

## COMPARISON OF LEARNING WITH CONCEPT MAPS AND CLASSICAL METHODS AMONG MEDICAL STUDENTS

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**Abstract.** Education in medical faculties is generally long and tiresome compared to other faculties. The aim of this study is to compare learning with concept maps and classical methods among medical students. For this reason, the successes of the fifth year medical students who are taught "Burn Management" in Plastic Surgery course either using classical methods (Group-A) or concept maps (Group-B) are analyzed. At the end of the Plastic Surgery course, the examination scores of Group-A and Group-B was 76.7 and 88.4, respectively. The difference between groups was statistically significant ( $p < 0.05$ ). Using concept maps in learning may facilitate understanding and may help analytical and critical thinking. As a conclusion, we believe that concept maps should be widely used in medical education, in order to promote meaningful learning.

### 1 Introduction

The goal of medical education is to prepare physicians who are ready to serve the fundamental purposes of medicine (Anderson, M. B., 1998). Medical sciences must always be responsive to evolving needs of the society, practice patterns, and scientific developments (Anderson, M. B., 1998). During their training, medical students are faced to a large amount of continuously increasing knowledge. This makes medical education even more difficult for both teaching and learning. If medical education is to serve the goal of medicine, medical educators must develop learning objectives that reflect an understanding of those attributes.

Novak's and Gowin's work on the nature of knowledge and learning explored factors that influence students' understanding of science and the acquisition of concept meanings (Novak & Gowin, 1984). Thus concept mapping is used as a learning strategy to understand key concepts and relationships between concepts. If concept maps are used in medical education, meaningful learning of the students can be promoted (Hinck S. M, & Webb P. P., 2006).

### 2 Materials and Methods

A randomized controlled prospective study is designed at the Department of Plastic Reconstructive and Aesthetic Surgery of Medical Faculty of Dokuz Eylul University. Since 2002, Problem-Based Learning (PBL) and Objective Structured Clinical Examination (OSCE) are used and in our Medical Faculty. At the end of Plastic Surgery course, with OSCE system, clinical skills are tested rather than pure theoretical knowledge. Our medical students take Plastic Surgery courses at their fifth year for 2 weeks. According to this study, students are divided into 2 groups and learning with concept maps and classical methods are compared.

#### 2.1 Design of the Study

One hundred twelve fifth year medical students are divided into 2 groups. In Group-A (n=56), classical method such as MS PowerPoint presentations based on texts is used in order to teach "Burn Management." In Group-B (n=56), concept mapping was the method of teaching.

#### 2.2 Teaching Methods

##### 2.2.1 Group-A

There were 56 fifth year medical students in this group. During their Plastic Surgery courses, "Burn Management" course was taught using MS PowerPoint presentation. Theoretical knowledge written as a text and patients' pictures were containing in the presentation. A sample of slides of this presentation is seen in Figure 1.

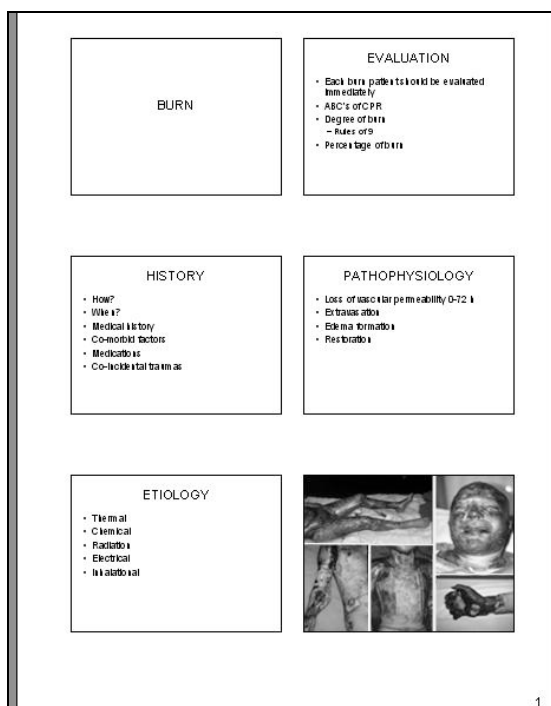


Figure 1. MS PowerPoint presentation used in Group-A

### 2.2.2 Group-B

There were 56 fifth year medical students in this group. Concept mapping is used in order to teach the approach to a burn patient. Web addresses of the concept maps are given to the students. Thus, they were able to check on their own the entire concept map including its links. The related concept map can be seen in Figure 2. Notice that each primary or secondary nodes of the concept map contains further links such as concept maps, pictures, documents, presentations, and/or web pages.

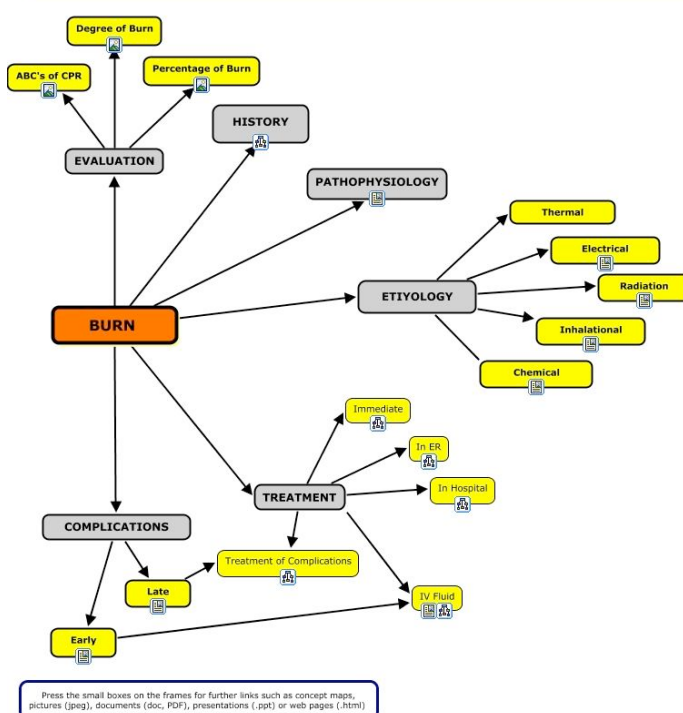


Figure 2. The concept map designed to teach the approach to a burn patient in Group-B

### 2.3 Evaluation

Each student was taken an Objective Structured Clinical Examination (OSCE) at the end of the Plastic Surgery course. OSCE consists of several short (4 minute) stations and each is examined on a one-to-one basis with real burn patients. In each station, students are assessed how they use their theoretical knowledge in the evaluation and treatment of burn patients. There was also a 20-question burn written exam. Students received 5 points for each correct answer. The top score was 100.

### 2.4 Statistical analysis

Each student score for both groups are calculated and analyzed statistically. Student *t* test is used in order to find out if there was a statistical significance. *P* values over 0.05 were taken as a significant.

## 3 Results

The mean score for the Group-A (classical method) was 76.7 (ranging from 58 to 86). When the scores of the students in Group-B (concept mapping) were analyzed, the mean value was 88.4 (ranging from 69 to 95). When the scores are analyzed with Student *t* test, a statistically significant difference was found ( $p < 0.05$ ).

## 4 Discussion

Since Novak and Gowin introduced concept maps into literature, concept mapping gained widespread acceptance in education (Novak & Gowin, 1984). Construction of concept maps provides the opportunity for students to break new knowledge into small parts (concepts), arrange and order concepts to make sense, and make connections between and among concepts (Irvine, 1995; Novak, 1990). In these circumstances, using concept maps in medical education might be very helpful for both students and medical educators. Since medical education is very complicated, concept mapping may facilitate understanding and may improve analytical and critical thinking.

In this study, learning how to approach burn with concept maps provides students to realize the whole process. As the students get into more specific concepts, for example the etiologic factors of burn, they also get the chance of come back to the starting point. This helps students to realize the main braches of the topic as well as the details.

At the end of Plastic Surgery course, the students who were taught "Burn Management" with concept maps reported that this system was more understandable comparing to the classical system. Students indicated that the maps helped depth thinking and the connections of concepts. This is similar with other research on concept maps and it is a very encouraging finding that students notice the value of concept mapping in medical education. The students also reported that the maps facilitated pattern recognition and provided a greater understanding of differential diagnosis. This can be explained by how the maps functioned in linking theoretical information to clinical practice. The result of their exams also approves their feedbacks.

From a student's view, concept mapping encourages them to think independently, produces more self-confidence and provides an increased awareness of finding connections between different topics. Teachers reported that concept mapping assisted students to become active learners and organize theoretical knowledge in an integrative manner or conceptual framework (Boxtel et al. 2002; Harpaz et al. 2004).

When the whole medical education is considered, this might be relatively small study, however, we believe that concept mapping can be used in many areas of medical education. This method can also be used in practical courses of medical education as well as theoretical courses.

As concept mapping gets popularized, we believe that will have a wide acceptance among medical educators.

## 5 Summary

This is a study about the use of concept mapping in medical education. A controlled randomized study has been designed in order to compare classical teaching methods and teaching with concept maps. As a result, students

in concept mapping group received higher scores comparing to other group. The difference was statistically significant.

## **6 Acknowledgements**

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