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Staff Development Story:

CONCEPT MAPPING: A STAFF DEVELOPMENT STRATEGY FOR ENHANCING ONCOLOGY CRITICAL THINKING

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Developing innovative educational programs to advance practice in a clinical research setting is challenging for educators. Varieties of learners coexist within each practice development setting, ranging from novice to expert nurses. Each nurse needs to find value in the content he or she is learning and be able to apply this knowledge in the clinical setting. Applying didactic content to the clinical setting while incorporating critical thinking and meaningful learning is especially important. Educators must consider dynamic and innovative teaching-learning strategies when developing programs to ensure that they are meeting the course participants' needs.

Concept mapping is a logic model that requires the learner to analyze data, determine relationships between concepts, review problems and issues, evaluate the correlations, and determine the nursing actions. Concept mapping was proposed by Novak and Gowin as a learning strategy in 1984 and was based on the method originally developed in 1972 as part of Novak's research (Novak & Gowin, 1984). Using concept mapping in the learning process promotes a higher level of thinking and development of skills, such as generation of ideas and decision making (Beitz, 1998). The concept map can be used for a variety of reasons: (a) to have a greater understanding of a patient/disease process and care provided, (b) to design additional practice development programs, and (c) to serve as an evaluation tool to measure program outcomes (Anthony & Higgins, 2006). By using a logic model, the

learner is able to view various aspects of the process and the cause-and-effect associations to enhance critical thinking in practice (Ellermann, Kataoka-Yahiro, & Wong, 2006).

Academic settings frequently employ concept mapping in place of the traditional care plan; however, there is limited literature on using concept mapping in the staff development setting. Concept maps incorporate all the elements of the nursing process but enhance it by allowing learners to visually map specific aspects of care into a cohesive whole (Glendon & Ulrich, 2004). Concept mapping allows adult learners to apply critical-thinking strategies when creating a particular map, just as one would personalize a patient care plan (Luckowski, 2003).

LITERATURE REVIEW

Hsu and Hsieh (2005) tested the efficacy of concept mapping as a learning strategy for 43 nursing students enrolled in a 2-year nursing program. Students were divided into seven groups to develop six concept maps based upon scenarios provided by the instructor. Within these groups, the students had to work together to analyze the scenario, determine the initial and secondary problems, and then correlate the relationships of the data. Hsu and Hsieh found that students were able to incorporate knowledge previously learned with new knowledge to develop the concept map. In developing the map, the students were required to critically think about all the elements of the map and their relationships. In addition, students were found to acquire “problem-solving and critical thinking skills by organizing complex patient data, analyzing concept relationships, and identifying interventions” (Hsu & Hsieh, 2005, p. 148). The groups of students were found to be engaged in discussions while working on the maps, thus leading to improved communication and relationships between the students and more positive attitudes toward their work (Hsu & Hsieh, 2005).

Kinchin and Hay (2005) studied the effectiveness of concept mapping to enhance collaborative learning among groups of nursing students. Students enrolled in a postgraduate certificate program in education were assigned to independently construct concept maps on a particular topic. The groups were then asked to compare their individual maps and develop a group map. This process provided an opportunity to discuss and incorporate different perspectives. The findings of this study suggest that the concept mapping group work is a critical component in the process of constructing knowledge and promotes effective exchange of information (Kinchin & Hay, 2005).

Hinck et al. (2006) studied the effect of incorporating concept mapping into a junior-level baccalaureate community-based mental health-care course ($n = 23$) on students' ability to correlate relationships to provide and evaluate nursing care. Using a quasi-experimental pretest and posttest design, students were required to complete concept maps for the patients they cared for throughout the course. Faculty scored the concept maps and provided suggestions based entirely on the map, rather than scoring based on the patient. Faculty noted the improvement of the concept maps throughout the course. At the end of the course, students were administered a questionnaire regarding their satisfaction with using concept mapping in planning care for the patient. The results showed that students responded favorably to the concept maps and that the mapping was helpful for most students in improving their thinking ability and providing insight into more complex situations (Hinck et al., 2006).

Concept Mapping

Incorporating concept mapping as an instructional method allows the learner to play an active, rather than passive, role in the learning process and to develop new knowledge by integrating previously learned knowledge and experiences. The learner employs a holistic

view of the patient by assimilating various concepts and data, including objective and subjective data. Concept mapping helps the learner understand how concepts relate to each other, identify problems that may occur, problem solve, and improve overall patient care. Throughout the process, the learner is incorporating current knowledge and experiences while linking and developing new knowledge into the map to correlate the concepts while yielding a broader understanding of the holistic patient. In addition, this strategy has shown to improve recall of knowledge in the future (Di Vito-Thomas, 2005; Harpaz, Balik, & Ehrenfeld, 2004; Hsu & Hsieh, 2005; Peter, 2005).

Concept mapping graphically describes a patient situation, identifying relationships between various aspects of the patient's care including the medical diagnosis, assessment data, medications administered, diagnostic testing completed, multidisciplinary interventions, and discharge planning. Recognizing these relationships contributes to and enhances meaningful knowledge for the learner by incorporating current knowledge with new knowledge, thus leading to long-term learning (Hsu & Hsieh, 2005). This strategy is especially useful for visual learners as they tend to learn best by visualizing what they are learning. Concept mapping easily provides this learning modality through the development of the mapping process. An example of this strategy is when teaching a nursing student about chest pain management. The student correlates information such as the patient's symptoms, vital signs, diagnostic tests, and nursing interventions to develop a visual representation of the patient's condition. Throughout this process, critical-thinking skills are improved by analyzing the data/patient problems and creating a framework based on this information. The learner then determines the connection of the information based on how the concepts relate or interrelate, providing a visual map of the holistic review of the patient and care necessary for practice. In addition, the map provides the educator with the opportunity to evaluate the thinking process of the learner (Anthony & Higgins, 2006; Luckowski, 2003).

Advantages and Disadvantages of Concept Mapping

Concept mapping promotes critical thinking and encourages learners to think creatively (Glendon & Ulrich, 2004). This strategy assists the learner in decreasing anxiety, increasing motivation to learn, and promoting greater achievement (Luckowski, 2003). Additional advantages of concept mapping include encouraging creativity, exemplifying concepts from simple to complex, and providing an educational activity that can be completed individually or in a group (Glendon & Ulrich, 2004).

There are also disadvantages to using concept mapping. This teaching strategy is a time-consuming process for both the instructor and the learner. The time required learning the mapping process is the primary reason some educators are not receptive to concept mapping (Beitz, 1998). Concept mapping is not an effective learning strategy for learners who are linear thinkers. Linear thinkers tend to have a difficult time navigating their way through the various relationships of a concept map (Luckowski, 2003).

THEORETICAL FRAMEWORK

Concept mapping as a learning strategy is derived from the constructivism theory of learning, which states that the learner develops knowledge through integrating new information with past knowledge and experience to create a process for meaningful learning. Within this framework, the learner begins with the basic information and advances to a more complex understanding of specific content areas. This complex understanding helps to assimilate knowledge and experiences previously learned with new knowledge into meaningful, long-lasting learning (Daley, 2004).

The constructivism theory views the instructor as the facilitator. The main role of the instructor is to encourage learners to take an active role in the learning process and structure new information based upon the learner's previous knowledge and experiences. The constructivist view of the learning process is built from the learner's perceptions instead of delivered from someone in an expert position. Constructivists also emphasize that learning must include strategies to enhance problem-solving skills and promote high-order thinking (Hsu & Hsieh, 2005).

CONCEPT MAPPING IMPLEMENTATION IN THE ONCOLOGY EDUCATION SERIES

The Research and Practice Development Section of the Nursing Department at the National Institutes of Health Clinical Center provides a 7-week Oncology Education Series (OES) supported by educators and clinical nurse specialists (CNSs). OES is a combination of three previously independent oncology education courses: concepts in cancer care, principles of chemotherapy and biotherapy, and oncologic emergencies. The target audience in this series includes novice nurses, experienced nurses with limited oncology expertise, and experienced oncology nurses requiring updates in the rapidly changing oncology practice arena. The audience consists of nurses from inpatient and outpatient care areas and primary oncology, intensive care, and supportive care areas such as medical surgical and neurology.

In November 2005, the oncology CNS and educator group met to plan and revise the upcoming Winter OES class. Many of the new nurses hired into the program had limited or no previous oncology experience, and it was identified that another means was needed to assist the nurses with developing their critical-thinking skills. The topic of concept mapping was introduced to the planning group by an educator with concept map experience, and three articles were distributed describing what concept mapping is and how it could be implemented into the program. Additional instruction and facilitation were provided on the development and use of concept maps. The central educator remained as a consultant and facilitator throughout the OES. After the discussion of the teaching-learning strategy, the group agreed to incorporate concept mapping into the OES. Course participants were divided into groups based upon their patient care unit and patient population. Course participants who were not oncology nurses were assigned to groups that most closely matched their patient populations. For example, the neurology staff nurse joined the medical-surgical intensive care staff. A PowerPoint presentation was given on the first day of class, providing an overview of concept mapping, identifying parts of the concept map, and giving suggestions for completing the map. A checklist was provided to guide the course participants through the completion of the assignment. Time was allotted at various intervals throughout the series for participants to work on their project. Each group was assigned an oncology CNS to provide feedback in both the content and the process for completing the concept maps. The educator from the practice development office was available weekly to provide face-to-face guidance to the course participants, as well as electronically. Course participants were encouraged to use creativity and innovation in developing their concept maps.

On the final course day of OES, members of each group presented their concept map to the class and the CNS-educator group. Nurse managers and colleagues from the respective programs of care were invited to attend the presentations. Each group presented a patient, the patient's research protocol, the treatment schema, symptoms, patient education, and other pertinent information, along with rationales for the decisions developing the map. Although the groups had similar ideas for the projects, the concept maps were unique, with each group having its own interpretation of the mapping process. One group outlined the map as a ship (representing the patient) sailing the high seas and the various events that

occurred on the voyage (e.g., sharks as side effects or problems that transpired with the oncology disease process). Another group presented drawings of the various concepts and how they were related for a melanoma protocol, highlighting the different systems and side effects occurring with the patient and the nursing care provided. Each group member was responsible for presenting a section of the map to the class. The presentation was seen as an opportunity to teach the class about the disease process and the research protocol, along with developing oral presentation and leadership skills for course participants.

OUTCOMES EVALUATION

Evaluating and placing a grade on each concept map and the group's presentation can be controversial. Concept maps are unique to each group's thought processes, and the evaluation process has the potential of stifling creativity in the development phase, thus inhibiting learning. Hinck et al. (2006) contended that grading the concept map may persuade the learners to structure their concept map based upon the criteria provided for grading. The result is a reduction of the potential to expand the learner's thought processes along the care continuum. The learner should be encouraged to be creative and innovative in the concept mapping project. Perhaps providing limited directions on the project and letting the learners have complete freedom in their perceptions of the map and the patient maximize the outcomes of the learning experience (Hinck et al., 2006).

Participants ($n = 25$) from the first OES course in which concept mapping was incorporated provided feedback regarding the project. Feedback from the staff was generally positive, with staff commenting on how the project helped them to better understand the content learned in the OES and the overall care provided to the patient in a clinical research setting. Constructive criticism from the staff included the need to receive more specific directions for completing the project and the need to have more class time allotted for completing the map. On the basis of these evaluations, modifications made such as incorporating more time for groups to work on their projects during the class day were made. In addition, a timeline and a checklist were developed so that the course participants knew exactly what they should include in the maps and what content they should focus on weekly. Nurse managers reported being very pleased with the results generated by the concept maps and the increased participants' understanding of the oncology disease process. Nurse managers further commented that the staff members were better prepared to care for oncology patients and had a greater understanding of the oncology patient's complex care needs.

The concept maps are used as an educational tool for nurses in a variety of settings. After presenting the concept maps, course participants take their maps back to the unit/care area to review with the nurse manager and present them a second time in an inservice class to the unit staff. Many concept maps are displayed on the units or in staff areas for review. The clinical educator or preceptor may also use them to orient new employees. The staff not attending OES commented how the maps helped them to understand new concepts related to oncology patient care. In addition, course participants are encouraged to incorporate a picture and explanation of the concept map in their professional portfolios. Elements of critical thinking exemplified during the use of concept mapping have best been described by a unit-based preceptor using the map displayed on the unit to precept new staff on care delivery for a patient enrolled in a new research protocol.

The evaluation process for the concept mapping groups incorporated is in alignment with the performance evaluation process currently in place at the institution (see Table 1). The evaluation tool was adapted and modified from Hanson's (2005) *Concept Map Evaluation Key* used in the academic setting. In this document, the evaluator rates the maps from 1 to 5, with 1 as unacceptable, 2 as minimally acceptable, 3 as fully successful, and 5 as

exceptional. Points were assigned based upon the documentation of data, relationships identified, ease of readability, integration of patient, and presentation of information. Evaluators provided comments regarding the creativity of the maps and how well the groups collaborated to present the content. After the presentation and prior to scoring the evaluations, the course participants were able to question the teams regarding the patient and the map, thus provoking additional learning and sometimes highlighting errors within the maps.

Evaluation involved assessing team members on their contributions to the project. Each team member evaluated himself or herself and other members on aspects of teamwork. Each team member completed the evaluation and turned it in to the course coordinator after presenting the group concept maps. Attributes of the group evaluation consisted of questions pertaining to: contributions to the team, individual efforts toward completion of the project, and respectfulness of team members. Evaluations were collated, and results were sent to each nurse individually, as well as to the respective nurse manager, for incorporation in the employee's performance evaluation.

In addition to the course, group, and team evaluations, the course participants completed an impact evaluation 8 weeks after the completion of the series. The focus of the impact evaluation was to determine the benefit of the overall project in providing care to this patient population using what was learned in the series. The response rate for the impact evaluation was 46.7%. The results of the evaluation indicated that concept mapping was helpful in learning and applying the concepts from the OES. The course participants stated that concept mapping was helpful in a variety of ways, specifically highlighting the increased knowledge of the protocol, patient/family teaching, education of staff regarding the protocol and the treatment process, and increased confidence in caring for oncology patients.

CONCLUSIONS

Concept mapping has been found to be an effective means of applying didactic content to clinical practice and enhancing critical thinking. This concept mapping project will remain an integral part of the OES. Other areas in the nursing department are implementing concept mapping into their programs because of the positive impact on both learning in the OES and improved performance in patient care areas. Unit clinical educators within the organization have discussed incorporating concept mapping in the unit orientation process by having a preceptor select a patient with whom the orientee needs to better understand the specific disease or clinical research process and develop a concept map.

Concept mapping is a great teaching-learning tool in the staff development setting. This approach to learning also provides the staff development educator with the opportunity to evaluate the learner's thinking process and guide the learner to incorporate this knowledge into practice. The shift from didactic to active learning has been a positive experience. Based upon the feedback received from course participants and nurse managers, this form of active learning will lead course participants to retain content learned. As staff development analyzes the cost effectiveness and practicality of knowledge transfer strategies in the midst of financial constraints, concept mapping may serve as a powerful tool to engage staff members in active learning in their specific clinical areas.

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TABLE 1
Concept Map Grading/Evaluation Tool

Team: _____

(5) *Exceptional* = Performed as a model of excellence by surpassing expectations.

(3) *Fully Successful* = Met critical element.

(2) *Minimally Successful* = Had difficulty meeting expectation.

(1) *Unacceptable* = Failed to meet expectation.

Criteria	5 = Exceptional	3 = Fully Successful	2 = Minimally Successful	1 = Unacceptable
Documentation (patho, risks, meds, dx, tests, assessment, protocol info)		Met requirements of documentation completely	Most data documented but missing some critical points.	No effort made.
Concept Relationships	Demonstrates highest level of topic Integration	Pertinent relationships shown between concepts	Shows some relationships but not complete.	No effort made.
Ease of readability	Innovative and creative.	Easy to follow, clear, and useful.	Understandable and minimally acceptable effort, but somewhat difficult to follow.	Unable to follow, very unclear, useless to client care.
Integration of patient (Holistic view)	Demonstrates highest level of integration and relationship of patient to map.	Shows a high level of understanding of the entire patient picture.	Shows a modest understanding of the patient picture.	Shows no understanding of the patient picture.
Presentation of information	Each team member demonstrates the highest level of understanding and interrelatedness of the concepts.	Each team member presents a portion of the concept map and describes the inter-relatedness of the concepts. Presentation flows well and provides a clear understanding of the patient and how each aspect relates/interrelates to the other concepts.	Moderate representation of the team; however, not every team member presents. Difficult to follow flow of concepts and how concepts relate/interrelate to each other.	No team representation, presentation provided by one person. Unable to describe the relationships of the concepts.
Total points				

Note. From Hanson (2005).