

## Mind Mapping as a Procedural Concept in Design Learning

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**ABSTRACT:** Year after year knowledge grows and the different fields of science are becoming more intertwined, interrelated and complex. This requires new teaching methodologies for students so they can learn most of these fields. The future students will then be able to learn the full scientific material so that future scientists can easily add to it.

The method of mind mapping is considered one of the most important methods used to improve the teaching process which can achieve maximum potential in the recipient's understanding of the scientific content with the use of the left and the right hemisphere of the learner's brain to understand and absorb the suggested scientific material. This mind mapping strategy offers the possibility of developing concepts and their links and its classifications in the right categories which saves time and effort to the learner.

The results of a survey for a group of academic and Masters and PHD's students came out positive on whether they prefer using the mind mapping strategy in teaching design in all stages of education (bachelor, masters and doctorate) for its time and effort saving, especially for students of Design and engineering colleges who deals with colors and pictures. Furthermore, the technical construction during the educational stages of these students within these colleges makes them highly capable of understanding the concepts and relationships in the way of the mind mapping s.

The problem of research resides in the difficulties most professors, even those who have years of experience, face when it comes to their students' understanding of some materials; some students are slow to absorb some of the contents of the lesson, especially those which are filled with information. The solution is to reduce the amount of information in the lecture, or to divide it.

The purpose of the research is to determine the compatibility of the mind mapping method with the absorption capacity of Design and engineering courses along with determining the extent of its efficiency in the different educational stages? Also, the research asks questions such as:

What are the reasons learners prefer to use mind mapping as strategy? Is it the habit of dealing with colors and images behind the preference of the sample in the way of mind mapping? Or the interest in the practical applications more than the theoretical part of the courses? What is the effect of the technical skills of Design and engineering students majors in their ability to understand the shapes and images used in the method of mind mapping, through the surveys and analytical and the work of surveys.

**KEYWORDS:** Mind Mapping, Design Learning, Efficiency Learning, Mind mapping advantages, Creativity learning.

### INTRODUCTION

Mind mapping is regarded as one of facilitative tools that help to improve learning and to develop knowledge which is based on logic. It helps to develop a systematic way of thinking that can be applied to everyday life. (Marinković, 2014).

Mind maps were invented in the early 1970 (عوجان, 2013) and its emergence dates to the first attempts of educational psychologists to classify information and knowledge acquired by man. (المحسن, 2015) Tony Pozan devised mind mapping to be used as plans for sorting and categorizing ideas and tasks. Poznan's goal for inventing the mind mapping was his understanding

that educational systems were largely focused on the use of one side of the brain, the left hemisphere, which is responsible for the use of logic, language, arithmetic, sequence, and detail study while neglecting the right hemisphere and not taking advantage of its potential represented by the use of images, imagination, emotions, colors and the overall outlook of the subjects. (حامد مبارك العبادي، 2015)

In recent years, academics have begun to use software maps (using computer programs to map out links with educational concepts). Tools are used to help transfer critical and analytical skills to students to enable them to see the relationships between concepts and to use these tools as a means of assessment. It is believed that images and structured chDesign are more intelligible than mere words, and a clearer way to illustrate understanding complex subjects. These methods are available under different names: " cartographic concept ", 'mind layout' and 'argument assignment'. These terms are sometimes used as synonyms. But there are obvious differences in each of these mapping tools. The choice of the appropriate tool depends largely on the purpose or objective used for it and all the methods used are complementary to each other in completing tasks. (Davies, 2011)

The use of mind mapping has been proved successful in many disciplines, including finance, economics, marketing, executive education, optics, medicine, etc. They are also widely used in professions such as fine Design, design, advertising and public relations (Davies, 2011)

This research aims at determining the efficiency of using this method in the different stages of education (BA - M.Sc. - PhD) in Design and engineering programs by taking the opinions of a group of academics staff and post graduate students (Masters and PhD) because of their previous knowledge of the details of courses for the different scientific stages, After reviewing the method of mind mapping in one of the topics related to the field of scientific research.

## WHAT IS MIND MAPPING?

Mind mapping is defined as the visual representation of ideas and their relations. It includes a network of concepts that are freely linked and connected together. The purpose of mind mapping is to create creative relationships between ideas by using the thickness of the line, colors, images and Design to help remember the provided concepts and information. The mind mapping is a way of radiation the brain uses to organize and formulate ideas and allowing them to flow and spread from the center in all directions. (يونيو، عوجان، 2013)

The mind mapping is drawn to express ideas through an innovative scheme in which the meanings of words are associated with pictures, and in which the different meanings are associated with each other. It is a map because it resembles the map in the general illustration, and it is mind because it is similar in the way it functions to the way the brain functions, According to a study conducted by Frand, Hussein and Hennessy (2002), in contrast to the traditional methods of taking notes, mind mapping helped improve the long-term memory of participants' factual information by 10%. (ThinkBuzan Ltd)

The mind mapping method employs the right and left hemispheres of the brain by using words, images and colors. The main title is placed in the center, and the sub-ideas begin to diverge in all directions in a radiological sequence through irradiated or incandescent thought in a simulation of how the human brain deals with different ideas and information, And connect them with relationships using colors and Images that refer to the ideas in addition to using keywords for each concept that show the mind in addition to the use of keywords for each concept. These concepts are linked together by using curved bonds that distance the learner from boredom and monotony. They vary in intensity, where the intensity decreases as we move away from the center signifying the transition from the general idea to the Specific partial idea. (حامد مبارك العبادي، 2015)

Mind mapping mimic the human brain as it is made up of millions of neurons. When examined they are found to consist of a main center with sub-links in the shape of curvature curves that diminish as they move away from the center. Science proved that whenever the brain wants to store a new piece of information, these cells produce a new link which gets linked to the underlying theme main topic to which that piece of information is linked. Or that new information is linked to the previously stored knowledge in the brain. The mind mapping is an identical visual representation of what happens in the process of storing information in the brain. (Marinković, 2014)

The mind mapping is similar to the neuron on the outside, as well as from the inside as the transmission of nerve impulses is from the center towards the axis of the cell and its limbs. This is what happens when the information passes through the mind mapping.

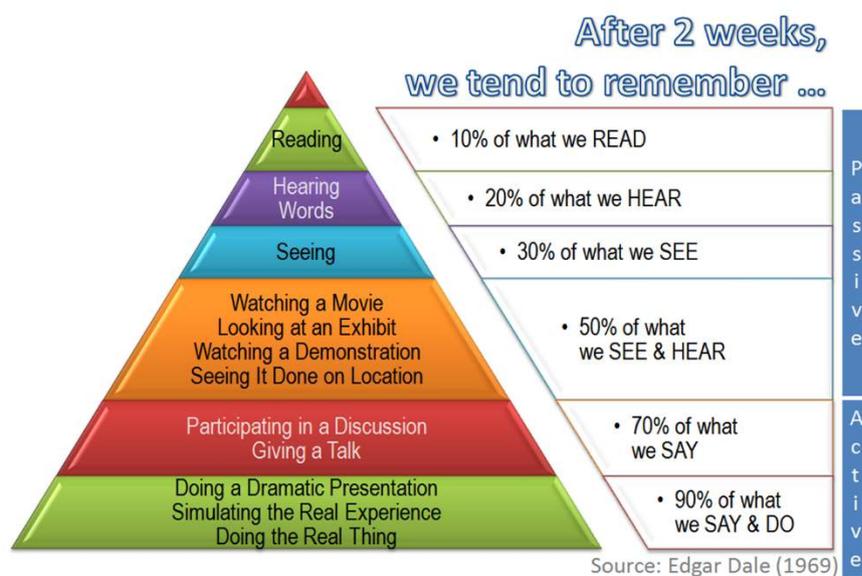
It designs from the middle then information spread to the parties/ends. In addition, while a neuron is full of neural connections and the mind mapping is full of lines that link information. (المحسن، 2015) So the power of the mind mapping lies in the fact that it has the same thinking approaches to man. (يونيو، عوجان، 2013)

The traditional form of mind mapping is hand-drawn, but with the advent of digital technology, the trend towards electronic mind mapping and the preparation of mind mapping has begun using the most effective computer programs, which are attractive for their images, colors and good-looking drawings that are easy to incorporate through the programs used. (حامد العبادي مبارك, 2015) A relatively recent innovation, developed since 2000, is the mapping of computer-assisted dialogue. (Davies, 2011)

**FACILITATION THE LEARNING PROCESS BY USING MIND MAPPING METHOD**

Evidence shows that mind mapping facilitate the learning process by using exciting, attractive and motivating methods, where participants have found pleasure in learning. This was attributed to the use of good design, colors, symbols and expressive key words. (ThinkBuzan Ltd)

The learning of the individual is either in auditory, visual, or sensory way or combining several methods. With the good design and use of colors and symbols in the way of mind mapping s in addition to the actual practice and thinking through the possibility of modification and development of mind mapping, where the mind mapping between what the human (the outcome of stored information) with what he wants to buy (new information). This is reflected in the highest methods of education as it illustrates the pyramid of education Figure (1) using various methods of learning passive & active learning method, and may be exercised by collective work and brainstorming, which enhances the use of mind mapping s method. (Marinković, 2014).



**Fig. 1. The Cone of learning (The Learning Pyramid, researched and created by the National Training Laboratories in Betel, Maine**

Fig. 1 illustrates the percentage of learner recall that is associated with various approaches. The first four levels lecture, reading, audiovisual and demonstration are the passive learning methods. In contrast, the bottom three levels discussion group, practice by doing and teach others are participatory (active) learning methods).

In Bloom, learning at higher levels depends on knowledge, and learning skills at the lowest levels. And with the use of mind mapping, different learning design can be linked. (Marinković, 2014)

This highlights the theory of meaningful learning by Ozebel, one of the pioneers of constructivist theory, which states that each learner possesses a unique sequence of knowledge experiences, and when he/she receives the new information he/she associates it with his previous knowledge to form a special perception and meaning for the learner. (حامد مبارك العبادي, 2015)

When a learner can link new learning experiences with previously learned experiences, "meaningful learning" as called by Ozebel occurs. This depends on the mental activities initiated by the learner towards the educational material, the organization of the material in a way that makes it meaningful and understandable and the presentation of the material in a way that helps the learner to invoke tribal learning.

According to Ozebel, learning depends on perceiving links and deducing principles and rules, rather than depending on the random linking between stimuli and responses only. The understanding of concepts and relationships must be based on structured strategies to make these concepts and links meaningful.

It helps to record and organize notes and information more effectively in order to facilitate archiving them and referring back to them. In addition, it is an effective tool in helping low achievers reaches the highest attainable level of achievement.

The use of mind mapping contributes to the long-term memory of scientific facts and the improvement of cognitive processes. It also encourages the use of deeper levels of fact-finding, understanding and rearrangement of memory. (حامد مبارك العبادي, 2015)

#### ADVANTAGES OF LEARNING USING MIND MAPPING

- Improve the learning capabilities through the ease of study with the perception of all concepts review and examinations. (Jennings, May 2012)
- Making learning more enjoyable and stimulating students' motivation, which makes it more interesting, giving a comprehensive picture of the subject being studied, helping to understand the links and ties, communicating complex ideas, and helping the learner integrate new knowledge with previous knowledge. (المحسن, 2015)
- Inclusiveness and focus on putting everything that goes on in the mind of the learner and all ideas of the subject in one paper and in a focused and brief manner. It helps the learner to use the entire brain energy. It also works on developing the memory of the learner and increasing his/her focus, which is a kind of participatory learning in the classroom, which facilitates the study of difficult subjects with the activation of brain sections. (المحسن, 2015)
- Organization by providing clear planned paths and the presentation of elements in free and focused forms.
- Facilitate the analysis process and highlight the issues to be discussed during brainstorming processes. (Jennings, May 2012)
- Enhancing the creative process where creativity is the ability to use imagination in order to reach new ideas or improve an already existing issue. (Davies, 2011) Mind mapping s help in planning and having a better overview and clearer communication and creating countless ideas. It is Ideal for promoting/enhancing creativity and generating new ideas. (ThinkBuzan Ltd)
- The process of using mind mapping method in the learning process works on the development of skills such as, the skill of organizing the main and sub ideas of a topic, the skill of ranking priorities and information assessment, the speed of information retrieval, the skill of self-learning and development of understanding and knowledge, the skill of artistic innovation and application, and the skill of analysis. (عوجان, يونيو 2013)

#### EFFICIENCY OF USING MIND MAPPING IN DESIGN AND ENGINEERING PROGRAMS

The method of mind mapping was reviewed by explaining a scientific material about participation in scientific conferences for postgraduate students and academic staff members in the faculties of design by testing-the ability to remember the information then conducting a survey for a sample. The results were as follows:

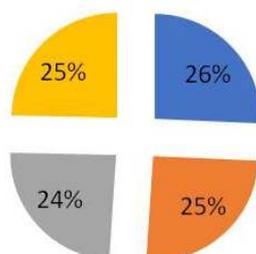
The results of the questionnaire emphasized the importance of using the method of mind mapping in teaching design and engineering courses in all stages of university education. The sample agreed on the efficiency of using the method recommending its use given the speed of taking in the provided information despite its quantity and complexity.

The sample attributed the rapid information intake to several reasons, all of the same degree of effect (as shown in Figure (2)):

- Being accustomed to images and colors.
- Interest in practical applications during most periods of study.
- Spending more time on practical courses than on theoretical ones.
- The technical construction of the student makes him/her able to absorb images and shapes better.

**The reasons of rapid information (Design and Engineering Courses) intake while using the method of mind mapping.**

- Being accustomed to images and colors
- Interest in practical applications during most periods of study
- Spending more time on practical courses than on theoretical ones
- The technical construction of the student makes him/her able to absorb images and shapes better

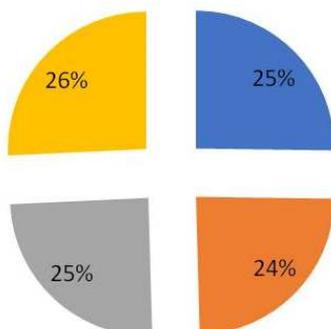


**Fig. 2. The equal percentage of four reasons of the rapid information intake**

The sample showed that using mind mapping in the different educational stages of design and engineering programs (Bachelor degree - Master degree - PH degree), are of equal efficiency. This emphasizes the importance of using the method of mind mapping in teaching of design and engineering courses.

The efficiency of the mind mapping use in the different educational stages of design and Engineering faculties (Bachelor degree- Master degree - PH degree).

- Bachelor Degree
- Master Degree
- PH Degree
- All of the above

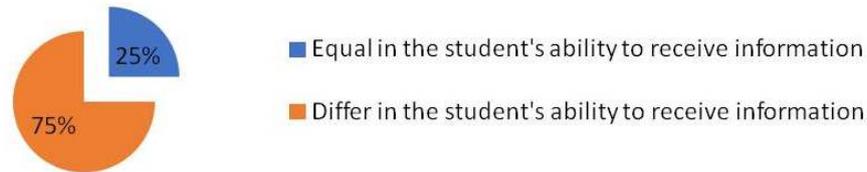


**Fig. 3. The equal percentage of the efficiency of the mind mapping use in the different educational stages**

The evaluations of the sample showed that a student doesn't have equal capacity to acquire information when mind mapping is used in teaching theoretical and scientific courses in the design and engineering programs about 75% of the sample agreed that the student's ability to receive information using the method of mind mapping differ in theoretical courses from practical courses. The other 25% of the sample agreed that the student's ability to receive information using mind mapping is equal in both theoretical and practical course

In addition, the entire sample agreed that the use of mind mapping in teaching theoretical and practical courses in design and engineering programs achieves efficiency in the educational process by more than 85%.

The sample saw the possibility of equal equivalence of student achievement of theoretical and practical courses in design and engineering programs.



**Fig. 4. The sample opinion of efficiency percentage when using mind mapping in teaching Theoretical and Practical courses for the design and engineering programs**

## CONCLUSION

When there is difficulty in absorbing students to some of the information presented in one of the courses, or the large number of information provided in it, it is not necessary to modify the course or delete some of its design, but it requires modifications to the teaching and learning methods followed

The method of mind mapping is one of the most important methods to simplify, arrange and quickly intake the information provided to students in various fields and stages. It is also considered the best way to use in the under and postgraduate stages of Design and Engineering colleges' students. That sample agreed on the efficiency of use by more than 85% for several reasons. One of them is the habit of dealing with images and colors, attention to practical applications most of the study periods, as well as more time consuming practical decisions on the theory, also the artistic and skill construction of the student, which makes it able to intake images and shapes better.

The understanding of students to the courses taught in the educational stages is different in the theoretical than the practical courses and this depends on the teaching methods used. About 75% of the total sample agreed that the achievement capacity of the students in the design and engineering is different in the theoretical and practical courses when using the mind mapping method.

The view of the selected sample of postgraduate students and academics staff in determining the efficiency of the use of mind mapping method is an unquestionable evidence of their usefulness for teaching to students of design and engineering colleges. They are accustomed to logical reasoning with specific relations, especially with color, images, and abbreviations. This helps in quick and easy understanding even with the complex information provided.

The majority of the sample agreed on the unequal efficiency of students in understanding when teaching using the method of mind mapping of theoretical and practical courses. This requires further studies that determine the best ways to teach courses, especially practical courses, which consume more time during the years of study in design and engineering college.

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