

Introduction of Concept Mapping as an Innovative Tool to Enhance Learning Outcome in the Medical Students

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Abstract

Introduction- In today's multifaceted & challenging context of medical education, students are unable to organise, integrate information to the medical problems, so a need to fill this gap is strongly felt. The purpose of this study was to evaluate the effectiveness of Concept Mapping (CM) over the traditional method of teaching & learning. **Aims & Objectives-** To compare learning by traditional lecture with lecture using CM. To foster meaningful learning using CM & boosting the relevance of topic. To obtain feedback & reflection for CM based learning. **Materials & Method-**Total 112 students were taken for the study. They were divided randomly in two groups. For group-A, lecture on Systemic lupus erythematosus was taken by traditional method of teaching. For group-B lecture was taken by using concept mapping of same topic. Post-test (10 Marks MCQs) was taken from both groups & comparing was done. Cross over study was conducted for ethical purpose. Reflection & feedback was taken from students about CM. **Result** - The result of post-test shows significant ($P < 0.01$) rise in marks in Group B (CM) as compare to Group A (Traditional method), suggesting CM as a potential tool for better understanding & easy recall. Regarding reflection of students about concept method over traditional lecture method it was observed that more than 90% students said that it is simpler, easy, smart, concise, efficient and effective method of learning. **Conclusion-**Students found it very interesting & effective tool for learning. Students also feel that this method will be helpful for revision before the sessional & professional examination.

Keywords: *Concept Mapping, Retention, Recall*

Introduction

It has been observed that first year M.B.B.S students face difficulty in linking and correlating the basics of Physiology to clinical problems which is the most important lacuna identified as of now. Now a days students are more focused on competitive examination rather than deep understanding of the subject. Less motivation in students about in depth knowledge. The students are unable to organise, integrate information and relate the link of the basics of physiology to the medical problems, so a need to fill this gap is strongly felt. In anticipation, introducing concept mapping would be a stepping stone in making a competent IMG.

Concept mapping would facilitate active, self - directed and deep learning. It will facilitate the better retention & recall of the content area. During the past decade, the use of concept mapping in medical education provided a chance for the medical students to improve their meaningful and deep learning^(1,2).

A concept map is a graphical tool which represents ideas & information as circles or boxes that are connected with labelled arrows in a downward branching structure⁽³⁾. Concept maps are a way to develop logical thinking and study skills by revealing connections and helping students see how to organise and comprehend the concept. In concept map each word or phrase connects to another & links back to the original idea, word or phrase⁽⁴⁾. Concept mapping has also been recently used in depth in physiology education to improve students' understanding of pulmonary concepts and to compare their understanding with that of teachers and medical

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experts⁽⁵⁻⁶⁾. By navigating through the concept maps, each learners can choose a personal path to follow that depends on the information being sought^[7]. Our objectives for this study was to improvise reasoning & learning skills as well as their deeper understanding of the subject by using concept mapping. Also to organize thinking & to foster the relevance of the subject to clinical practice to improve learning gains.

Methodology

This was a qualitative & analytical type of study. This study was conducted on 112 second year medical students continued for a period of six months.

Approval from Institutional Ethical committee was taken. One day workshop was conducted to sensitize the faculty members & students about concept mapping. For study purpose, students were divided into two group ,Group A(n=56) & Group B (n=56) .Initially the topic Systemic Lupus erythematosus was taught by Traditional teaching method to Group A,while same topic was taught by using concept Mapping to Group B. Learning

outcome was checked by conducting 10 marks pre-validated MCQ questionnaire for both groups.

For ethical justification, the group A which was taught initially by traditional method, was now crossover with another group ie. Group-B. Within a period of month this Group -A was taught by newer method ie by using concept mapping. This was not to be included as a part of study, but the motive was to give exposure for the newer method of Teaching & Learning to every student. Feedback using 5 point Likert scale & reflection was taken from students about CM. Then the result was analysed using student t-Test. Feedback & reflection was analysed in percentage. The questionnaire assessed the following issues: deep understanding of the subject matter, relevance of the cases, opportunities for discussion, use of critical thinking, usefulness of concept mapping, relevance for future practice, promotion of self-assessment, promotion of active learning, motivation to learn, meaningfulness of learning, and the role of the teacher with an open-ended question at the end of the questionnaire.

Results and Observations

Table 1: Test of significance between marks obtained by students using Concept Mapping and Traditional Lecture

Teaching Method	N	Mean	SD	t-value	P value
Concept Mapping	56	7.8	0.76	2.713	0.008
Traditional Lecture	56	7.4	0.80		

Out of 10 marks, mean marks of student with concept method was 7.8 and with traditional lecture was 7.4 with SD 7.8 and 7.4 respectively. The difference in marks of students by different methods of teaching was significant ($t = 2.713$, $P < 0.01$). It has been concluded that there was

significant increase in marks of students who learnt by using concept method as compared to traditional lecture method. From the result we can conclude that concept method is more effective than traditional lecture method.

Table 2: Feedback response of students regarding session (n=112)

Questions	VD	D	N	S	VS
How was the session?	0	0	2 (1.79%)	34 (30.36%)	76 (67.86%)
How was Content of Session?	0	0	8 (7.14%)	13 (11.61%)	70 (62.5%)
How was Presentation of session?	0	0	8 (7.14%)	28 (25.0%)	76 (67.86%)
How was Usefulness of session?	0	0	8 (7.14%)	24 (21.43%)	80 (71.83%)

VD: Very Dissatisfactory, D: Dissatisfactory, N: Neutral, S: Satisfactory, VS: Very Satisfactory

Out of total, 67.86% students liked the concept method and were **very satisfied** with the session, followed by 30.36% who were **satisfied** and no student was dissatisfied by the session. More than 70% students were very satisfied regarding content, presentation and usefulness of session.

Table 3: Feedback response of students regarding effectiveness of Concept Mapping (n=112)

Questions	S D	D	N	A	S A
Time duration (15 mins) was sufficient?	0	2 (1.79%)	8 (7.14%)	42 (37.5%)	60 (53.57%)
Given questions were adequate in number and content of course?	0	2 (1.79%)	12 (10.71%)	58 (51.79%)	40 (35.71%)
Concept Mapping is more effective than Traditional Lecture?	2 (1.79%)	0	8 (7.14%)	4 (3.57%)	98 (87.5%)
Satisfied with the pattern of teaching?	2 (1.79%)	0	4 (3.57%)	38 (33.93%)	72 (64.29%)

Regarding time duration for the session of concept method, 91.07% were opined that it was sufficient and good. 87.50 % students agreed that the given questions were adequate in number. Overall 91.07% students agreed on the point that concept method is more effective than Traditional lecture method. 98.22% students were satisfied with the pattern of teaching.

Table 4: Reflection of students about Concept Mapping over traditional lecture (n=112)

Reflections	Number of students (%)
More Simple and easy to understand	110 (98.21%)
Much Smart and concise lecture	102(91.07%)
More Efficient and effective	102(91.07%)
More Interesting and useful	90(80.36%)
More Useful for exam purpose	98(87.5%)
Like to learn by concept method	106(94.64%)

Regarding reflection of students about concept method over traditional lecture method it was observed that more 90% students said that it was simpler, easy, smart, concise, efficient and effective method and they would like to learn by this method frequently. Also more than 80% students agreed that concept method was more interesting and useful for exam as compared to traditional lecture method.

Discussion

Medical Educators can utilize concept map to find out students misunderstanding of the topic & to identify knowledge gaps that need to be fulfilled. CM can be used as a supplement to more traditional learning methods. In our study students found that learning by using CM is more interesting than the traditional learning. Students opined that topic became more easy to understand by using CM. Our results are supported by various other studies that shows that CM is an innovative tool which increase the contextual thinking, retention & recall of the topic. CM helps to identify the existing knowledge & correlate with the new concept. These findings strongly suggest that CM is a useful strategy to promote meaningful learning in medical education^[8]. CM is a easy way to reach at high levels of cognition when the process is done well, This can be one of the powerful evaluation tool ^[9]. Students of all age navigate through the CM as a way to both learn from experts knowledge & various links in CM. The strength of CM is its multiutility, it can be used for assessment purpose also. It can be given as project or home assignment for students. Concept maps are a valid means of evaluating students' knowledge in the area of biology.^[10] The use of concept maps within a PBL course stimulated meaningful learning and promoted the development of students' learning strategies both individually and as a group^[11]. All of the usual educational activities can be combined and integrated through an evolving concept map.^[12]

Concept mapping fosters learners critical thinking ability in reading classes. As a result of this ability learners are to question or evaluate the validity of ideas or premises residing in the texts and to identify the lines of reasoning and arguments along with the associated fallacies.^[13] Concept Maps are a kind of schematic summary of what students know. They can be used to display students' prior knowledge about a given topic, or they can be used to summarize what has been learned.^[14]

Concept Maps have been used to examine students' prior knowledge, to track a student's progression of knowledge throughout a course, to compare students at different levels of knowledge and so forth.^[15,16,17,18] Concept Maps have also been used to identify specific misconceptions in knowledge and to identify alternative educational approaches to address misconceptions.^[19,20,21,22]

From the volume of literature on the subject of uses of Concept Maps, it is easy to conclude that the most prevalent use of Concept Mapping is for teaching and learning.

Conclusion

Lecture using concept Mapping was appreciated by the students & found it easy to correlate the clinical case with the basic principles of Physiology. Students found it very interesting with a significant gain in the learning of the subject taught, $p \leq 0.001$

It is also effective in retention of knowledge extremely helpful for revision before the sessional exam & professional examination.

Recommendations

The study can be continued further by taking CM as a tool for assessment.

Limitations

Study outcome is based on only two topics out of whole subject. Study is conducted only in 2nd year students, can be conducted in all years of M.B.B.S.

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Conflict of Interest – NIL

Ethical Clearance- From Institutional Ethics Committee.

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