

The Relationship between Concept Mapping and Critical Thinking Skills among Nursing Students

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Abstract: Nowadays nursing science becomes more advanced and complex, therefore nursing educators should apply new strategies in the clinical training that help undergraduate nursing student to learn more effectively. Educators have to employ the most recent teaching techniques, among which concept mapping that help students to understand concepts more deeply by designing their concept maps based on nursing process. **Aim:** The study aimed to assess the relationship between concept mapping and critical thinking skills among nursing students. **Research design:** A descriptive correlational design was utilized. **Setting:** The study was conducted at Health Technical Institute in Tanta. **Subjects:** Included in the study were (60) nursing students. **Tools:** Data were collected by using the modified concept mapping questionnaire, critical thinking skills questionnaire. **Results:** Findings revealed that the relationship between concept mapping and critical thinking skills was the highest among nursing students. **Conclusion:** It was concluded that there was a high statistically significant positive relationship between concept mapping and critical thinking skills among nursing students. **Recommendations:** Raising awareness about concept mapping and critical thinking skills among nursing students by developing and implementing strategies of concept map and critical thinking skills and motivate nursing students to join in new educational methods in their martial courses.

Keywords: Concept Mapping, Critical Thinking Skills, Nursing Students.

I. INTRODUCTION

Nowadays nursing science becomes more advanced and complex, therefore nursing educators should apply new strategies in the clinical training that help undergraduate nursing student to learn more effectively. Educators have to employ the most recent teaching techniques, among which concept mapping that help students to understand concepts more deeply by designing their concept maps based on nursing process. (Machado, et al., 2020).

Moreover, nursing educator help students to visualize of patient care priorities through a holistic view of the client that can be achieved through concept mapping more than nursing process and provide high cognitive function which promote problem solving skills. In addition to the minimal use of text or words makes it easy to scan for a word, phrase, or the general idea that is being explored. (Pishgooie, et al., 2019).

Besides, Literature has looked at critical thinking that has been defined by many philosophers in different ways indicating the multifaceted nature of critical thinking as a process or outcome. Wechsler considers critical thinking to be the proper use of cognitive skills that increase the possibility of achieving suitable results (Wechsler et al., 2018). While Supena,

Darmuki& Hariyadi, 2021) reviewed critical thinking as a systematic and active cognitive strategy, which is necessary for examining, studying, understanding issues, solving problems, and decision making based on accurate reasons and valid evidence.

Consequently, Literature asserts that concept mapping could promote dialogue between students: Concept mapping organizes information around the main points. When learners are learning a certain content, they can draw a concept mapping of the theme through the group and carry out communication and discussion among group members and groups, so as to cultivate their sense of cooperation and enhance their interpersonal communication skills. (*Collins& Nyenhuis, 2020*).

Furthermore, the history of concept mapping adopted to Joseph D. Novak in the year of 1970. He was established the concept of "Concept mapping". It helps for the better understanding of the subject information in the form of different shapes, hierarchical graphs, and visual imaginations by using images. It is mainly assisting in the construction of knowledge on any topic. The concept maps are the best example of visual thinking techniques. The best visual thinking techniques in nursing education are concept maps. These maps are frequently used to exemplify ideas and relations among any particular topic and to improve critical thinking capacity among student nurses or among any other group of students in any educational category. (*Seckman & Van de Castle, 2021*).

Along with, *Bilik, Kankaya,& Deveci, (2020)* stated that creating concept maps can help nursing educator in pre-assessment phase to gauge student knowledge about a particular subject. In addition to teaching the nursing student problem-solving, and strategic-thinking skills and in brainstorming. Moreover, concept map can be used as a visual aid in memorizing vocabulary, events, or complex theories.

Significance of the Study:

In this study there is a highly significant difference between concept map and critical thinking among nursing students.

Aim of the Study:

This study aims to assess the relationship between concept mapping and critical thinking skills among nursing students.

Research question:

Is there a relationship between concept mapping and critical thinking skills among nursing students?

II. SUBJECTS AND METHODS

1-Technical design:

The technical design includes research design, setting, subjects, and tools for data collection.

Research Design:

A descriptive correlational research design was utilized in the current study.

Setting:

The study was conducted at Health Technical Institute in Tanta among 1st grade nursing students. The institute contains eight labs. Four of them, on the 1st floor specialized for 1st student grade and other four labs on the 3rd floor specialized for 2nd student grade. The institute not affiliated with the College of Nursing.

Subjects:

One sample was utilized to collect the data of the present study. The study sample included all available (n=60). Nursing students (registered in Medical –Surgical Nursing Course students in the 1st Year).

Tools for data collection: Two tools were used to collect the necessary data:

First Tool: Modified Concept Mapping Questionnaire. Consisted of three parts:

Part 1: Personal Characteristics: datasheet of the participants includes Age, Gender, Job title, Marital status, residence housing, and student`s family characteristics includes family type, father`s job, and mother`s job.

Part 2: Modified Concept Mapping Sheet:

Modified concept map questionnaire was developed by the investigator based on (Hilten, et al., 2005 and retrieved (2019)). It was used in this study to measure knowledge of nursing students about concept mapping. This tool composed of 30 items, classified under the following dimensions: **Definitions of concept map** (3 items); **Importance of concept map** (2 items); **Uses of concept map** (9 items); **Advantages of concept map** (7 items); and **Benefits of concept map** (8 items).

Responses were measured on 3-point Likert scale ranging from (1= Disagree); (2= Neutral); to (3= Agree).

Scoring system: The modified concept mapping questionnaire scoring system ranged between:

- I. Low $\leq 50\%$.
- II. Moderate 50% to 75%.
- III. High $\geq 75\%$.

Part 3: Concept Map Quiz:

Concept map quiz_based on (Hilten, et al., 2019). It was used in this study to measure general knowledge of concept map. This tool composed of 9 questions

Responses were measured on correct answer = 2; and incorrect answer = 0.

Scoring system: The concept map quiz scoring system ranged between:

- I. Low $\leq 50\%$.
- II. High $\geq 75\%$.

Second Tool: Critical Thinking Skills Questionnaire:

Critical thinking skills questionnaire This tool was developed by the investigator based on (Mohammed et al., 2004) and it was used by (Sabah Ragab et al., 2018). It was used in this study to measure level of students' critical thinking skills.. It consists of 76 items classified under the following dimensions: **Evaluate external subjects**

(6 items); **Correct use of language in listening, writing and reading** (10 items); **Discern matters** (7 items); **Discuss matters objectively** (9 items); **Caring about judgment of certain phenomena** (6 items); **Reach conclusion correctly** (3 items); **Caring about observation of matters and subjects** (9 items); **Openness and flexibility in dealing with matters** (7 items); **Identify relations from subjects** (3 items); **Avoid rumors in judgments** (5 items); and **Adaptation to new situations and Providing in innovative solutions** (4 items). **Responses** were measured on 3- point Likert scale ranging: from (1= Disagree); (2= Neutral); to (3= Agree).

Scoring system: The critical thinking skills questionnaire scoring system was calculated according to three levels of percentile ranking based on:

- I. Low $< 50\%$.
- II. Moderate 50% to 75%.
- III. High $> 75\%$.

Validity of the tools:

The two tools were distributed to a jury group consisted of three experts specialized in nursing administration all from the faculty of nursing Menofyia University are two professors and one assistant professor. They assessed the clarity, comprehensiveness, relevance, and accuracy of the tools for face and content validity and translation into Arabic through an opinionative sheet. Accordingly, the necessary modifications and rephrasing of some statements were done based on their opinions.

Reliability of the tools:

The two tools were tested for their reliability. The internal consistency reliability of the items composing the tool was assessed using the Cronbach alpha coefficient. Test of reliability for the two tools yielded (0.84) for total concept map and (0.78) for total critical thinking skills ; indicating homogeneity among the items under each construct.

Ethical considerations:

Before the study was conducted, ethical approval was obtained from the scientific research and ethical committee of the faculty of nursing-Helwan University. Besides, the investigator obtained official permission from the director of Health Technical Institute in Tanta where the study was conducted. Additionally, Ethics, values, beliefs and cultures of the study subjects were respected.

Pilot study

A pilot study was conducted on (6) participants of the study subjects. They represent 10 % of the study sample in the study setting. The pilot study aims to test the applicability and clarity of the tools and to identify obstacles and problems that may be encountered during data collection. Additionally, to estimate the time needed to fill it out. The time subjects took to fill in the questionnaire sheet was 15 minutes for each tool. These participants were included in the main study sample since no changes were needed in the tools.

Field Work:

After obtaining permission for data collection; the investigator explains the aim of the study to participants. All participants were assured that anonymity and confidentiality were guaranteed and the right to withdraw from the study at any time.

3) Administrative Design

An official agreement was obtained from the director of Health Technical Institute, Tanta -Egypt to conduct the study in the hospital.

4) Statistical Design

Data entry and statistical analysis were done using the Statistical Program for Social Science (SPSS) version 20.0 software package.

III. RESULT

Table (1): reveals that, frequency and percentage distribution of personal characteristics among studied nursing students, which played highest percentages of aged nursing students -19 year (83.3%) with mean age 19.53 ± 0.57 year were female .Also, the highest percentages (88.3%) of nursing students were single, (80%) of students from rural, (61.7%) of nursing students have not attended or participated in workshops or conferences before, and (65.0%) have heard of critical thinking.

Continue Table (1) : reveals that , frequency and percentage distribution of family characteristics among studied nursing students, which played highest percentages (55%) of the nursing student`s family type was Extended .Also, the highest percentages (95%) of nursing student`s parents were Together, (36.7%) of nursing student`s father education was Reads and Writes , (48.3%) of nursing student`s father job was Free Business , (41.7%) of the nursing student`s mother education was secondary , (63.3%) of the nursing student`s mother work was House wife , and (70%) of the nursing student`s family income was enough .

Table (2): reveals that, the relationship between Concept Mapp and Critical Thinking skills among studied nursing students, in which showed, there was a high statistically significant difference between Total Concept Mapping and Critical Thinking among nursing students as P-value $< 0.001^*$.

Table (3): reveals that, there is highly statistically significant positive correlation between Concept map with "Correct use of language in listening, Writing and reading, Tendency to discern matters, Tendency to avoid rumors in judgments and Adaptation to new situations" as p-value $< 0.001^*$. Also, Statistically significant positive correlation between total concept

maps with "Tendency to evaluate external subjects, Tendency to discuss matters objectively, Caring about judgment of certain phenomena, Caring about observation of matters and subjects, Identify relations from subjects and providing in innovative solutions" as p-value <0.05* . Besides, there is no correlation between total concept maps with "Tendency to reach conclusion correctly and Openness and flexibility in dealing with matters" as p-value >0.05.

Figure (1) reveals that more than one-half of the studied nursing leaders (68.3%) had a high level of concept mapping knowledge, while less than one quarter (15.0%) had a low level of concept mapping knowledge.

Figure (2) represents that, less than three quarters (73.3%) of studied nursing leaders had a high level of critical thinking skills knowledge, while 10% had a low level of critical thinking skills knowledge.

Table (1): Frequency and Percentage Distribution of Personal Characteristics among studied Nursing Students (N=60).

Personal Characteristics	Items	No.	%
Age	-19	30	50
	-20	28	46.7
	-21	2	3.3
	Mean ±SD	19.53±0.57	
Gender	Male	10	16.7
	Female	50	83.3
Marital status	Single	57	88.3
	Married	3	11.7
Housing	with the family	57	95.0
	Not staying with family	3	5.0
Residence	Rural	48	80.0
	Urban	12	20.0
Have you attended or participated in workshops or conferences before?	Yes	23	38.3
	No	37	61.7
Have you ever heard of critical thinking?	Yes	39	65.0
	No	21	35.0

Continue table (1): Frequency and Percentage Distribution of family Characteristics among studied Nursing Students (N=60).

Family characteristics	Items	No.	%
Family type	Nuclear	27	45.0
	Extended	33	55.0
Parents	Together	57	95.0
	Not together	3	5.0
Father's education	Illiterate	4	6.7
	Reads and writes	22	36.7
	Primary	3	5.0
	Secondary	15	25.0
	University	16	26.7
Father's work	Free business	29	48.3
	Employer	28	46.7
	Retired	1	1.7
	Not work	2	3.3
Mother's education	Illiterate	8	13.3
	Reads and writes	7	11.7
	Primary	9	15.0
	Secondary	25	41.7
	University	11	18.3
Mother's work	Free business	2	3.3
	Housewife	38	63.3

Family income	Nurse	1	1.7
	Head nurse	1	1.7
	Employer	18	30.0
	Not enough	4	6.7
	Enough	42	70.0
	Enough and save	14	23.3

Table (2): Relationship between Concept map and Critical Thinking among studied Nursing Students (N=60).

Total Critical Thinking	Total Concept Map					
	Satisfactory		Unsatisfactory		Total	
	N	%	N	%	N	%
High	40	66.7	4	6.7	44	73.3
Moderate	5	8.3	5	8.3	10	16.7
Low	1	1.7	5	8.3	6	10
Total	46	76.7	14	23.3	60	100
Chi-square	X ²	21.039				
	P-value	<0.001*				

Table (3): Correlation between Concept Mapping and Critical Thinking Skills Practice among studied Nursing Students (N=60).

Critical Thinking skills	Total Concept Map	
	r	P-value
1-Evaluate external subjects.	0.248	0.039*
2-Correct use of language in listening, Writing and reading.	0.490	<0.001*
3-Tendency to discern matters.	0.745	<0.001*
4-Tendency to discuss matters objectively.	0.265	0.041*
5-Caring about judgment of certain phenomena.	0.327	0.011*
6-Tendency to reach conclusion correctly.	0.047	0.723
7-Caring about observation of matters and subjects.	0.347	0.007*
8-Openness and flexibility in dealing with matters.	0.240	0.064
9-Identify relations from subjects.	0.519	0.003*
10-Tendency to avoid rumors in judgments.	0.755	<0.001*
11-Adaptation to new situations.	0.966	<0.001*
12-Providing in innovative solutions.	0.239	0.046*

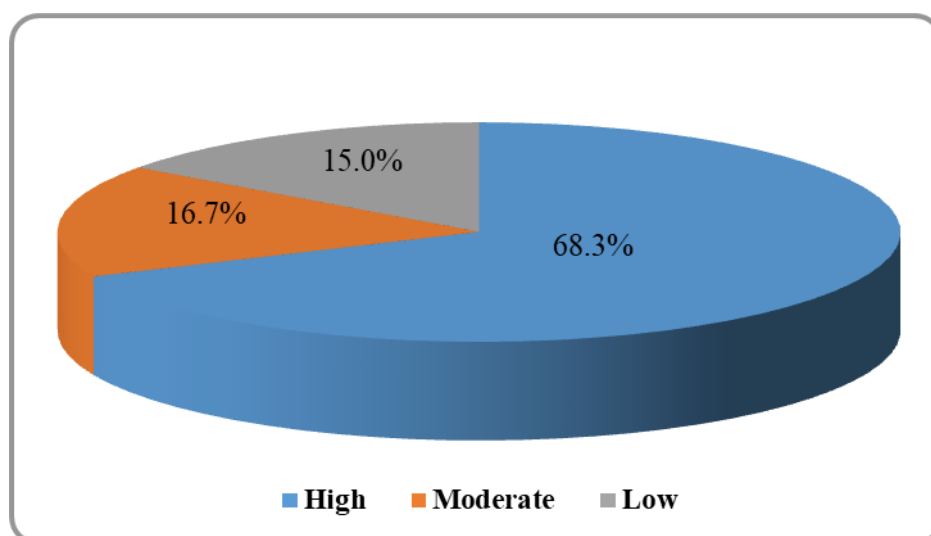


Figure (1): Percentage Distribution of Concept Mapping among studied Nursing Students (N=60).

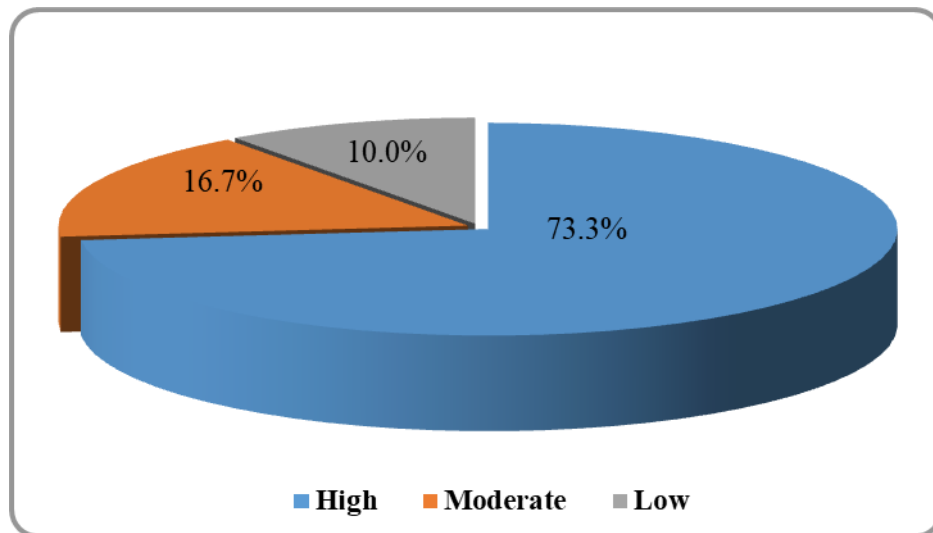


Figure (2): Percentage Distribution of Critical Thinking Skills among studied Nursing Students (N=60).

IV. DISCUSSION

As regarding to participant gender, the results of the current study revealed more than three quarters of the study participants were females (table 1). This finding totally matched with the study done by **Mohammadi, et al ., 2019** on 81 subjects in Shiraz, Iran to determine the effect of conceptual mapping on nursing students' critical thinking and also found that more than three quarters of the study participants were females. This may be due to the increase number of females more than number of males in nursing institutes.

As regarding to participant age, the results of the current study revealed that on half of the study participant aged 19 years old and this findings disagree with findings of the study done by **Abd El-Hay, El Mezayen, & Ahmed, 2018** on 60 undergraduate nursing students in Tanta, Egypt to evaluate the effect of concept mapping on problem solving skills, competence in the clinical settings and knowledge among undergraduate nursing students and found that the majority of the study participants aged 19-22 years old. These results may be due to university education started from age 19 years.

As regarding to marital status the results of the current study revealed that about two thirds of the study participant were single and this contradicting with findings of the study done by **Hasanpour, Bagheri & Heidari , 2018** on 124 nursing students in Iran to investigate the relationship between emotional intelligence and critical thinking in nursing students and found that more than three quarters of the study participants were single. These findings may be due to decrease age of the study participant and being in the university till now.

As regarding to previously attending workshop about concept map and critical thinking, the results of the current study revealed that about one thirds of the study participant was attended and participated in workshops or conferences about concept map and more than two thirds of the study participant heard of critical thinking.

This finding inconsistent with findings of the study done by **Abbas, Eldin, & Elsayed, 2018** on 140 students at the College in Helwan University, Egypt to investigate the effect of mind mapping (MM) and concept mapping (CM) on the understanding of challenging text and found that the majority of the study participant had no prior knowledge about the topic under experiment. These findings may be due to differences between students related to educational needs and interest also incentives for learning are a factor taken into consideration.

As regarding to housing the results of the current study revealed that nearly total of the study participant living with family. this findings contradicting with the findings of a study done by **Dehghanzadeh & Jafaraghaee, 2018** on 85 second-year bachelor's nursing student in Iran to compare the effects of traditional lecture and flipped classroom on Iranian nursing students 'critical thinking disposition. and found that about two third of the study participant living with family. These findings may be due to similarities between the study groups in culture, norms, and beliefs.

Regarding to Relation between total concept map with items of critical thinking the results of the current study revealed that there was a high statistically significant difference between total concept mapping and critical thinking among nursing students as P-value <0.001*

This finding totally consistent with the findings of a study done by **Sundararajan, Adesope, & Cavagnetto, 2018** on 15 participant in kindergarten classroom to investigate the role of collaborative concept mapping in the development of kindergarten learners' critical thinking skills of analysis and interpretation over a five week period and found that there was a high statistically significant difference between total concept mapping and critical thinking among nursing students as P-value <0.001* .

Regarding to total for correlation between total concept maps and total critical thinking skills the results of the current study revealed that there was a highly statistically significant difference between total concept map and total critical thinking as p-value <0.001*. This finding completely matched with the findings of a study done by **Siburian, Corebima, & Saptasari, 2019** on 52 undergraduate students in Indonesia to reveal the correlation between critical thinking and creative thinking skills on students' cognitive learning results in inquiry learning strategy and to reveal the contribution of critical thinking skills and creative thinking skills to students' cognitive learning results and found that there was a highly statistically significant difference between total concept map and total critical thinking and creative thinking skills on students' cognitive learning p-value <0.001*.

These results may be due to that the learning process stimulates students to always empower their critical thinking through the training process; students develop as scientific observers that support their reasoning.

V. CONCLUSION AND RECOMMENDATIONS

In light of the study findings, it can be concluded that there is a strong positive relationship between concept mapping and critical thinking skills among nursing students.

In light of the study findings, the following recommendations are suggested:

- Raise awareness about concept map provided for nursing students and explained to them during the material courses.
- Raise awareness about critical thinking skills provided for nursing students and explained to them during the material courses.
- Develop and implement strategies of concept map and critical thinking skills among nursing students.

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