MIND MAPPING: AN EFFECTIVE MULTISENSORY, LEARNING AND TEACHING STRATEGY, UNDERUTILISED IN MEDICAL EDUCATION IN SUDAN

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ABSTRACT

Purpose: Present evidence of the Mind Mapping (MM) value, for better teaching, learning and researching. Improve understanding about the effectiveness of using MM in medical education in Sudan.

Methodology: The literature was gained by searching library databases (PubMed, PsychINFO, MEDLINE and EMBASE). It is a summary of both conceptual and empirically published literature on the uses of MM in medical education.

Findings: MM promotes meaningful learning; boosts teaching confidence and effectiveness; expresses research ideas in a visual way. There is a lack of significant priorresearch on using MM in medical education in Sudan.

Practical implications: High-quality professional training for university teaching staff.

Social implications: Assist learners with lower cognitive competence.

Originality/value: MM supports knowledge acquisition, fosters critical, finds a logical progression through modules and researches. The article advocates that MM approaches could be more widely adopted in Sudan.

*Keywords***:** professionalism; profession; dietetic practice; nutrition; dietetics; Sudan.

INTRODUCTION AND OBJECTIVES

An overview of the problem

Medical students are laden with a great amount of information, with a limited amount of time to memorise all the information and handle it at once. Therefore, many medical students struggle with their own capacity to meet the burdens of medical curriculum and are not successful during the examination time (Anderson and Graham, 1980; Yussof and Baba, 2013).

Many university educators throughout the world use the traditional method – Power Point – slides, as the main delivery process for their lectures. According to Garber (2001), Power Point is a term describing the use of slides messy with text, often with unrelated additions, leading to little meaningful learning and student dullness. As a traditional method, Power Point presentations can be improved, but still there is an essential inadequacy in using this educational method. Text slides and lectures are linear representations that coat the rich inter-relations among the medical ideas and concepts. This results in linearity rather than connectivity, less meaningful learning and less critical thinking, which are of weighty importance in the education and development of future medical practitioners.

The dynamic nature of medicinal science and the need for future medical practitioners to remain competent, requires a change in the educational methods by which medical students are taught. Recently, the number of studies on learning approaches used in medical education that might assist students in learning and eventually, integrating information has increased (Dolmans et al., 2005; Kim et al., 2006; Zajaczek et al., 2006). Different authors have recognised the need for alternative teaching and learning methods that will enable medical students to retain vast amounts of information, incorporate critical thinking skills and solve a range of complicated clinical problems.

According to Pudelko et al. (2012) Mind Mapping (MM) is a non-linear, multisensory, teaching and learning strategy that has recently emerged in higher education as a means to maintain students' critical thinking skills and support a deeper level of information integration.

While MM teaching and learning strategy has arisen in the literature, its use by medical educators in Sudan is uncommon. Creating an environment that improves students' critical thinking skills and ability to master the quantity of information required to succeed in the medical institution in Sudan is one of our foremost roles as Sudanese medical educators.

WHAT IS MM?

According to Tony Buzan, the inventor of mind mapping, MM is defined as a influential graphic method which offers a universal key to unchain the potential of the brain. It connects the full range of cortical skills – number, word, colour image, rhythm logic and spatial awareness – in a solitary, uniquely powerful manner. The Mind Map can be applied to each face of life where purer thinking and better learning will augment human performance (Figure 1).

MIND MAP CORTICAL SKILLSEFFECTIVENESS

Mind Maps are constructed over several key parts, which have been proven to play an important role in releasing thinking capacity. Many research efforts support the effectiveness of using Mind Maps for many types of activity including learning, research, unifying, solving problems, etc.

RADIANT STRUCTURE

MM is an example of radiant thinking application, which stimulates all aspects of the brain working in interaction, with thought starting from a main central point. MM provides an infinite and useful way of using the brain, as opposed to the usual linear method, which limits thinking and blocks recording the information (Buzan and Buzan, 1994). According to Anokhin (1973) it was reported that the brain works on the base of connotation and it can connect even thousands of concepts and ideas. Research also uncovered that the
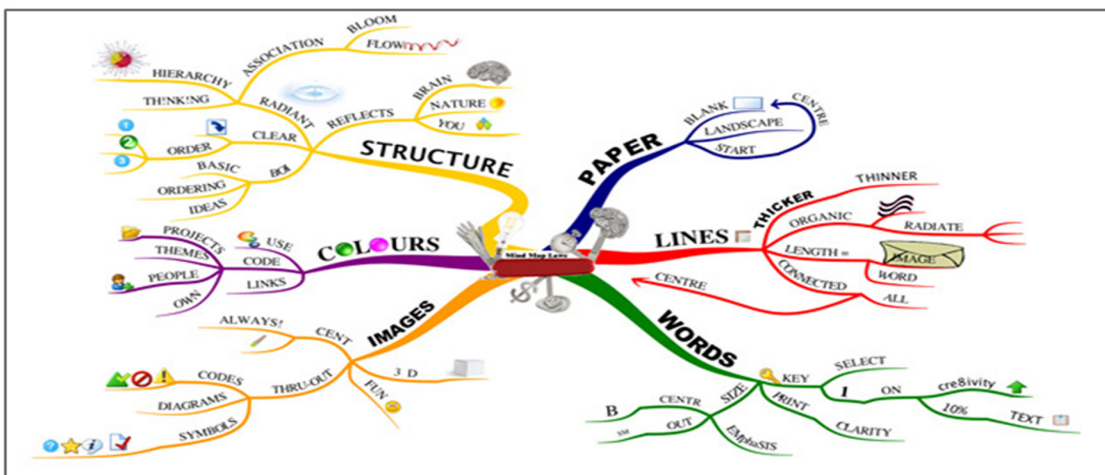

Figure 1   The cortical skills of Mind Map;http://www.tonybuzan.com/about/mind-mapping

connection-construction and individual sense-making benefits of Mind Maps are energetic to the better understanding of abstract ideas.

BASIC ORDERING IDEAS (BOIs)

BOIs are defined as the principal topics that emit out from the central idea of a Mind Map, which are accountable for shaping and managing the method of association by setting the main frame work and the hierarchy from which ideas can be extended. Ideally, main topics should be broad to provide for a larger range of associations Frey and MM Software Blog (2008) considers good BOIs for improvement of the quality of Mind Maps.

SINGLE KEY WORDS

A Key Word is mainly a word that will generate as much related meaning as possible. In MM Key Words open thinking and stimulate the mind to see more detail onthoughts that were previously unclear. According to Howe (1970) research on note-making and note-taking it revealed that key word notes given to students were more effectual in terms of the understanding and recall by far than complete text notes or sentence summary notes.

INTERESTING COLOUR

Colour is well thought out as one of the most forceful and entertaining parts of MM. It recovers memory,excites creativity, and makes an influence on how you communicate with others. Psychologists have uncovered that colour helps to process and store images more competently than colourless (black and white) scenes and memorise them better as a result. Journal of Experimental Psychology (2002). Learning, Memory and Cognition.

IMAGES AND ICONS INFLUENCE

Not only does a Mind Map use images, it is an image in itself. MM stresses visual imagery, pictures, drawings, symbols and doodles. Using imagery stimulates the brain's visualising capacity, which brings enormous creative benefits and enhances the memory's storing and recalling capabilities. Images are considered as excellent memory assistants. Our aptitude to remember images is far better than our memory for words. This picture power effect is confirmed by astudy undertaken by Anglin et al. (2004). An additional study by Haber (1970)

also supports the worth of imagery. McArdle (1993) uncovered that adding visuals like photos or maps to a presentation raises the amount of recalled information by as much as 55%. Icons increase clearness, attach appropriate meaning to topics and are quickly understood by the brain. These tiny visual symbols such as, crosses, ticks circles, support the benefits of using imagery in Mind Maps.

RELATIONSHIP ARROWS

Relationship arrows demonstrate the connection of different topics with each other throughout the map and give multi-dimensional direction to thoughts. In this way, MM fosters different and extremely creative thinking (White and Gunstone, 1992).

EMPHASISING (CHUNKING)

Emphasising (Chunking) is the memory technique used in MM through collecting and highlighting key branches within a boundary to make definite topics or ideas in the mind map. This makes the topicsbe visually obvious against the rest of the content, making these ideas easier to memorise and connect to others. The short-term memory is on average only efficient for storing seven items of information and chunking can help in using this storage space more efficiently (Frey, 2009).

WHOLE BRAIN THINKING

Using the of all of the above Mind Map features results in active engagement of a variety of cognitive processes in a way such that both the left and the right halves of the brain are used. This idea is initially mooted by Sperry (1968) who fixed that the thinking cap of the brain (Cerebral Cortex), is divided into two main hemispheres which make up a range of intellectual (thinking) tasks,known as cortical skills. The left-brainis found to work in a linear way, such as listing things in a consequential order. It is relatedto logical and analytical thinking and deals with naming and classifying things, language, reading, writing, mathematics and representative inference together with seeing things in black and white. The right brain processes information rapidly in a non-sequential and non-linear style. The right brain works use images in a non-verbal way and excels in dealing with colours, emotions, forms and shapes, rhythm and perceptive information. The mental ability of individuals is contingent on how they use their brain. MM is one way of achieving an ambidextrous mind (using both sides). Through MM, thoughts will be diffused and streamed within lines and relations, which are linked with imagination and creative thinking.

RESEARCH STUDIES ON MM IN EDUCATION

Since the invention of MindMaps by Tony Buzan, 40 years ago, MindMaps have proved to be a simple but energetic aid to learning, and have had astonishing success in education all over the world.Mind Mapping methods have found an eager response from students of all ages, as mind maps help them in understanding, revising and recalling information related to their courses. There has been important research related to the benefits that MM could convey to the education system and its importance as vital tool in teaching and learning.

PROMOTE CREATIVITY

Al-Jarf (2009) found that MM software provides influential advantages in improving the capacity of anyone to breed, visualise and unify ideas. The subjects who participated in the study stated that the MM tool fortified creative thinking and they became faster at breeding and unifying ideas for their writing.

ENHANCE MEMORY

Compared to conventional methods of learning and note taking, the cortical skills of MM confirmed to significantly increase information recall (Toi, 2009) affirm that MM can aid children in remembering words more efficiently than using lists, with up to 32% enhancement in memory. Furthermore, Farrand et al. (2002) found that MM added value to the long-term memory of accurate information in their users by 10%.

TEACHING CONFIDENCE BOOSTING

According to study done by Boyson (2009), using MM for lesson preparation could help teachers find a rational plan or teaching method that upsurges the recollection of the subject material. This can facilitate the credible running of programs and boost teaching confidence. MM was found to be a valuable approach for presenting novel concepts, offering a whole-class concentration for a big research project, evaluating learning of persons and providing choice in how people select to complete projects and assignments (Goodnough and Long, 2002).

LEARNING PROCESS ENABLING IN MEDICAL EDUCATION

Farrand et al. (2002) carried out the first investigation about the potential function of MM in medical education. They investigated the superiority of MindMap learning method to

traditional note-taking in actual long and short-term retention of written information in medical students. The researcher found that the MindMap method significantly enhanced long-term memory of actual information.

D'Antoni and Pinto Zipp (2005) established that, from a group of 14 physical therapy students, 10 out of 14 decided that the MindMap method allowed them to arrange and integrate the material presented in their course exceptionally well. Numerous participants in study approved of the fun aspect of Mind Mapping in being creative when generating MindMaps through lots of diversity in design, colour, key words and symbols. Farrand et al. (2002) conducted study on medical undergraduate students to examine the effectiveness of using the Mind Map method to improve accurate recollection of written information, examining if MM overcomes many of conventional study techniques limitations by evaluating long-term memory. Results showed that the Mind Maps offer an efficient study technique when applied to written material and improve memory and recollection of information.

The capability to assimilate information by finding usable relationships between ideas allows students who create MindMaps to reach a metacognitive horizontal (Willingham, 2007). Srinivasan et al. (2008) reported that the additional scopes of pictures and colours that are solitary to mind maps does not only facilitate memory, but also provide medical students witha broad range of pictographic – linear-oriented and diverse learning designs which allow students to distinguish the interand intra relationships between thoughts. This mirrors the way of real-world thinking predominant in the clinical location.

Julie et al. (2013) published study entitled "Radiant Thinking and the Use of the MindMap in Nurse Practitioner Education" which reported that the mind map, by using graphical technique links between thoughts, increases the visualisation of relationships, which helps in information gaining, data retention and inclusive comprehension. Faculties can encourage students' use of MM technique for writing notes, brainstorming, arranging ideas, learning collaboratively, presenting ideas and studying. It can also be used in problem-based learning, emerging care plans, health elevation doings, making disease procedures and developing differential diagnoses. MM is an inspired method which involves students in an exclusive way of learning that can enlarge memory remembrance and assist in making a novel environment for managing information.

PRESENTATIONS EFFECTIVENESS

A study done on a number of administrators using MM without rooting with notes in their presentation, showed an effective way in recalling and handling information, which is caught and stored in a radiating and integrated manner rather than a linear form (Mento et al., 1999).

PROJECT PREPARING

MM is a influential tool for assisting in plan-and-structure assignments and projects. Participant were able to improve the quality, rationality, structure and management of their work (Holland et al., 2003/2004).

WRITING IMPROVEMENT

Conclusions from a study by Al-Jarf (2009) showed that the written work formed by using MM was well-organised and connected ideas with more related detail. It elevated the functioning of the students at all talent stages as they became more resourceful in generating and unifying ideas for their writing.

THOUGHTS ORGANISATION

A Mind Map can aid in thinking with greater lucidity to discover relationships between ideas and features of an argument, finding keys to problems by placing a new view point on things and by allowing all the related issues and study choices to be seen within the big image. This had been confirmed by the results of Mueller et al. (2002) study which spoke of how the use of Mind Maps to propose patient care at Front Range Community College developed an enhanced critical and t comprehensive thinking.

While MM teaching and learning strategy has arisen in the literature, its use by medical educators in Sudan is uncommon. Though, computerised databases are resourceful and efficient, no related data was found in the review of present literature (on the use of MM in medical education in Sudan).

SPECIFIC PURPOSE OF THE LITERATURE REVIEW

The purpose of this literature review is to present evidence on the value of MM for better teaching, learning, researching and to promote understanding about the effectiveness of using MM to improvea student's critical thinking skills and ability to master the quantity of information required to succeed in the medical institution in Sudan.

METHODOLOGY

Searching for the literature

Targeted search: the literature was gained by searching library databases (PubMed, PsychINFO, MEDLINE and EMBASE). It is a summary of both conceptual and empirically published

literature on the uses of MM in medical education up to April 2015.

Search strategy: the keywords and phrases used were Sudan, MM, critical thinking, visual learning and medical education. The reference lists from published studies and reports were searched for additional sources. The Tony Buzan website (ThinkBuzan.Com) and number of specialised electronic Journals specialising in medical education were searched. The general search mechanism revealed discussion papers, medical educators' opinions, and information from consultation papers, which were examined to abstract evidence related to the present literature review objectives. The review was integrative.

Selecting the articles and review resources

Inclusion criteria: the inclusion criteria include articles (reviews, population, intervention of MM in learning, teaching, critical thinking and outcomes required), particularly in Sudan.

Topics of interest: topics of interest are Sudanese Education system, medical educators and MM learning types.

Evaluating the evidence: final selection of articles was done by careful review of each article, which was examined by two personsto avoid omissions and errors.

DISCUSSION

With the fast pace of development and revolution in medical education and clinical practice, medical educators face several challenges in making students comprehend the enormous amounts of content and relations between concepts. Medical educators are responsible for preparing graduates who are capable to reason critically and resolve problems in a variety of clinical practice settings. This is amatter that requires functional teaching strategies which fosters communicative learning, instead of depending on traditional methods that uphold routine memorisation.

As academicians in the health disciplines generating learning experiences, the improvement of critical thinking is essential as it maintains students' ability to successfully practice their skills as evidenced-based independent clinicians. The evaluation in this study reports on this problem by focusing on the effectiveness and creativity of one teaching strategy 'MM' as compared to more traditional methods. A study done by D'Antoni and Pin to Zipp (2005); recognise MM as aprobable teaching-learning strategy that actively involves the mapper (learners) in making and integrating material in a non-linear expressive way which enhances critical thinking.

Farrand et al. (2002) reported that Mind Mapping is an effective study method when applied to written material and is likely to inspire a greater level of managing memory creation.

Words and images jointly make Mind Maps a rich optical medium for imaginative and pioneering appearance. Visual presentations are more effective than verbal presentations.

The audience saw presenters who used visual language as more effectual than those using no visuals. They were stronger, more brief, more exciting, more specialised, more reliable and better organised.These findings agreed with the results of Howe (1970) which revealed that key words were more efficient,by far, than sentence summary notes or complete transcript notes in terms of comprehension and recollection.

MM raises the mind's potential through whole brain thinking, by using both cortical sides together; the right brain (images,curves, creativity colour, space) and the left brain (linearity words, numbers logic) which noticeably increases brain's power. This is confirmed by the findings of Sperry (1968), who reported that the greater the integration of the right and left brain actions, the more the brain's functioning turn out to be synergetic, in that every cortical skill boosts the actions of other parts so that the brain is functioning at its peak.

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

There have been much research verifying the science of MM effectiveness in education. Mind maps can be used as a teaching implement to foster critical thinking in medical education by inspiring students to combine information between disciplines and realise relationships among the clinical and basic sciences. The usage of Mind Maps in medical education may benefit more students with diverse learning styles. MM has been found to be a useful implement for creative thinking, planning and collaborating with others. The findings from this Literature Review are that Sudanese medical educators are, currently, not using Tony Buzan Mind Maps as a mechanism for transmitting and integrating information in medical education programs. This primacy data is the first of its kind on Tony Buzan MM's usefulness in medical institutes in Sudan and can be used to investigate strategies to address the supposed barriers.

Considerable work is needed to support MM as a teaching and learning strategy that can foster critical thinking skills. Informing higher education officials about the MM strategy and the available evidence may support the use of MM as a teaching and learning strategy within medical education and healthcare programs in Sudan.

As scholars of teaching and learning, educating others on innovative teaching and learning strategies is part of our role as scholars while also seeking evidence for their implementation. However, before mind maps are generally adopted as a study technique, consideration has to be given to ways of improving motivation amongst users.

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SUDANESE DIASPORA
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BIOGRAPHICAL NOTES

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