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Concept mapping in nursing education

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Abstract

Concept maps are a graphical tool which is used to visualize meaningful relationships among concepts. Positive effects of concept maps in nursing education is to develop students' critical thinking skills, academic success, nursing competence skills, knowledge and comprehension levels, student satisfaction and cognitive learning levels. Concept maps can be of different types based on their process of using. All types of concept maps are connecting main ideas and concepts with the help of branches and reveal new knowledge and connections.

Process of concept mapping can take place in a single day or can be spread out over weeks or months depending on the situation. Finding of the various studies have shown positive results about the use of concept maps. Students also have given positive feedback regarding impact of concept mapping in learning process. It was determined that the use of the concept map teaching method for nursing students improves the students' critical thinking skills, the sense of accomplishment and self-confidence.

Keywords: Concept maps, learning process and nursing students

Introduction

Concept mapping is a powerful and efficient way of depicting data in a graphical structure so that the entire idea being imparted can be broken down into smaller digestible bits.

Concept maps as linear tools which make connections concerning the situations and concepts about a problem or subject and organize the information. (Novak ve Gowin, 1998) [5].

Concept of Concept mapping was developed by Joseph D. Novak at Cornell University in the 1970s.

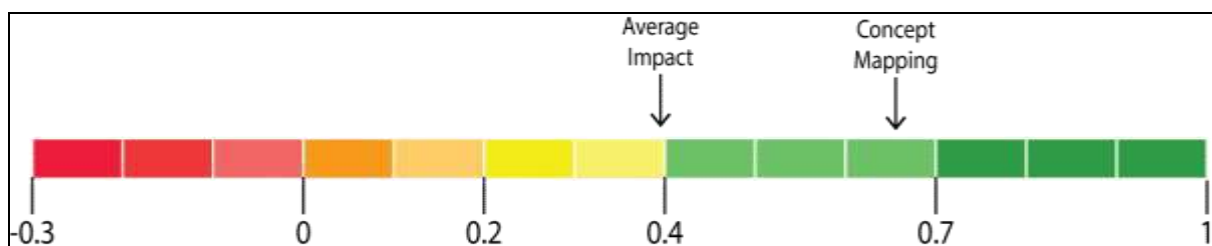
Concept mapping is a learning strategy that involves visualizing relations between concepts and ideas using graphical representations. It is a form of graphic organizer that consists of various circles or boxes (called nodes) each of which contain a concept and are all interlinked through

linking phrases. The role of these linking phrases is to 'identify the relationship between adjacent concepts' (McClellan and Broggy, 2009) [13].

Concept maps are diagrams that are used to organise, represent and create knowledge, and provide a useful framework for critical analysis and problem solving.

Concept maps are based on 'Asubel's theory of meaningful learning' which states that "learning is meaningful when the student comprehends the relationship of what is being learned to other knowledge" (KILIC and CAKMAK, 2013, p. 154).

Research shows that teaching through concept mapping is better than other traditional teaching strategies. A review of meta-analytic research shows that concept mapping has a typical impact of $d=0.66$ which is a much larger impact than most other teaching strategies.



Concept mapping can be used as a learning tool in the field of Nursing education. Nursing Teachers can teach their nursing students and grasp their attention through visual presentation of information that seems too much for nursing

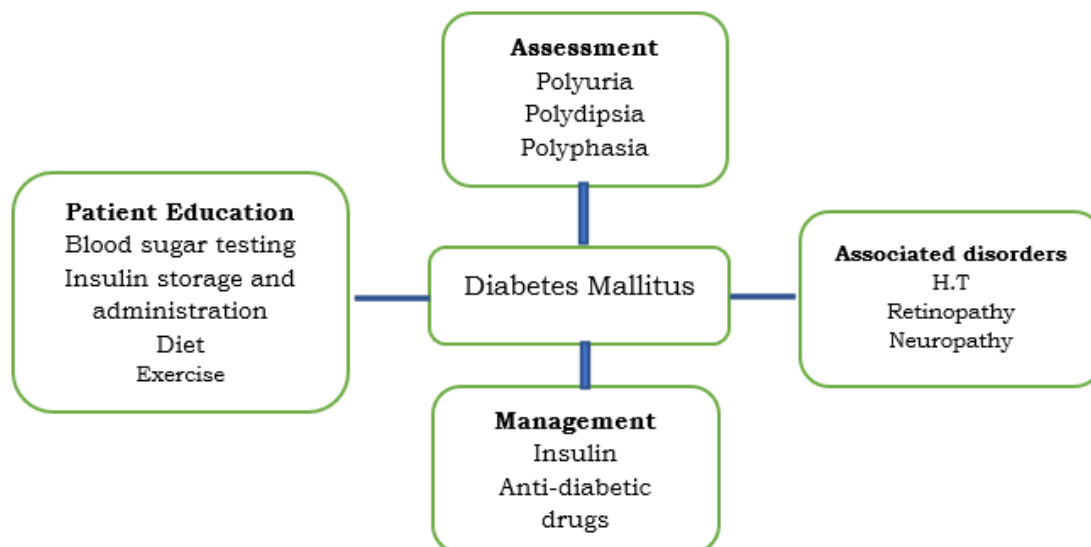
students to retain. Concept mapping can also help in easy analysis and aids in classroom discussions, encouraging students to think critically about alternative ways around a topic.

Types of Concept maps

Concept maps can be of different types based on their process of using. All types of concept maps are connecting main ideas and concepts with the help of branches and reveal new knowledge and connections. Various types of concept maps are as follows; -

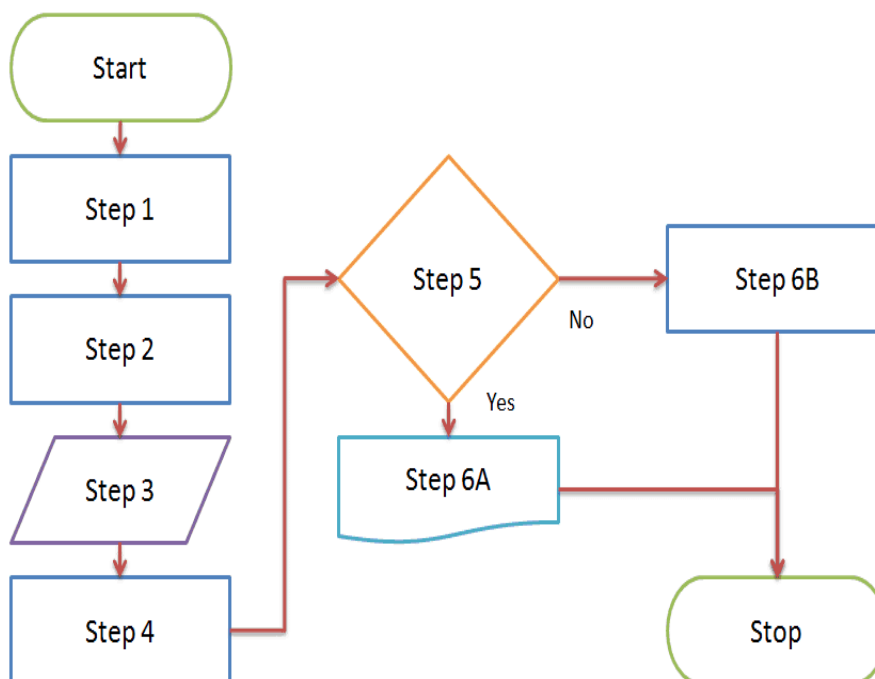
Spider concept maps: A spider concept map is one where

the branches on this type of concept map cascade outward in a radial pattern, with more detail the farther out we go. Think of a web spiralling out from a central focal point or idea. Spider concept maps are usually used when we have a single idea or theme that we want to build upon. The concept of Diabetic Mellitus can be represented in the form of spider concept mapping in the following manner.



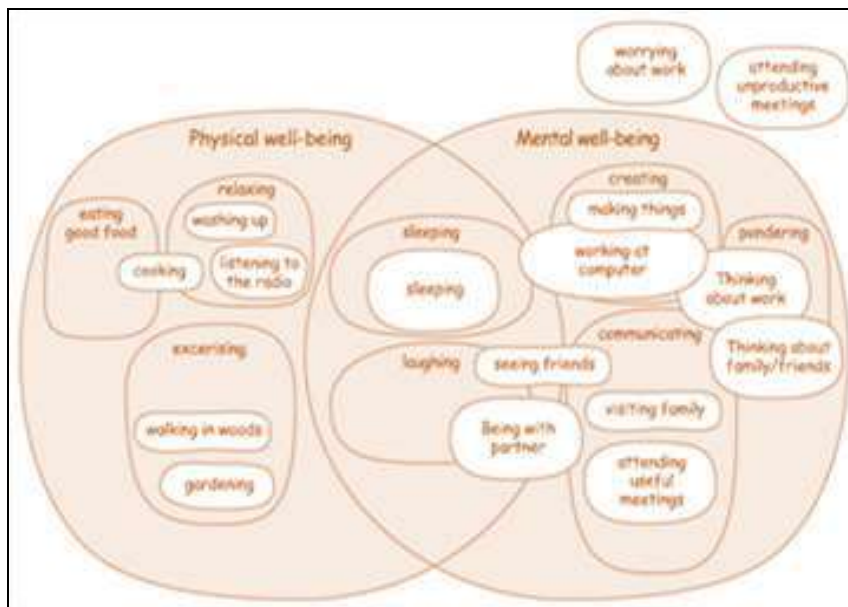
- Flow charts:** - Flow charts show concept in a far more linear fashion. Flow charts generally move from either left to right, or from top to bottom, instead of spiralling

outward in spiral concept maps. Flow chart concept maps are used when we need to understand a process or make a decision.



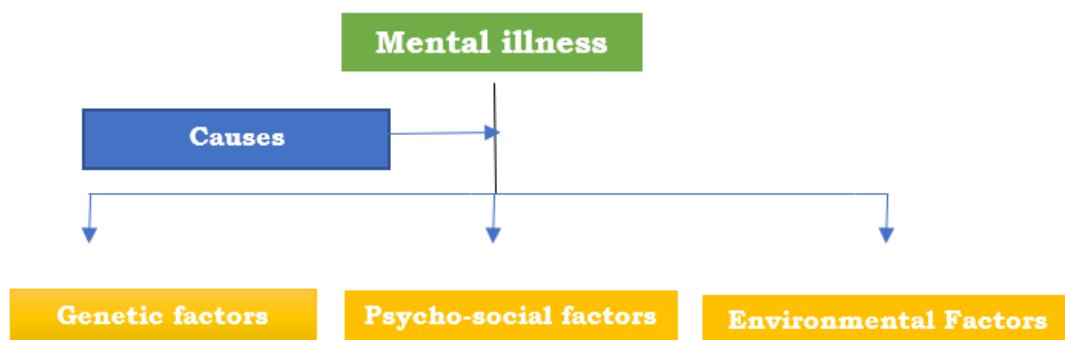
- System maps:** - System maps outline all the major parts of a system and use connecting arrows to show how the parts of the system interrelate. The structure of these tends to be more web-like, but they don't need to

spiral outwards like a spider map. System maps are used when we need to understand the inner workings of how a system or team is functioning.



4. Hierarchy maps: - Hierarchy concept maps look like family trees or waterfall maps, where we read ideas from top to bottom as they cascade. Hierarchy concept maps are

used when we need to understand the elements of a system, along with which elements are in the highest position and which are in the lowest.



Advantages of concept mapping in Nursing education

- Concept maps explain how ideas relate to each other and can be a great discovery and learning tool in nursing education.
- Concept maps can be beneficial for Nursing students to grasp the ideas more quickly and retain them for longer period rather than reading them in an article or a book.
- Brainstorming during the process of concept mapping tend to produce a lot of disparate ideas among nursing students.
- Visual representations of knowledge is proved to be both stimulating and increasing brain activity (Marzono, 1998, cited in Birbili, 2006).
- The visual mode or presenting the information makes it easily comprehensible and also allows Nursing students to skim through for quicker understanding.
- Concept mapping can be beneficial for students to have better understanding about the subject
- Concept mapping has a positive effect on their academic achievement.
- Use of the concept map as a teaching method in nursing

education, improves the students' critical thinking skills, the sense of accomplishment and self -confidence.

- Concept maps boost social interaction, communication and collaborative team work.
- Nursing students with the help of concept maps can connect prior knowledge with new concepts and ideas to discover relationship among them.
- **Concept maps** are an excellent assessment tool when they have been used for teaching and learning.
- The hierarchical structure of the concept map can be a meaningful learning approach
- Concept maps in nursing education can be used as a tool for formative assessment of students' knowledge during the learning process.
- Use concept maps can be used as summative assessments tool at the end of a lesson or *course* unit.

Difference between concept mapping and mind mapping

The term concept mapping and mind mapping are used interchangeably but there lies an array of differences between these two designs. These differences are as follows;

S. No	Concept maps	Mind maps
1.	Developed by Joseph D. Novak	Technique developed by Tony Buzan
2.	Key concepts are enclosed in a Box or Oval	Key concepts are written on branches
3.	Linking lines are labelled	Linking lines are not labelled
4.	Most general concepts are at the top of the map	Most general concepts are at the middle of the map
5.	Limited use of icons and visual metaphors	Extensive use of icons and visual metaphors
6.	More logical than creative	Balance between logic and creativity

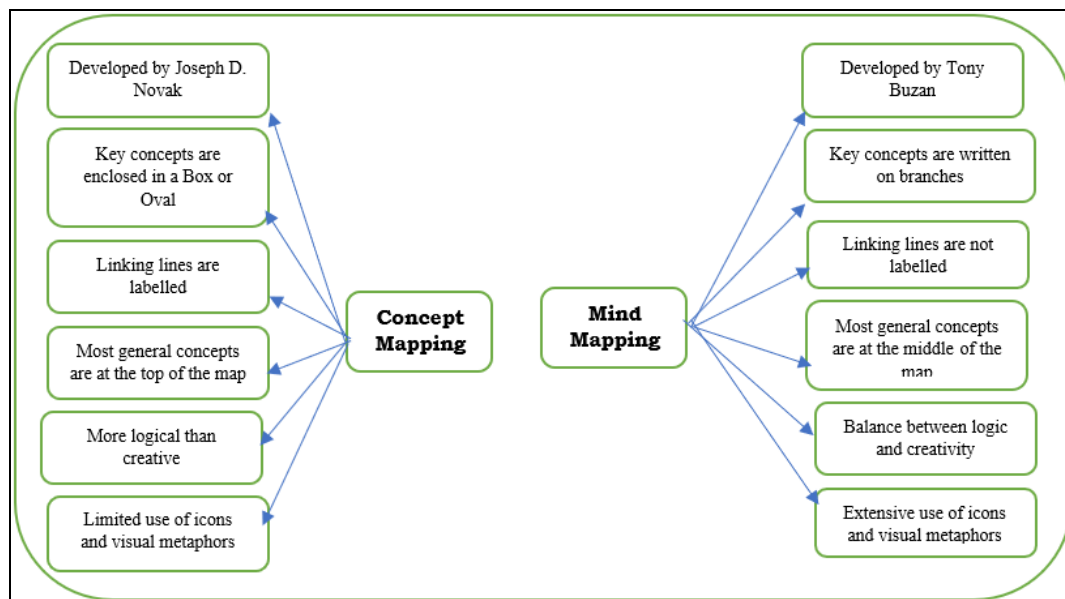


Fig 1: Difference between concept mapping and mind mapping

Steps of concept Mapping

Process of concept mapping includes six steps. These steps can take place in a single day or can be spread out over weeks or months depending on the situation.

1. **Preparation Step.** It includes three things.
 - a. **Identify the participants:** The facilitator of the mapping process works with the initiators to identify participants. Process of concept mapping may have various number of stakeholders participating but it is better to have small group containing 10 to 20 stakeholders involved.
 - b. **Develop focus for the project/task:** The initiator works with the stakeholders to develop the focus for the project.
 - c. **Schedule for mapping:** - Finally, the group decides on an appropriate schedule for the mapping.
2. **Generation Step:** - In the generation step, the stakeholders develop a large set of statements that address the focus. Stakeholders might generate statements that describe all of the specific activities that will constitute a specific program. This step of concept mapping can be processed with the help of various methods such as traditional brainstorming, brainwriting, nominal group techniques, focus groups, qualitative text analysis, and so on.
3. **Structuring Step:** In the Structuring Step the participants do two things.
 - a. **Sorting the statement in piles:** Each participant sorts the statements into piles of similar ones. Every participant will name each pile with a short descriptive label.
 - b. **Rating the statements:** Each participant rates each of the statements on some scale. These statements are

rated on a 1-to-5 point scale. It is based on their relative importance. Statement rated 1 on 5 Point scale is considered relatively unimportant and statement rated 5 on 5 Point scale is considered as extremely important.

4. **Representation Step:** In this step analysis is done which is the process of taking the sort and rating input and “representing” it in the form of map. There are two major statistical analyses that are used in the representation step and these are as follows;
 - a. **Multidimensional scaling:** It takes the sort data across all participants and develops the basic map where each statement is a point on the map. Statements piled together by more participants are closer to each other on the map.
 - b. **Cluster analysis:** It takes the output of the multidimensional scaling (the point map) and partitions the map into groups of statements or ideas, into clusters.
5. **Interpretation Step:** In the Interpretation Step, the facilitator works with the stakeholder group to help them develop their own labels and interpretations for the various maps. The facilitator names the clusters, identify regions in the map, understand seeming anomalies and missing items and identify ‘minimum’ meaningful and ‘maximum’ meaningful number of clusters for each map.

Utilization Step: The Utilization Step involves using the maps to help address the original focus. It includes further consultations, developing measurement tools, program design and development and deciding evaluation criteria.

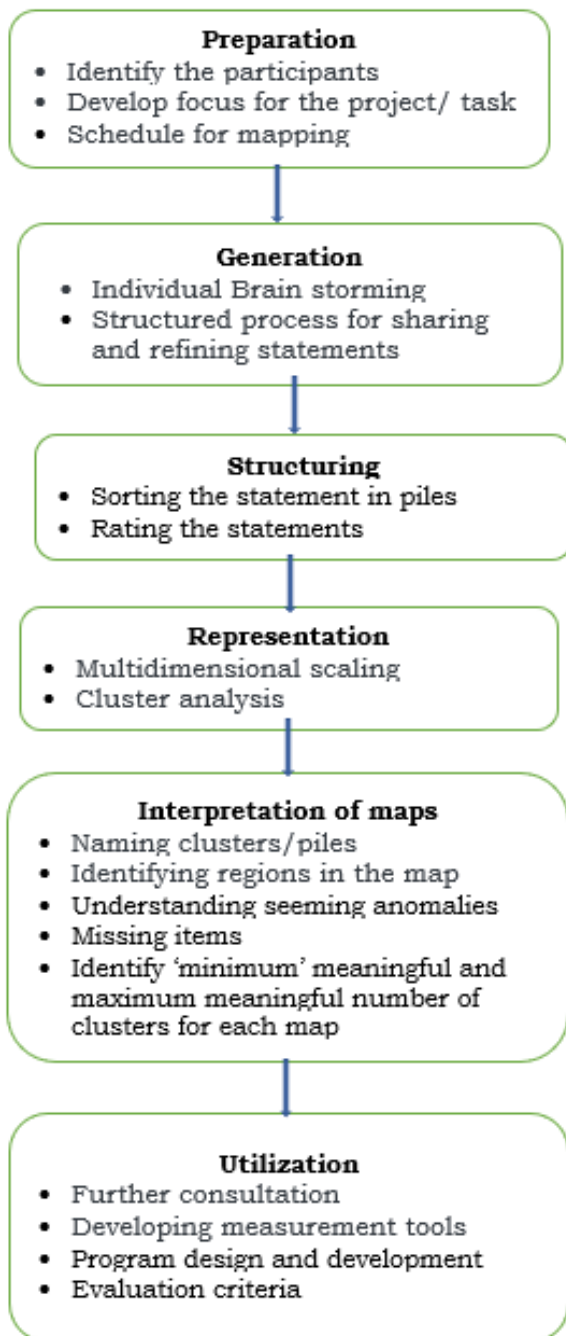


Fig 2: Steps of Concept Mapping

Concept maps in Nursing Education

Nursing education is an important for improving judgement and thinking skills of nursing students. One of the aims of nursing education is to prepare nursing students to be ready to different clinical situations. The permanence of taught information and participation of the students in the process of learning is an important for realizing these objectives. Actual and potential health problems of the patient can be identified with the help pf nursing care plans. Nursing students find it difficult to assimilate data to identify and understand the many diverse patient problems with the help of rigid structure of nursing care plan.

Nursing student come across various challenging situation during their clinical postings and Nursing teachers help them to think critically and solve problems in a variety of clinical practice settings. Nursing teachers can promote

meaningful learning through active teaching strategies such as concept mapping. Traditional methods promote rote memorization.

Nursing teachers believe that concept mapping being a motivating teaching strategy fosters the long-term and meaningful learning among nursing students. Concept mapping has worthy outcomes in nursing education. Findings of various researches have given enough evidence regarding positive impact of concept mapping in the process of active learning hence concept mapping can be integrated as a continuous teaching strategy in nursing educational programs.

Finding of the various studies have shown positive results about the use of concept maps. Students also have given positive feedback regarding impact of concept mapping in learning process. It was determined that the use of the concept map teaching method for nursing students improves the students' critical thinking skills, the sense of accomplishment and self -confidence. In addition, it was found that students can more easily identify subjects they don't know and understand, can better understand the subject and it has a positive effect on their academic achievement.

Review of Literature

Research have proved the importance of concept maps in learning compare to other teaching methods. Concept maps have a great impact on nursing student's competencies for their nursing profession. Evidence suggests increased in the use of concept maps in nursing education. Various studies have shown positive effects of the use of concept maps in achieving learning objectives.

In recent years, when the studies on the use of concept maps in nursing education have been reviewed in various countries like Turkey, Saudi Arabia, Iran, Taiwan, USA, India etc. various studies have been conducted to compare the effectiveness of concept mapping strategy over traditional teaching method and the findings of the study revealed that the concept map teaching method had more positive effects.

The review related to use of concept maps in nursing education revealed that students who participated in concept mapping sessions are likely to be more active and independent learners. A study conducted by Hill (2006) has revealed that concept maps incorporate self-learning techniques and students learned how to acquire knowledge independently and empower themselves to function in the professional setting.

A quasi-experimental study was conducted on 102 nursing students. The tools used for the assessment was concept map assessment Rubric. Finding of this study revealed that concept mapping is directly correlated with students' abilities to solve problem independently.

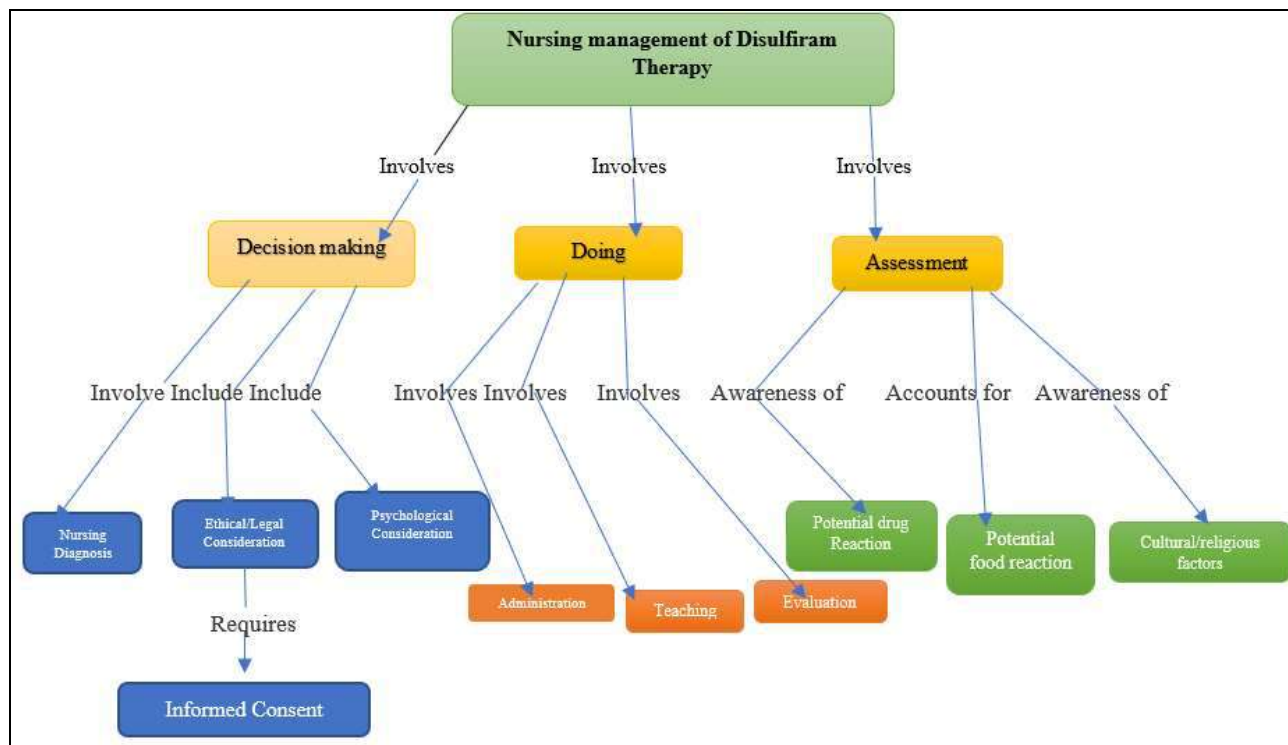
Findings of an experimental study revealed that students were appreciated their abilities to integrate the learned knowledge in clinical settings, and they were creatively drawn concept maps for their patients including nursing care plan for each patient. Findings also revealed that use of clinical simulation and scenarios with the help of concept mapping, leads more satisfaction and positive attitude among nursing students towards their clinical training.

Conclusion

Concept maps are a graphical tool which is used to visualize meaningful relationships among concepts. Positive effects of concept maps in nursing education is to develop students' critical thinking skills, academic success, nursing competence skills, knowledge and comprehension levels, student satisfaction and cognitive learning levels. It is

suggested that nursing teacher teaching nursing students about the process of concept mapping should increase knowledge level about concept maps, provide opportunity to practice, support nursing students adequately and including courses related to concept maps in the curriculum.

Example of concept map in Nursing



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