

# Mind Mapping Applied as a Pedagogical Tool for MBBS Students

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## Abstract

**Background:** To assess efficacy of mind mapping technique in lecture classes versus traditional didactic lectures on immediate and long-term memory.

**Materials & Method:** 150 First MBBS students, randomized into two groups (75 each), by simple random technique (odd roll number-group 1, even roll number-group 2). Study group (Mind mapping group) Control Group (didactic lecture /non mind mapping group). Batches reversed for another topic to address ethical issues. MCQ test was taken after class for short term memory, after a month for long term memory.

**Results:** Descriptive and inferential statistics (paired t test and independent t test) was used to compare the data. P value of Mind Mapping group when compared to Non Mind Mapping group in terms of both short term and long term memory was highly significant ( $p < 0.0001$ ) for both topic 1 and 2. P value was not statistically significant when short term and long term memory of mind mapping group was compared. But highly significant p value ( $p < 0.0001$ ) was observed when short term and long term memory of Non Mind Mapping group was compared.

**Conclusion:** The performance of Mind Map Group is better than the Non Mind Map Group both in terms of short term and long term memory.

Mind mapping used as a pedagogical tool can improve the academic scores of students.

**Keywords:** Didactic lectures, Mind Map, MBBS course, Pedagogical tool, Physiology examinations  
Reproducibility of concepts,

## Introduction

Only a moderate number of first-year medical students (60%) could pass the university Physiology examination in the first attempt at our college during the past 3 years. Feedback from students revealed their difficulty in listening to a theory class for an hour,

reproducing the concepts delivered by a teacher and the voluminous syllabus to be covered, studied and reproduced for MBBS university exams.

Mind map is a diagram used that offers an overview of a topic and its complex information, allowing students to comprehend, create new ideas and build connections. A mind map has a basic theme placed at the centre and sub branches related to the subject are added to the basic theme.

When the mind map is read, the central word/sentence forms the starting point and the branch to the top right-hand of the central image is the first branch inspected. <sup>(1)</sup> Throughout the whole process imagery,

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color and the visual-spatial arrangement of the material are emphasized. Mind maps can be drawn by hand, either as “rough notes” during a lecture or meeting, or as higher quality images when more time is available <sup>(2)</sup>.

For instructional purposes, concept mapping fulfills many important roles; by granting pupils a way to reflect their knowledge about a certain subject, by acting as a tool to ease the burden of studying with the means of providing comprehensive understanding on a given subject, by supporting the creation of new ideas and the way these are organized and by facilitating the learning of new concepts and their intricate relationships. <sup>(3)</sup>

Visual representation also allows the development of holistic understanding that words alone cannot convey, because the graphical form allows representations of parts and whole in a way that is not available in sequential structure of text. <sup>(4)</sup>

While no one can actually claim to have invented the mind mapping technique (since people have been using it to learn for ages) Tony Buzan is widely regarded as the author who “patented” it.

Tony Buzan, in his work, claims that the brain’s natural preference in receiving and adopting new information is a nonlinear graphical form compared to the traditional and established forms like reading where the information is acquired from left to right (or right to left) and top to bottom<sup>(5)</sup>.

The world is becoming more and more competitive. The quality of performance has become the key factor for personal progress. . In our society academic achievement is considered as a key criterion to judge one’s total potential.

Medical college curriculum and syllabus are a difficult and rigorous endeavour, but what exactly makes it so difficult? Teachers are continuously developing and refining their teaching skills. Can a change of teaching methodology make a difference to the students.

In view of this, a study was conducted to evaluate first year MBBS students’ performance in Medical Physiology on the basis of constructive teaching method of mind mapping to answer the following questions:

### Aim

To determine whether “Mind Mapping” as a teaching tool, compared to the didactic lectures, improve the performance of first year MBBS students in Physiology

To determine whether the attention span of students and recollection of contents be improved through the technique of teaching through mind mapping.

### Objectives

To assess efficacy of mind mapping technique in lecture classes versus traditional didactic lectures on immediate and long-term memory.

### Materials and Method

All students are admitted to I MBBS course through the National Eligibility Entrance Exam (NEET) year.

150 First MBBS students, randomized into two groups (75 each), by simple random technique (odd number-group 1, even number-group 2)

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Study group (Mind mapping group)

Control (didactic lecture /non mind mapping group)

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Batches reversed for another topic to address ethical issues.

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MCQ test after class for short term memory, after a month for long term memory

### Results

**Table 1 Results of pre- and post test scores of MMT and NMMT groups for Topic A**

	Topic A			
	Short Term	Long Term		
Academic Performance	Pre Test (n=75) (Mean±SD)	Post Test (n=75) (Mean±SD)	Mean Difference (Outcome)	P value

**Cont... Table 1 Results of pre- and post test scores of MMT and NMMT groups for Topic A**

Mind Mapping Technique Group1(MMT)	7.89±1.5	7.81±1.24	0.08	0.7071
Non Mind Mapping Technique Group1 (NMMT)	4.54±1.74	2.74±1.96	1.8	0.0001
Mean Difference (outcome)	3.35	5.07		
<b>P Value</b>	<b>0.0001*</b>	<b>0.0001<sup>s</sup></b>		

\* Independent “t” test between mean of MMT and NMMT for short term memory

<sup>s</sup>Independent “t” test between mean of MMT and NMMT for long term memory

**Table 2 Results of pre- and post test scores of MMT and NMMT groups for Topic B**

	Topic B			
	Short Term	Long Term		
Academic Performance	Pre Test (n=75) (Mean±SD)	Post Test (n=75) (Mean±SD)	Mean Difference (Outcome)	P value
Mind Mapping Technique (MMT)	7.51±1.49	7.55±1.51	0.04	0.8525
Non Mind Mapping Technique (NMMT)	3.7±1.78	2.34±1.76	1.36	0.0001
Mean Difference (outcome)	3.81	5.21		
P Value	0.0001*	0.0001 <sup>s</sup>		

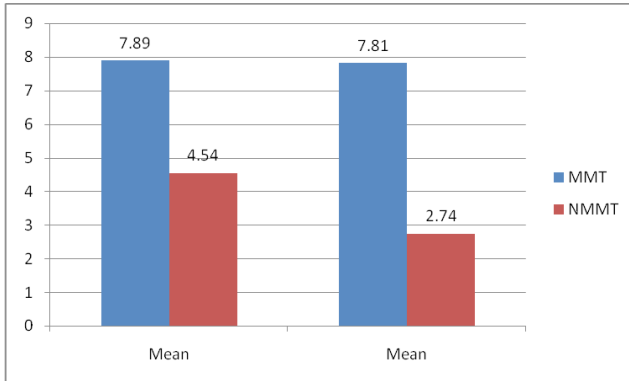
\* Independent “t” test between mean of MMT and NMMT for short term memory

<sup>s</sup>Independent “t” test between mean of MMT and NMMT for long term memory

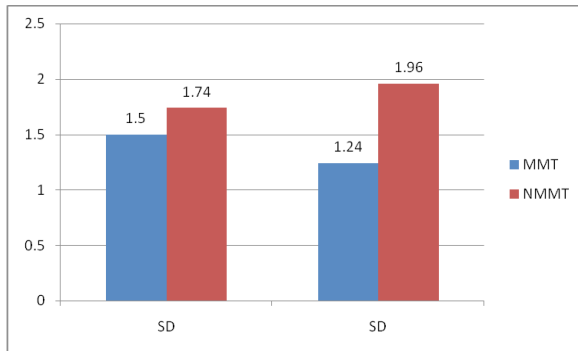
Descriptive and inferential statistics (paired t test and independent t test) was used to compare the data. P value of Mind Mapping group when compared to Non Mind Mapping group in terms of both short term and long term memory was highly significant (p value 0.0001) for both topics 1 and 2. P value was not statistically

significant when short term and long term memory of mind mapping group was compared for both topics 1 and 2. But highly significant p value was observed when short term and long term memory of Non Mind Mapping group was compared for both topics A and B.

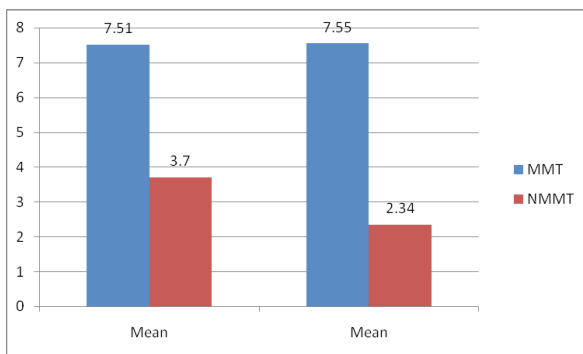
**Graph 1: Bar chart showing comparison of SD pre and post test score (MMT and NMMT) of Topic-A**



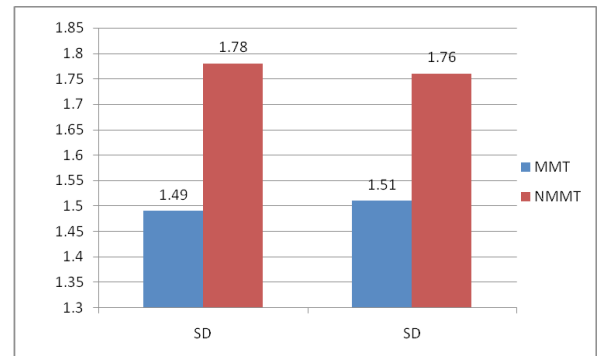
**Graph 2 - Bar chart Showing Comparison of the Mean of Pre & Post Test Score Of Topic-A**



**Graph 3 -Bar chart Showing Comparison of the SD of Pre & Post Test Score Of Topic-B**



**Graph 4- Bar chart Showing Comparison of the Mean of Pre & Post Test Score Of Topic-B**



**Group-A**

- Independent "t" test between mean of MMT and NMMT before intervention show statistical significant difference, p value<0.001
- Independent "t" test between mean of MMT and NMMT after intervention show statistical significant difference, p value<0.001
- The difference between pre and post test score of MMT short and MMT long were analyzed by paired t test and was found to be statistically non significant ,MMT p value=0.70
- The difference between pre and post test score of NMMT short and NMMT long were analyzed by paired t test and was found to be statistically significant. NMMT p value <0.001.

**Group-B**

- Independent "t" test between mean of MMT and NMMT before intervention show statistical significant difference, p value<0.001
- Independent "t" test between mean of MMT and NMMT after intervention show statistical significant difference, p value<0.001
- The difference between pre and post test score of MMT short and MMT long were analyzed by paired t test and was found to be statistically non significant ,MMT p value=0.85
- The difference between pre and post test score of NMMT short and NMMT long were analyzed by paired t test and was found to be statistically significant. NMMT p value <0.001

## Discussion

Analyzing the data shows that, as a strategy to improve memory for written information, the Mind Mapping technique has the potential for an important improvement in efficacy as a pedagogical tool.

In the case of both Group A and B mind map technique resulted in 90% recall of lecture contents, in case of short term and long term memory and it was statistically significantly ( $p < 0.001$ ).

The recall advantage with the mind map technique was very impressive for the test given immediately after class and also the test given after a month compared to the performance in both the test for the non mind map group.

That differences seen in between the groups in performance suggests that improvements that arise with mind maps are likely to be dependent upon improvements in cognitive processing.

Our results are in concurrence with the results of the study by Jain S who evaluated Mind Mapping in urban school children.<sup>2</sup>

Dr. Roger Sperry, a Nobel Prize winner, is the man who put mind mapping into a scientific frame.

He proved what was commonly known or at least suspected - visual forms of note making and learning were superior to the traditional ones. He showed that the part of the brain which was the latest to evolve "the thinking cap" is (as well as the brain itself) divided into two hemispheres that perform complex tasks which are called cortical skills. These skills include logic, daydreaming, imagination, color recognition and several others.<sup>(5)</sup>

It is proven that with the use of a Mind Map more of these functions will cooperate and will be in synchronization, creating a lasting information and impression in the brain.

There is definitely more than enough evidence to get a person to start using mind maps as a pedagogical and learning tool.

There are plenty of reasons for implementing Mind Mapping as a go-to technique when teaching or learning something new. Visual stimulants of different colors and symbols combined with connections made will engage

one's brain much more effectively than traditional methods.

It is likely that mind map as a pedagogical tool encourages a deeper level of processing of information by the student compared to conventional didactic lectures.

This paper has shown the efficacy of using mind maps as a pedagogical tool in medical colleges.

For the effective implementation of competency based medical education, the use of mind maps as a pedagogical tool should be encouraged while handling large groups and adequate educational materials provided to the faculty for the use of mind maps.

## Conclusions

The performance of Mind Map Group was better than the Non Mind Map Group both in terms of short term and long term memory. Due to the emphasis on Problem Based Learning (PBL) to create a competent medical graduate, it is very important that the teachers formulate a teaching method which will help students improve their memory for written material whilst complementing the deeper level of learning obtained with PBL. Such a teaching technique is particularly important given that a current weakness of PBL is that students perform worse on examinations which require recall of factual contents. Mind Mapping stimulates prefrontal cortex (short term memory) and reinforces information in the medial temporal lobe (long term memory). Mind maps are active learning approaches that integrate information on a Meta cognitive level.

The limitations of this study are that it was carried out with two topics in a small number of students.

We would recommend that the technique of Mind Mapping be used in a larger number of students, for longer periods of time to validate its superiority over didactic lectures, especially in the MBBS course.

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