

## Concept Mapping as a Teaching Tool on Critical Thinking Skills and Academic Performance of Diploma Nursing Students

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### ABSTRACT

In today's challenging and highly complex health care settings nurses must be able to think critically. With the current traditional and rote methods of learning, the critical thinking skills among the students are seen to diminish. As nurse educators must find a different method in their teaching on how to encourage students to engage in analytical thinking and how to make the analytical thinking process part of their daily practice due to increase safety of the patients. This will give challenge for the nurse educators to reshape education by adopting instructional strategies to equip students with foundational knowledge in critical thinking, creative problem solving and collaboration. Through concept mapping, students should be able to transfer applied didactic objectives from the classroom to the clinical practice, where critical thinking and problem solving skills are needed for success. It also provide nurse educators with the ability to help students learn how to organise data, prioritise patient needs and can relate patient medical illness and nursing intervention.

**Keywords:** *Concept mapping, Teaching tool, Critical thinking skills, Academic performance, Nursing students*

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### Introduction

Educators might be successful in teaching the basics, but it does not mean the students will be able to analyse and evaluate what they are taught. There is a need to understand the complex processes involved in critical thinking. One of the active teaching and learning methods proposed to promote critical thinking was concept mapping. Concept mapping is a method of learning and an educational tool using diagrammatic relationships among concepts representing subject knowledge (1, 2). Concept-mapping has been identified as a stimulating learning method to facilitate critical thinking by encouraging students to connect new knowledge to their prior learning, and to give students an

opportunity to gain further, wide and varied knowledge on a number of concepts in a short period (3).

Facilitating critical thinking remains a challenge faced by both nurse educators and student nurses, especially to change the method of learning from the traditional to concept mapping. To promote critical thinking skills into didactic phase requires the construction and reconstruction of meanings by students through active seeking and integrating of new knowledge with knowledge already existing in their cognitive structure (3). Health care problems require nursing students and nurses to have critical thinking skills (4). Increase patient acuity, the movement of patients' care from acute care facilities to community settings and

rapidly changing health care environment have increased the demand for nurses to be competent and capable to thinking critically.

Concept mapping is an innovative teaching learning strategy if the students have the ability to develop concept maps. In nursing education, concept mapping is adapted to develop nursing care plans from the assessment data collected from patients instead of the common care plans prepared in columns (5). However, teacher-centered approach does not allow nursing students the time to develop clinical judgement skills, problem-solving abilities, or nursing care skills (6). This led students to experience less critical thinking, learning subjects merely for examination purposes. When this happens, the long-term learning will not occur. Therefore, when students are in the clinical field, they cannot perform well and be competent because they cannot relate the knowledge they had learn in didactic theory e.g. diabetes mellitus patient care and relationship between concept and plan nursing care to their patients. They may not be able to think outside the box due to the traditional method of learning. They would become followers failing to know any better.

## Importance of Critical Thinking in Nursing Practice

The present health care system is growing more complex and challenging. Nursing graduates need to be prepared to not only be compassionate caregivers, but need to be highly skilled problem solvers and critical thinkers. Concept mapping will increased critical thinking because it required the students to view the patient holistically and relationships between patient problems, not just copy information from a care planning book. It is consistent with the finding by Hsu & Hsieh (2) reported that the students gained a more holistic view of the patient and their problems through the use of concept maps. In addition, the students learned how to organise complex data and explore deeper relationships. To teach

thinking, teachers must have an awareness of and competence with the specific skills of thinking.

Teachers take a self-inventory to determine which thinking skills they can move directly into providing opportunities for students to practice skills with the appropriate interventions, cooperative learning structures and graphic representations of their thinking (7). Both methods offer invaluable evidence of growth as students actively process content and build on prior knowledge and past experiences (7). Through cooperative learning strategies, students gradually accept responsibility for their own learning as they articulate their thought to each other and thus engage in interactive, metacognitive approach to processing information and problem-solving (8).

Critical thinkers and non-critical thinkers use the nursing process differently (9). Alfaro-LeFevre (9) took the position that critical thinkers take a “more proactive dynamic approach” to the nursing process whereas, non-critical thinkers view the nursing process as “linear” to be “followed rotely, without critical thinking”. For example, consider the client has been ordered to receive beta-blocker daily. By using concept mapping, the students will learn the critical thinking skills, in assessing the patients in temperature, blood pressure and heart rate. The students will make an assessment and evaluation to the patient before give the medication; and then act upon that decision by giving the medication. This will avoid medication error occur. Non-critical thinkers would give the medication as ordered, without assessing the heart rate or blood pressure or, if they did make those assessments, they would not correlate the abnormal findings to decide whether the medication should be administered or held.

## Concept Mapping

Concept mapping was originally developed by Novak in the 1980s, to document the

way children learn science (10). They have demonstrated that concept maps are graphical tools for organising and representing knowledge in networks of concepts and linking statements about a problem or subject. It was described as a hierarchical map structure with links to form valid propositions or linking words. The components of concept mapping include meaningful proposition, connecting words, cross links and relevant examples. Concept map is a visual representation of an individual's understanding of selected phenomena (11).

Concept maps as “schematic devices for representing a set of concept meanings embedded in a framework of proposition as hierarchical graphical organisers that serve to demonstrate the understanding of relationships among concepts” (12). Major concepts are circled or boxed. Lines show relationships or links, and the direction of the thought process is indicated with arrows. Propositional links between concepts, showing the meaning of the relationship between the two concepts, are represented by connecting lines with words that describe the relationship written along the lines. The hierarchical structure and the development of cross links are two aspects of concept maps that promote critical thinking (13, 14).

The research on the use of concept mapping has included areas such as medicine, education, business, nursing, engineering, dentistry, physical therapy, and psychology (15). Since the heart of nursing practice is the application of knowledge in the clinical setting, it is imperative that nursing students be able to link concepts from different domains of knowledge (8, 16, 17). As nurse educators, must obligation to understand the teaching learning process well enough to improve it. Nurse educators need to know how to teach in an expert way, with the ability to assess, analyse, plan, implement, evaluate and more important to improve the quality of teaching and learning in classrooms. As an alternative to the traditional lecture, concept mapping is an instructional strategy to visually

represent and organise knowledge, facilitate the process of meaningful learning (18). In addition to aiding in the representation and development of meaningful learning, concept mapping is considered to be predictive of critical thinking (8, 14, 16, 19, 20). The researcher agree that from finding of many study done, concept mapping is an effective learning strategy to help students apply new knowledge and they will become skillful and competent in clinical practice.

### Advantages of Concept Mapping

Many research studies have been conducted using concept mapping as an intervention to improve teaching and learning and nursing students also benefit from their use (16, 21, 22). The concept of the nursing process as resolution by reflection, i.e. the nurse makes an assessment of the problem (23). During the assessment phase data is collected. Next a diagnosis is made using a knowledge base. A plan of action is then developed. Intervention follows based on the diagnosis and action plan. The last phase is reflection on the choices made and then evaluation of the effects of the interventions used.

Hence, study done by Atay & Karabacak (24), demonstrated a statistically significant improvement in critical thinking post-test scores between an experimental group and control group when concept mapping was taught and the effects of care plans prepared using concept maps on the critical thinking dispositions of students were investigated in a pre-test and post-test control group design. The critical thinking dispositions of the groups were measured using the California Critical Thinking Disposition Inventory. Harpaz et al. (20) stressed that 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.

Another advantage of using concept maps allowed the students to identify learning difficulties and provided immediate

feedback (25). For example, a patient's chief complaint or medical diagnosis is placed in the center of a concept map. Assessment findings are then placed around it. Seeing a diagram with all of this information enables the nurse to identify important factors that may contribute to the patient's problem. With this information, the nurse can plan her patient's care more appropriately, implement her plan and check for its effectiveness. Although educators realise its importance, the challenge still remains how to incorporate critical thinking into the curriculum and use effective teaching methods that enhance and develop critical thinking skills (26). A concept map also helps the nurse to see relationships between certain assessment findings and she may be able to address such related findings with the same interventions. The above assertion incorporates the concepts of critical thinking, life-long adult learning and the professional mandates that nurses will practice.

Concept map will makes the learning becomes interesting and not stressful, if the student can relate the new knowledge with the prior experience they have. For example, when they learned subject of fundamental of nursing (FON), they will learned about vital skills such as taking temperature, blood pressure and pulse rate. Based on the learner experience having the fever they can relate the nursing intervention that they have learn on how to reduce the temperature. Active learning occurs when "students are doing things and thinking about what they are doing" and meaningful learning happens when students integrate new information into what they already know (27). Researcher agree that if nurse educator's can provide a learning environment that promotes understanding through interaction, the learning will take place when meaningful learning occur and go to the long term memory.

## **Disadvantages of Concept Mapping**

Many students have difficulty identifying the important concepts learning in nursing. Part of the problem stems from a pattern of learning that simply requires memorisation of information, and no evaluation of the information is required. In order to address these common places of education, curriculum, and instruction, when using concept mapping, additional time must be allotted for student understanding. Studies reported that building concept mapping is difficult and time consuming especially when they first experience it (28). Additional time allotted to educate students on the use of concept mapping proved beneficial to students' attitude toward the use of concept mapping in later studies. Mapping processes that ask students to describe and label relationships among concepts can be particularly time consuming; students often need to practice mapping several times before being able to make meaningful maps (29).

## **Concept Mapping in Promotion of Critical Thinking**

Concept mapping can promote critical thinking in problem-solving, thus helping students organise complex patient data, process complex relationships, and offer holistic care to patients (13). Nurse educators need to know how to teach in an expert way, with the ability to asses, analyse, plan, implement, evaluate and more important to improve the quality of teaching and learning. Concept mapping is one of these strategies to be effective in promotion of critical thinking. Concept mapping will facilitate critical thinking and makes the learning becomes meaningful and effective. The usefulness of concept maps in developing critical thinking skills in nursing students (30).



## Importance of Concept Maps in Nursing

Concept mapping helps the student nurse have a view regarding theory that they have learn in didactic phase with the clinical area field, such as nursing intervention toward patient care. Investigators have suggested that an increase in complexity in concept mapping indicates an increase in conceptual and critical thinking (30, 31) and may be an indirect measure of clinical performance. Concept mapping, like critical thinking, is a nonlinear cognitive function and is an excellent strategy to develop higher-level cognitive functions and critical thinking (32). Through concept mapping, students should be able to transfer applied didactic objectives from the classroom to the clinical practice, where critical-thinking and problem-solving skills are needed for success. In nursing, a concept map is made up of a patient's medical problem, health assessment findings, nursing interventions and evaluation of how well the interventions worked.

## Concept Mapping in Curriculum Development and Planning

Using concept maps in planning a curriculum or instruction on a specific topic helps to make the instruction “conceptually transparent” to students. Concept mapping, like critical thinking, is a nonlinear cognitive function and is an excellent strategy to develop higher-level cognitive functions and critical thinking (32). Through concept mapping, students should be able to transfer applied didactic objectives from the classroom to the clinical practice, where critical-thinking and problem-solving skills are needed for success. Available data suggests that newly graduated nurses may have a knowledge deficit in the development of critical and reflective thinking skills necessary for safe and effective clinical reasoning (33). Therefore, nurse educators need to examine their assumptions regarding

curriculum and traditional teaching methods.

Similarly, Li-Ling (6) aptly developed her research questions by queering the possibility of establishing high quality nursing education when nursing faculty treat their work as mere routine and not change their clinical teaching methods. It is important that nurse educators play their role as researchers to investigate the didactic validity of teaching and assessment methods on a continuous basis and to lay down guidelines to improve the practice of educators in promoting critical thinking of student nurses. Nursing students struggle with the concept of nursing process and its application to clinical practice, those without understanding in their learning will use rote memorisation.

In nursing education, concept map analysis has the potential to evaluate how nursing students think and use knowledge in a way that traditional multiple-choice examinations cannot (34). When evaluating nursing students' conceptual and critical thinking, the hierarchical organisation of conceptual knowledge in a concept map is a highly sensitive tool (16). Concept mapping serves as a tool that fosters both the learning of critical thinking and the measurement of those thinking abilities within the context of nursing practice (16). Researcher believes teaching methodology is significant in increasing critical thinking. Furthermore, the need to evaluate the effect of teaching strategies on academic performance has come to the forefront as nursing programs have shifted to an emphasis on outcome-oriented education.

## Summary

Researcher belief that nursing curricula needs to changes to the student centered learning approach where the students should understand concepts, as opposed to rote memorisation of facts. Designing lessons for meaningful learning begins with

what educators want students to be able to do and proceeds to the evidence educators will accept that students have learned it. Based on recent studies that support the linkage between conceptual knowledge and meaningful learning, the research outlines the rationale and procedures through which concept mapping can be used to emphasise the conceptual organisation of course content. Findings from several reviewed studies suggest that using concept mapping can improve academic performance in nursing education but significantly more research is needed in order to validly conclude that concept mapping should be embraced by nurse educators.

However, in Malaysian nursing education, it is not being practiced widely among the nurse educators and the students, though there are adequate evidences on the use of concept mapping. In an effort to prepare nursing students to deliver safe quality care, critical thinking become essential to nursing education. If nurse educators do not begin using some alternative, more interactive classroom activities, students' opportunities to think critically will be limited. Most of the finding in the research literature found the use of concept mapping can makes the student understand the concepts and allow them to see all the patient care and needs. Therefore, nurse educators need to examine their assumptions regarding curriculum and traditional teaching methods. This study aims to provide more evidence that will further support the use of concept mapping as valuable instructional as a learning method in enhance critical thinking among nursing students, because it is an active strategy that engages the learner to search for relationships between their previous knowledge and new knowledge. The study will be expected help students to shift the learning pattern from rote learning to meaningful learning of concepts as the study involves students in the learning process actively through individual and group work in structured tasks.

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