the past but is no longer recommended because deep meaning is not integrated into learning. Student nurses must take an active role in the learning experience and become self-directed learners. Concept mapping assists learners to self-critique learning using the decision-making process (21).

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The aim of this study was to assess the effect of concept mapping on knowledge, attitude, and academic achievement of nursing students.

The finding of the current study showed that the highest percentages of nursing students had unsatisfactory level of knowledge about concept map before awareness sessions, while there is improvement after awareness sessions and the highest percentage of nursing students had a satisfactory level of knowledge.

This may be due to fact that concept mapping is a new teaching strategy applied by the researcher in the College of Nursing, ABHA, King Khalid University, Kingdom of Saudi Arabia, in addition the students did not have any previous experience regarding this method, where, exposure to learning by using concept mapping strategy made the students gaining theoretical background about concept mapping as well as , the novelty of mind mapping as a learning strategy and orientation sessions causes this improvement of knowledge.

The study finding agreed with the previous studies of **(21,22, and 23)** they founded that most of the students had poor level of knowledge regarding concept mapping pre intervention, while, there was an improvement in the level of knowledge about concept mapping among the students post intervention.

Concerning the students' opinion regarding concept mapping the current study revealed that, the highest percentage of nursing students had a positive attitude towards concept mapping as a new teaching strategy. This finding may be due

the nursing students were interested in using the geometric form to organize the lecture's information which helped them to think deeply and let them feel more motivated.

These finding were supported by the previous studies of (24, 25, and 26) they found a highly level of satisfaction among the nursing students regarding their learning experience and affective recognition of concept mapping and the nursing students had positive experiences and perceptions of concept mapping as a learning strategy.

The findings of the present study revealed that concept map strategy more effectively improved the students' academic achievement and the highest percentage of nursing students achieve high level in final written exam. From the researcher point of view, concept mapping is a unique method that increases the students' ability to accommodate new information with preexisting one in a meaningful way, which increases the student's understanding. As well as this may be due to enhancing the student's ability of analyzing, link between ideas which improve the student's comprehension and rapid recall of information of the contents through using mind maps. The study findings were supported by (27, 28, 29, and 30) they founded that the concept map strategy improve students' academic achievement in the final written exam.

The application of the rubric score to evaluate the students' concept map assignments; The finding of the current study showed that the majority of the

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nursing students had moderate score in the 1st assignment and few percentage of them had high score, while, in the 2nd and the 3rd assignment the highest percentage of students had high score and few percentage of them had moderate score and no one in three assignments had low score. Improvement increased from further assignments to another until the last one, this may be explained by the continuous guidance by the researcher and the continuous feedback given by the researcher to the students to improve their assignments (construct the concept map).

This finding agreement with the previous studies of (31, and 32) they founded that the score of the nursing students' assignments regarding the concept map rubric was improved from the first to the last assignment and no one achieved the satisfied concept map in the first trial.

The findings of the present study found there is a positive statistically significant correlation between total concept mapping knowledge and the total achievement scores among nursing students. This may be attributed to the nature of concept maps strategy that encourage students to generate the highest number of ideas that are varied and creative in a spontaneous and free open climate that is not critical and doesn't limit the freedom of launching ideas. Moreover, its nature based on phases allows students to move from one-step to another freely after completing the previous step.

These findings were in an agreement with (33) who reported a significant correlation between the achievement test

scores of the nursing students and their knowledge score about concept mapping. While this finding disagreement with the study of (34) who found that there was a positive statistically significant correlation between knowledge score and attitude of nursing students regarding concept map.

Conclusion

According to the study findings, it was concluded that there was a high significant difference between students' knowledge about concept mapping before and post awareness sessions. While regarding applications of concept map scoring rubric assignments the majority of the nursing students had moderate score in the 1st assignment and high score in 2nd and 3rd assignments. Furthermore, concept map improved students' academic achievement and the highest percentage of nursing students achieve high level in final written exam. Finally, most of students perceived concept map positively as a learning tool.

Recommendations:

Based on the study findings, the following recommendations were suggested:

1. Nursing educational programs should introduce this innovative teaching learning strategy in different nursing courses.
2. Special training may be required for the nursing educators (faculty staff members) to get oriented and acquire skill in adapting concept map as an innovative teaching and learning strategy.
3. Nursing educators should empower their students to use concept mapping strategy in all nursing courses

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4. Training for the nursing students to acquire concept mapping skills as a learning strategy in their education
5. Further follow-up study of graduate nurses about the impact of concept mapping on acquiring nursing competencies should be initiated
6. Further research involving larger sample are recommended to ensure generalization of the results

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