Concept Mapping: An Educational Strategy for Advancing Nursing Education

Irit Harpaz, MA, RN, Chaya Balik, PhD, RN, and Mally Ehrenfeld, PhD, RN

TOPIC. *Application of concept mapping as a tool in nursing education.*

PURPOSE. *To highlight the use of concept mapping as a method for advanced learning in nursing education.*

SOURCES OF INFORMATION. *Literature from nursing and general education, instructor and student experiences, and opinions from using concept maps as a method of teaching/learning.*

CONCLUSIONS. *Instructors and students reported satisfaction from use of concept maps in the educational process. Teaching with the aid of concept maps has been incorporated as an innovative and viable teaching method in nursing education.*

Search terms: *Concept mapping, nursing education*

Irit Harpaz, MA, RN, is Class Coordinator and Instructor, Sheba Academic School of Nursing, Tel-Aviv University; Chaya Balik, PhD, RN, is Director, Sheinbrun Academic School of Nursing, Tel Aviv; Mally Ehrenfeld, PhD, RN, is Head, Department of Nursing, Tel Aviv University, Tel Aviv, Israel.

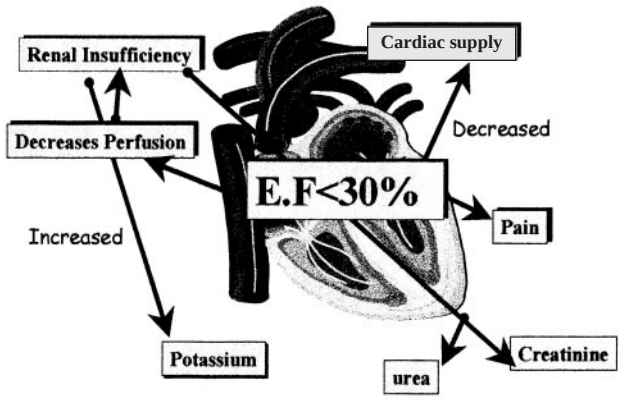
There is a growing awareness of the need for changes in nursing education systems, especially in developing self-learning techniques where the student is an active participant in the learning process. If the educational goal in nursing is indeed to develop a professional who is able to self-direct and to continue on the educational path, the individual must be skilled in the process of self-learning.

One such educational strategy is concept mapping, which involves the use of flow charts to organize central concepts and which facilitates understanding of the relationships between them. Research has shown that concept mapping is an advanced method for successful learning. This article demonstrates how concept mapping in nursing education can help advance learning processes and develop skills needed by the student, such as critical thinking, organization of information, understanding complex relationships, and the integration of theoretical knowledge and nursing practice.

One of the goals of nursing educators is to help students develop skills that enable them to continue acquiring knowledge independently, even after their formal education is completed. In this era of abundant information and technology that is characterized by rapidly changing data and knowledge, it is up to the students to learn how to study, and even more, how to organize the knowledge and differentiate between significant and insignificant information. There are several methods of teaching that can help the student in the process of becoming a "smart learner." One of the strategies of teaching/learning that promotes this educational concept is called concept mapping.

Concept mapping is a visual presentation of the contacts between key terms derived from the subject being

Figure 1. A Concept Map for Cardiac Insufficiency



learned. Concept mapping is aimed toward organizing knowledge so that it correlates with the way it is organized and represented in the human memory. This obliges the student to delve into and understand the connections between the different areas of knowledge. Learning new concepts that are well organized develops a high capability to learn and solve problems, improves thinking skills, and enables the student to see the patient as one whole unit.

In an attempt to improve and expand teaching methods in one Israeli nursing school, some of the staff members were taught to use concept mapping. Following an intensive period of preparation, teachers began to develop concept maps with the students both in theoretical and clinical settings.

Literature Review

Ausubel (1968) claimed that in every area of knowledge it is possible to identify the system of the relevant concepts that are built in a hierarchical way. At the top of the hierarchical ladder are the overall and general concepts, and following them are the more specific concepts. The model presented by Novak and Gowin (1984, p. 138) was based on this view. In order to design a map, the model presents five steps for organizing the concepts:

1. Locating the overall, general concept
2. Presenting concepts located at lower levels of the hierarchy
3. Making connections between the concepts by using arrows
4. Defining the relationships between the concepts by using conjunctions
5. Connecting between concepts by using cross-connections—integration

Using the mapping technique enables the learner to understand the main concepts of the area of knowledge and the connections between them, and to represent the concepts in a way that shows his or her way of understanding. The goal of this method is to achieve a method of meaningful learning that occurs when the learner actively connects new concepts to existing concepts from former formation of knowledge. Accordingly, this helps complete the missing knowledge, clarify existing knowledge, and improve critical thinking.

Learning in this manner becomes significant and stimulating, aids in retaining knowledge or an extended time, and makes new learning easier. Methods that do not use a "learning-through-understanding" attitude may cause students to retain data for shorter periods. Hence, significant learning means absorption of concepts and arguments into existing cognitive structures. Daley (1996) claims that significant learning directs the learner to examine each subject from all aspects and to find connections between different areas of knowledge, while completing the missing knowledge independently.

Smith (1992) examined students who studied immunology during their nursing studies. The students reported that learning through concept mapping encouraged them to learn by themselves and provided reassurance, orientation in knowledge, and its implementation in the clinical field. Daley (1996) also describes in her research the meanings and connections that students create between the theoretical material and its implementation in the clinical field. Her conclusions were that maps of concepts help bridge the gap between theory and implementation and enable the student to inte-

grate different areas of knowledge and their implementation in direct care of the patient.

Implementing Concept Mapping

There are various kinds of concept maps:

- Blank maps where one has to choose the appropriate concepts.
- Maps that have the concepts labeled and the student chooses the conjunctions from a provided list.
- Concept maps that the student designs.

Figures 1 and 2 are examples of other maps.

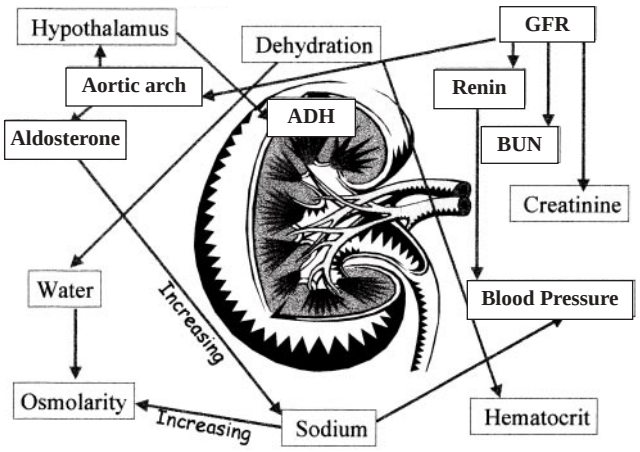
A full map of concepts is like a road map in which every concept leads to knowing the subjects and content of the area in order to reach the goal. Kathol, Geiger, and Hartig (1998, p. 32) described the instructions the student receives in order to design a map during the clinical experience:

1. Create a client problem list.
2. Diagram the relationships among the problems (cause and effects).
3. Identify pertinent lab and diagnostic tests related to each problem.
4. Correlate the medications and therapies related to each problem.
5. Include the client's human responses to the identified problems (physiological, psychological, sociocultural, spiritual, and developmental).
6. Identify nursing diagnoses.

Use of concept mapping is not unique to the classroom. It enables integration between the knowledge acquired in the class and its implementation in direct treatment of the patient in the clinical field, in locating specific problems, and in planning interventions appropriately.

Figure 3 is a map of concepts designed by a nursing school student during her clinical experience with an elderly patient who was hospitalized because of complaints of confusion and vomiting. These data were collected during the assessment:

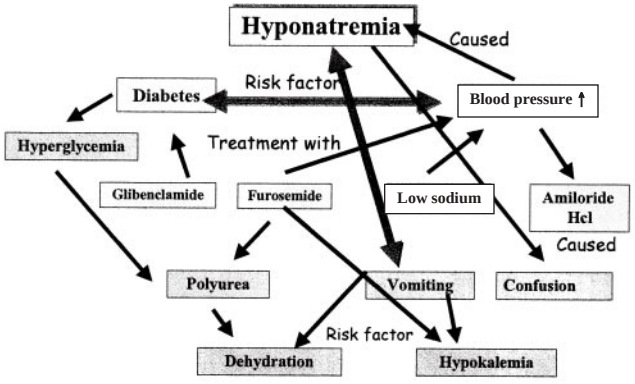
Figure 2. A Concept Map for Monitoring Fluids and Electrolytes



- A 70-year-old patient complaining of confusion and vomiting.
- Background: Diabetes mellitus and hypertension
- Current lab results:
  - serum glucose = 300 mg%
  - sodium = 128 mEq/L
- Vital signs:
  - blood pressure 110/60
  - 22 breaths/min
  - pulse 112, regular
- The patient was on a low-sodium diet.
- Medications the patients received at home:
  - Furosemide 80 mg × 2
  - tab. Amiloride HCl+hydrochlorothiazide 5 mg × 2
  - Glibenclamide 5 mg × 1

The student demonstrated the connections between the health problem and other variables with a concept map. Using the map, she described the reciprocal systems while presenting the patient as one whole unit. With it, she planned the intervention based on knowledge and understanding. By understanding the connections, the

Figure 3. A Concept Map Designed by a Student



student derived the relevant nursing diagnosis for care. It was done according to priorities of planning the nursing intervention.

The clinical instructor also may use maps students have designed as tools aiding in their final assessment of accomplishments, for examining the student's ability to identify relevant items of data relating to the patient, as well as for assessing their ability to integrate the theoretical knowledge with the patient's condition (All & Havens, 1997; Baugh & Mellott, 1998).

Outcomes

At the end of each semester, both instructors and students were asked to assess the efficiency of teaching/learning when using the concept mapping method. In the assessment, both groups were asked to compare concept mapping with traditional teaching methods.

Students reported that learning through concept mapping

- Encouraged them to think independently.
- Increased orientation in knowledge and in finding connections between the different areas.
- Gave them more confidence in implementing their knowledge in clinical work.

Teachers reported that concept mapping

- Helped organize the theoretical material in an integrative way.
- Changed the student from a passive learner to an active one.
- Enabled evaluation of students' knowledge.
- Improved evaluation of the student's safety in the clinical environment.

Conclusion

Teaching with the aid of concept maps has been incorporated as a viable teaching method and has been adopted by instructors at the Sheba Academic School of Nursing, Sheba Medical Center, affiliated with Tel-Aviv University. The method serves a variety of students in the class as well as during clinical experience. Furthermore, following requests from instructors from other nursing schools in the country, workshops were held and the method was taught and subsequently integrated into additional schools of nursing. It is equally important to understand that the use of concept mapping does not presume to replace existing teaching methods, but rather to accompany them as an additional way to promote teaching and learning.

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Author contact: ehrenfel@post.tau.ac.il, with a copy to the Editor: cooperconsulting@socal.rr.com

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continued on page 36

full-time staff nursing. Although I realized there was a nursing shortage at the time and that hospitals were understaffed, I had no idea that this, coupled with the onset of managed care, could have such a negative impact on our healthcare system in such a short time. Dad tells me that every nurse he asked told him that he/she had no more than 2 years of experience—even the ICU nurses.

This was made evident to me when I came in to see him one evening when he was receiving a unit of blood and complaining of pain at the IV site. The nurses did not seem to know why the infusion was painful, and as long as it was running, that seemed to be all they were concerned with. The catheter was placed at the bend in his wrist, so I put a towel roll under his hand to cock the wrist. It relieved the pain immediately. This man had had three units of blood through this particular site before I arrived, and no one thought to do this simple patient comfort measure.

While in ICU, my father received no assistance whatsoever with his personal hygiene needs, and were it not for my mother and me, he would not have had any. I found out later that he had received multiple units of blood and IV fluids running at 150 cc/hour, and no one thought to split the units or give him some Lasix. He retained a lot of fluid. Thank God his kidneys were in good enough shape to handle it. He was given a colonoscopy at one facility without any prep and, needless to say, this invasive test needed to be repeated at another. He had barium studies done and was not told to drink fluids nor what to expect the next time he defecated. Each day saw the advent of a different physician. Continuity of care was virtually nonexistent, both medically and in regard to the management of his care. I firmly believe this is why dad ended up being "lifeflighted" downtown from a community hospital and spending 2 days of his 9-day stay in an ICU unit there.

I saw very little assessment and patient advocacy by the nurses, and even less patient education in either facility. I was not sure if it was a lack of experience, compassion, time, or all of the above that kept my father from receiving the "care" he needed. All I know is that he barely received the "services" he was promised from the system.

I could not help thinking, what do people do who do not have nurses or healthcare professionals in their families? What if they do not have families? I firmly believe my father's stay was lengthened, not shortened, by the system. In our zeal to provide modern services that are cost-effective, have we lost our ability to care? After all, clients are consumers, whereas patients have always been perceived as individual human beings, in need of specialized care. I came away from this experience with a whole lot of valuable insights to share with my medical-surgical nursing students.

I do not believe it is possible to provide adequate health services at a reasonable cost if we cannot, or will not, choose to take the responsibility of caring for those individuals whose lives have been entrusted to us. I think my father would agree.

Edie West, MSN, RN, CS
Assistant Professor of Nursing, Lake Superior State University
Sault Ste. Marie, MI

Author contact: ewest@gw.lssu.edu, with a copy to the Editor: cooperconsulting@socal.rr.com

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continued from page 30

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