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## Comparison of two interactive tutorial methods: results from a medical college in Karachi

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### Abstract

**Objective:** To compare perception of students on usefulness of interactive tutorials and clinically-oriented problem-solving tutorials.

**Methods:** The cross-sectional study was carried out from January 2012 to November 2013 at Bahria University Medical and Dental College, Karachi. The perception of medical students on usefulness of interactive tutorials and clinically-oriented problem-solving tutorials was acquired through a questionnaire distributed to medical students having completed the first two years of studies. The responses on various aspects of learning of physiology were acquired on a scale of poor, good or excellent. The learning abilities and acquired skills were compared in terms of not at all, to some extent, and to great extent. Data was analysed using SPSS 15.

**Results:** Of the hundred students initially enrolled, complete response was obtained from 83(83%). Of them, 47(57%) were females. There was significant difference in understanding of structure and function by clinically-oriented problem-solving tutorials ( $p=0.04$ ). The students preferred clinically-oriented problem-solving tutorials as far as understating of difficult concepts was concerned ( $p<0.01$ ). Presentation skills were improved by interactive tutorials ( $p=0.02$ ) whereas clinical reasoning skills acquired by clinically-oriented problem-solving tutorials was found to be significantly better ( $p<0.05$ ). Both tutorials helped in the learning of content of Physiology.

**Conclusion:** Clinical reasoning skills were acquired more by clinically-oriented problem-solving tutorials that helped in better understanding of structure and functions.

**Keywords:** Interactive tutorials, Clinically-oriented problem-solving tutorials, Physiology. (JPMA 67: 196; 2017)

### Introduction

Physiology is the branch of medical sciences which is understood by a variety of effective teaching methodologies, objective oriented activities and flow of information from teachers to students and vice versa. Different medical colleges are equipped with different teaching techniques starting from traditional teaching chalk and board, to more advanced power point and video clips. Thus, it is very important to know the different types of teaching methods and their impact on students so as to use effective, interesting and enjoyable methods for teaching and learning of Physiology.<sup>1</sup>

Interactive tutorials (IT) have evolved from traditional tutorials which are a form of small group discussions (SGDs) meant to revise and reinforce whatever had been taught in the lecture. It is somewhat similar to a mini-

lecture in which a teacher tries to elaborate the lecture material by asking frequent questions.<sup>2</sup> Clinically-oriented problem-solving tutorials (COPST) is an exciting teaching strategy by which students work in small groups to understand concepts of basic sciences through a clinical case. It involves linking of theory and practice which serves as the core ingredient for developing clinical reasoning in medical programmes.<sup>3</sup> The National Centre for Case Study has defined attributes of a case that it should be based on real patient story, common scenarios, should have well-defined learning outcomes, educational usefulness and general acceptability to promote decision-making.<sup>4</sup>

Researchers have used COPST for teaching of Physiology by clinical cases presented to the students on which they brainstorm and apply their knowledge and logic to diagnose the clinical condition with application of basic knowledge of Physiology.<sup>5,6</sup> Both forms of the tutorials are taken on the topics and concepts already discussed in the didactic or interactive lectures with the difference that in COPST, relevant clinical cases are prepared for better exposure and orientation of students to tie knowledge with practice.<sup>5,6</sup> Keeping this in mind, the current study was planned to know which form of tutorial is more useful

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for understanding of Physiology from students' perspective.

## Subjects and Methods

The cross-sectional study was carried out from January 2012 to November 2013 at Bahria University Medical and Dental College, Karachi. The decision to conduct IT or COPST in different topics of Physiology was made by the departmental committee. The class was divided in three equal groups for both tutorials. Objectives of IT and COPST were distributed to the students before the session. In the preparation of tutorial objectives, students were encouraged to come prepared and deliver/present content in front of the class. The self-administered questionnaire to assess usefulness of teaching methods was developed by modification of the instrument from published studies by other researchers.<sup>7</sup> The questionnaire was pretested and verified for error on a group of 50 students. The reliability of the questionnaire was recognised by Cronbach's alpha (81%) which disclosed good consistency in the responses received from students. All the students who had attended 4/5 IT and 32/40 COPST during two years were recruited in the study. The responses on learning of Physiology for its content, relationship with other sciences, understanding of pathological aspects, integration and application of knowledge were estimated on the basis of five-point Likert type scale (poor, satisfactory, good, very good, excellent) with score range from 0- 4 (lowest to highest) for both tutorial groups. The learning abilities and acquired skills from the tutorials were compared on the scale not at all, to some extent and to great extent. Data was analysed using SPSS 15, and was presented as median with interquartile range (IQR). Wilcoxon Sum Rank test was used to compare results in both groups.

## Results

Of the hundred students initially enrolled, complete response was obtained from 83(83%). Of them, 47(57%) were females. The pre-medical background of 67(81%) was matriculation and 16(19%) Cambridge O levels. Only 6(37.5%) students continued with A levels, and the rest shifted to intermediate. Overall, 69(83%) students were day scholars. Outcomes from the two different tutorials attended by same students were compared (Table-1). There was significant difference in understanding of structure and function and students preferred COPST over IT ( $p=0.04$ ). The students recommended IT as a better teaching methodology as far as understating of difficult concepts is concerned ( $p<0.01$ ) (Table-2). Better clinical reasoning was acquired through COPST ( $p=0.08$ ), but the

**Table-1:** Tutorial Topics of First and Second Year medical students.

TOPIC	Interactive tutorial	Clinically Oriented problem Solving tutorials
Homeostasis and body fluid	None	01
Cell organelles	None	01
Nucleus and genetics	None	01
Cell junction, membrane transport	1	01
Cell signaling & membrane potential	1	None
Action Potential	1	None
Smooth muscles	None	1
Blood	None	06
Cardiac Mechanics	None	04
Circulation	1	None
Respiration	1	04
Gastrointestinal tract	None	05
Kidney	None	04
CNS	None	05
Endocrinology	None	04
Reproduction	None	03

CNS: Central nervous system.

**Table-2:** Usefulness of Tutorials in understanding of Physiology.

Contents	Median, IQR		P-value		
	Interactive tutorials	COPST			
	1. Poor	2. Satisfactory	3. Good	4. Very Good	5. Excellent
Objective of understanding		3,1	3,2	0.10	
Understanding the structure and function		3,2	3,2	0.04*	
Understanding difficult concepts		3,2	3,1	<0.01*	
Perception and Pathologies of disorders		3,1	3,2	0.47	
Integrated of Knowledge		3,2	3,2	0.26	
Application of Knowledge		3,2	3,2	0.70	

\* $P<0.05$  considered significant using Wilcoxon Sum Rank test.

IQR: Inter-quartile range

COPST: Clinically-oriented problem-solving tutorial.

**Table-3:** Usefulness of Tutorials in acquisition of learning abilities.

Contents	Interactive Tutorial	COPST	P value
	Median	IQR	
Learning ability through Active learning	3,1	2,1	0.49
learning ability through self directed	3,1	2,1	0.66
Learning abilities in Group	3,1	2,1	0.45
Learning Ability Skill presentation	2,1	2,0	0.02*
Learning abilities Clinical Reasoning	2,1	3,1	0.08
Skill of assessment and management	2,1	2,1	0.85

\* $P<0.05$  considered significant using Wilcoxon Sum Rank test.

COPST: Clinically Oriented Problem Solving Tutorials

Scale: 1. Not At All 2. To Some extent 3. To Great Extent.

students were able to present the content using IT better than by COPST ( $p=0.02$ ) (Table-3).

## Discussion

Students of undergraduate medical education face challenges in understanding the content from books and interactive lectures and connect it with the real world scenarios. A study has proved that SGDs are effective teaching strategies for medical students in conventional educational curriculum.<sup>8</sup> Planning of curriculum has been shifted from discipline-based to integrated problem solving curriculum all over the globe.<sup>9,10</sup> This transition has called for use of SGDs in context of problems/ clinical cases that they can actually comprehend.<sup>11</sup>

Positive interdependence and cooperative learning developed as a result of discussions and interactions in small groups emphasises importance of active learning.<sup>12-14</sup> The significance of SGDs in learning of Physiology in our study is emphasised by good ranks acquired by both COPST and IT for understanding of the topic. The results are comparable to a study in which teaching by SGDs enhanced learning of medical students and improved their performance in clinical examination, which is a step toward more effective medical education.<sup>15</sup> Problem-oriented SGDs were found to be effective in active learning compared to didactic lectures by researchers.<sup>5</sup> In our study, since the comparison was made in both SGDs, no significant difference was observed as far as active learning was concerned. Self-regulated learning at the same time was enhanced by both types of SGDs as they took the guidelines from learning objectives which helped them to acquire information, focus their learning for self-improvement and clarified difficult concepts with the help of their facilitators.<sup>1</sup>

In one of the surveys on IT, a larger percentage thought that this method facilitated understanding and improved rapport with teachers while a smaller group of students felt it ineffective due to repetition of topics and sometimes students were not able to generate discussion.<sup>2</sup> IT, in our university, however, helped the students to concentrate, discuss and understand the topic but they were somewhat better able to relate structure with functions by COPST. It may be explained on the basis of discussion of real world scenarios that calls for recall of knowledge and integration of concepts by engaged learning to reach the final conclusion.<sup>5</sup> The specific scenarios that students had to address did not have single right answer but required the students to collaborate and aim at analysing the problem.

Students developed clinical reasoning in our study that has been approved since case-based teaching develops

analytical thinking and reflective judgment by reading and discussing complex, real-life scenario.<sup>5</sup> This approach helps to produce more clinically-oriented doctors with clear and strong physiological concepts. Since working in small groups and solving a clinical case with discussion required the students to read and discuss complex real life scenarios with their class mates, clinical reasoning skills were developed in our students more than was the case with IT.<sup>3</sup> The importance of this new teaching/learning modality is supported by another study conducted in India on first year medical students for teaching of Physiology.<sup>10</sup> A study found that when didactic lectures are followed by COPST, students are more involved due to inquiry-driven active learning of those concepts.<sup>6</sup> COPST thus engendered development of critical thinking among students, enabled them to solve problems creatively as has been proved by others.<sup>11,15,16</sup> An increase in their critical-appraisal skills thus enhances relevance of Physiology in medicine that facilitates lifelong learning in meaningful context by triggering prior knowledge and then engagement of students in the learning process.

Our study is limited in terms of difference in number of IT and COPST as well as objectives, subjective variation in the knowledge and style of facilitators who conducted these sessions. Yet the comparison improvises continuation of both as effective teaching tools for learning of Physiology. It also highlights few areas that show significant areas of improvement in IT as well as COPST. We also need to explore how IT improved presentation skills in students, so that latter that component could be adopted in COPST as well.

## Conclusion

Both forms of SGDs helped in understanding of the topic, perception of pathological aspects, and integration of knowledge with other subjects taught in basic medical sciences. Clinical reasoning skills were acquired by COPST that helped in better understanding of structure and functions. A combination of both forms of SGDs should be continued for teaching of Physiology with improvement in both on account of feedback from students.

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