Nurse Educator

Nurse Educator
Vol. 33, No. 5, pp. 220-223

Use of Premade Mind Maps to Enhance Simulation Learning

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Simulated patient care is used in nursing curriculum to facilitate the transition from didactic to practical learning. On the basis of the observations of nurse educators, students frequently struggle when trying to apply the nursing process to simulated scenarios. The author discusses a study that was initiated after faculty observed his use of mind maps as a personal note-taking method.

Noted psychologists Novak and Gowin[1] laid the foundation for alternative teaching strategies when they proposed concept maps as one way to create more meaningful learning experiences. In nursing education, several descriptive and informational articles have been published about concept mapping.[2-8] Mind mapping, a creative alternative to concept maps, has received far less recognition.

Mind mapping is a human information-processing technique that uses color, images, and text in a graphical, nonlinear style that enhances learning and memory recall.[8] Unlike concept maps, which have most often been used to explore the components of disease, there is no hierarchical structure in mind maps.[9] Knowledge is synthesized through the visual display created by "key words" on "branches" radiating outwards from a central image that represents the topic being considered.[8] The radiant structure of mind maps, combined with the use of images, color, and text, makes them an interesting alternative for nursing students who are struggling to understand the links between their patient and the care they are providing.

Data from other disciplines show significant differences in knowledge retention and memory recall among study groups using mind maps as a technique for learning. In the study conducted by Farrand et al,[10] students who elected to use a mind map study technique had better factual recall of written material after 1 week than did students who used a "self-selected" technique. Even though mind maps enhanced learning, student motivation for using them was significantly lower than the motivation that students had for using their own techniques.[10]

To date, only 2 studies have examined variables related to student motivation. One of the studies examined correlations between students' *learning styles* and the grades they received on an assignment that required them to create their own concept maps from course materials; there were no significant differences between learning styles and grades.[11] In the other study, investigators found that among a group of undergraduate pharmacology students, motivation to select and use instructor-made concept maps was negatively influenced by the students' *approach to learning*.[12] Outside these 2 studies, there are very little quantitative data describing the impact of either mind mapping or concept mapping on comprehension and knowledge synthesis in nursing education.

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Purpose

Most articles written on this topic present strategies for teaching students how to construct concept and/or mind maps. We were more interested in developing a mind map that communicated weekly topics in a consistent format and in knowing if students' use of the mind maps contributed to their understanding, comprehension, and knowledge synthesis of course concepts. We hoped to convey the benefits of mind mapping while minimizing resistance to its use.

Theoretical Framework

Buzan mind maps use images, words, shapes, colors, and lines structured as branches stemming from a central idea to create a radiant model of thinking that engages the whole brain, thereby improving creativity, memory, and recall.[8] To create a mind map, the user starts with a blank piece of paper in landscape orientation. The center of the page is reserved for an image that represents the main topic of study. The next step is the identification of *key words* that carry major significance to the topic. The key words are placed on large *branches* that radiate from the central image. As knowledge becomes more specific, additional key words are added to the appropriate *main branch* using smaller text placed on smaller branches. Wherever possible, users are encouraged to use color and to draw pictures that can be associated with the key words. When connections are made between points of information, previously thought to be unrelated, the user draws lines and arrows to show the relationship. According to Buzan,[8] the greatest motivational obstacle to using mind mapping is individuals' perceived beliefs that they are incapable of drawing creative images.

For the past 10 years, I have used the Buzan mind mapping technique regularly for brainstorming, project management, reflection, and speech writing, to name a few examples. I prefer the free form and flexible use of space to the rigid, linear style of traditional outlines. Much of the learning effect conveyed by a mind map is through its

creation. The shapes and colors of the lines and images that I draw, along with the placement of images and the size and style of the words, contribute to my ability to recall that information later. Considering the personal nature of mind mapping and its relatively novel approach to nursing education, there is no validated method for using mind maps. My goal in writing this article is to provide you, the reader, with a description of our attempt to translate this highly personal *learning* method into a practical *teaching* strategy.

Research Questions

As we were designing this study, we focused our efforts on the following 2 questions:

1. Using the Buzan method, can we design a template that can be customized each week to depict how the stages of the nursing process are applied to critical care scenarios?
2. Do instructor-made mind maps help students achieve measurable improvements in learning?

Setting and Sample

The study was conducted at the largest, public, land-grant institution in the United States. The convenience sample included 14 graduate students enrolled in the critical care nursing course of an accelerated graduate nursing program. The course consisted of a 4-hour lecture once a week and a weekly simulation laboratory where students participated in interactive patient care scenarios built around the conditions that were discussed in the lecture. Students electively chose simulation laboratory days based on convenience with their schedule. Students electing to have laboratories on either Monday or Tuesday were chosen for this study because the same instructor led both sections. The mind map group (MMG) consisted of 9 students in the Tuesday section, whereas the control group (CG) consisted of 5 students in the Monday section.

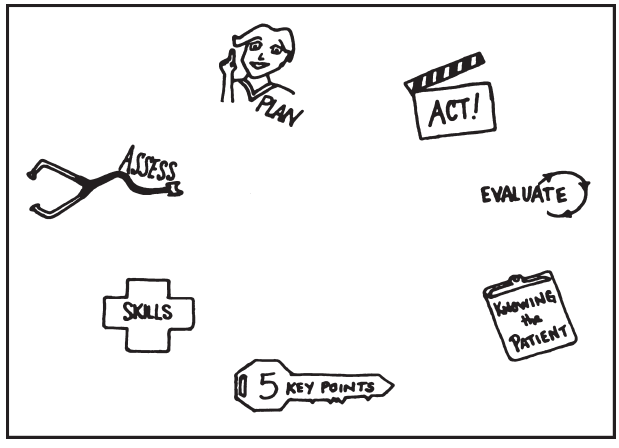

Figure 1. The mind map template with key words.

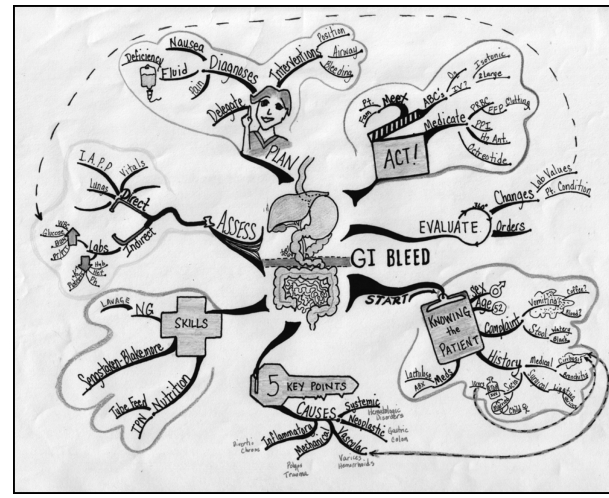

Figure 2. A completed mind map, read from the bottom right to left.

Process

I collaborated with faculty to create a basic mind map that served as a template for all of the mind maps used in the study. As illustrated in Figure 1, 7 key words were chosen, namely, (1) *knowledge* of the patient, (2) *5 key points* of the central topic, (3) *special skills* required for care of the patient, (4) *assess*, (5) *plan*, (6) *act*, and (7) *reevaluation*; the main ideas of nursing knowledge were placed along the bottom of the map, and the components of the nursing process were placed across the top. For each subsequent week, a central image that represented the core concept of the scenario was added, and large branches were drawn to connect the key words to the image. Off of each key word, specific details were placed on smaller branches, and free space was left for students to write their own notes (Figure 2).

As a class, all students received the same assignments, exposure to lecture content, and simulated learning experience. At the start of each simulation laboratory, instructors held a 15- to 20-minute preconference for explanation and discussion of the day's topic. The preconference provided a natural period for the introduction of new teaching strategies. During the preconference, I was invited to explain how the central image represented the simulation topic and how each key word was related. The group's clinical instructor facilitated further discussion, questions, and answers. The simulation laboratory started at the end of the preconference, and I was able to observe the students in action.

We conducted the study in 2 phases. Phase 1 lasted until all students completed the midterm examination, and phase 2 took place after the midterm and lasted until the final examination. During phase 1, only the MMG received the mind map during the preconference. During phase 2, we presented the mind maps to both the MMG and the CG.

Once the CG crossed over into the MMG, we used the remaining students enrolled in the course for comparison. All students completed weekly quizzes and a midterm and final examination. At the end of the quarter, study participants completed the Mind Map Evaluation Survey. We evaluated outcomes by tracking the average quiz and test scores for the MMG and CG, as individual groups and with the remainder of the class as a whole.

Instruments

The entire class completed seven 10-question quizzes. Questions were designed to test students' comprehension and application of clinical decision making when given a specific patient scenario. On weeks 5 and 10, students were given a 50-question midterm and final examination, respectively. On the last day of simulation laboratory, students in the MMG and CG were asked to complete a survey designed to assess their opinions regarding the mind maps. The survey included a total of 8 items. The first 6 items were statements that asked students to indicate the strength of their agreement using a scale of 1 to 5. The last 2 items were open-ended questions aimed at soliciting the students' attitudes toward the mind maps.

Data Collection

We began the data collection process after obtaining exemption status from the university institutional review board. At the first meeting with the MMG, I explained the study and made it clear that participation was voluntary and that students' personal data would be kept confidential. I assured them of confidentiality and impunity if they decided to withdraw at any time. I obtained a signed consent from each student who agreed to participate. At the beginning of the quarter, we used the individual grade point average (GPA) of each student to calculate the group GPA in order to establish similarity between the MMG and the CG. At the beginning of the study, the MMG GPA was 3.76; the CG GPA was 3.72. Each week, we tracked quiz scores by calculating the group average just as we did with the GPAs; the same was done for the midterm and final examination scores. At the end of the quarter, we reviewed information from the surveys for common patterns.

Results

For research question 1, I initially thought that creating a template for mind maps that would be used by other people for teaching and learning was too much of a divergence from the rules of Buzan mind mapping. After creating the template and beginning the work on the weekly maps, I became more comfortable with the idea. In the end, we were able to successfully answer this question. The mind map template was important for the following reasons:

- Improved validity: because we explored the feasibility of using a technique that is not well studied and because we analyzed the results of quiz and test scores, it was important to minimize the number of variables under consideration.
- Timely creation of new mind maps: after reaching an agreement on the format of the template, each subsequent mind map took less than an hour to create.
- Acceptance and use: students only needed orientation to the first mind map, and by our second meeting, I observed several of them using the mind maps for note taking and as a reference tool during the simulation exercise.

On the evaluation survey, students agreed that the mind maps were easy to read, helped them prepare for the simulation laboratory, and helped them understand the concepts of critical care nursing. In addition, most students indicated that they would like to have mind maps for other topics in nursing. Based on the catalog of 7 mind maps that was created using the template and the overall positive response of students, creating a template was a successful approach to incorporating mind maps into simulation exercises.

For research question 2, the instructor-made mind maps seemed to positively impact the learning experience. During phase 1 of the study, the MMG consistently outperformed the CG on weekly quiz scores, indicating a positive impact from the mind maps. However, an even better indicator was seen during phase 2, when the CG started receiving the mind maps. Before phase 2, the CG's cumulative grade on quizzes was 84.82%. After receiving mind maps during the simulation laboratory preconference, the group's quiz grades increased to 98.3% in week 7 and 95.0% in week 8.

There were 2 exceptions to the generally positive impression seen in the quiz scores. In week 4, the quiz was administered on Friday even though the midterm examination was scheduled for the following Monday. We believe that the drop in scores was likely because students were placing more emphasis on studying for the midterm than the quiz. In week 9, the simulation laboratory was cancelled and the groups received the mind maps after they had taken the quiz. Although it was neither planned nor expected, the drop in quiz scores actually substantiates the benefit that students received from the mind maps even further.

Unfortunately, students might not recognize the benefits, or see them as significant enough, to adopt mind mapping as a learning strategy. Responses on the evaluation survey revealed that the overwhelming majority of students disagreed with the statement "I will use mind maps in my future studies." Answers to the open-ended questions indicated that some students believe that the mind maps would be "too difficult or time consuming to make," whereas others indicated that mind mapping "is not my style of learning." As mentioned earlier, we knew from our literature review that *learning style* and *perceived abilities* were 2 known factors that negatively affect motivation to use mind mapping. This finding actually confirms our reason for providing the students with mind maps in the first place, to benefit those students who might otherwise never use this beneficial strategy.

Conclusion

We were successful in creating a template and 7 unique mind maps that were used by nursing students during simulated patient care scenarios. Our sample size was too small to make highly accurate statements about the effectiveness of instructor-made mind maps as a

teaching strategy in nursing education. Still, we found that students who received the instructor-made mind maps had better quiz scores than did students who did not receive them. Furthermore, when the students who had been receiving the mind maps did not get them, their quiz scores dropped. Buzan's[8] theory emphasizes that learning occurs during the creation of mind maps, yet this study shows that these students benefited from our instructor-made mind maps. Future studies with larger cohorts are needed to verify our results and establish reliability.

Even though most students indicated that they would not use mind maps in the future, there were some who indicated that they would. Maybe those are the students on whom faculty can have the greatest impact by making mind maps that show the *big picture* of nursing care in a creative and meaningful way.

Acknowledgments

The author graciously thanks Melissa Popovich, MS, RN, for her encouragement, guidance, assistance, and for the use of her office. Her willingness to provide access to students, and support during presentations, data collections and drafting this article made this project possible. Thanks also to advisor Linda Daley, PhD, RN, for her continuing support and help to define this project by serving as the principal investigator.

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