

## Brief Communication

### Towards active learning case study at the end of the physiology course in dental student

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Traditional learning is the current approach of teaching in our Physiology Department, Faculty of Medicine, Ain Shams University, Ain Shams, Egypt for the first year of dentistry students, and involves theoretical lectures, practical, and tutorial classes. The lecture content is well organized and presented to the students. Most of the lecturers use a variety of modern teaching techniques such as multimedia instructional materials and power point slides to make the lecture more interesting. Lecturers mainly focus on how to deliver knowledge and center on the content of the course. It has been proved that basic science knowledge learned in the context of a clinical case is actually better comprehended and more easily applied by medical students than basic science knowledge learned in isolation.<sup>1</sup> The best approach may be to integrate modern teaching methods as case study learning with our traditional teaching methods to develop critical-thinking skills in undergraduate dentistry students and to help them understand and apply the basic physiological concepts in clinical practice and to motivate students to learn physiology.<sup>2</sup> At the end of the physiology course (cardiovascular: 12 hours, blood: 12 hours, nerve and muscle: 6 hours; autonomic nervous system: 6 hours, respiratory: 6 hours, endocrine: 12 hours, gastrointestinal: 6 hours) we apply 11 case studies covering these systems. The aim of the present study is to validate the effectiveness of case study learning in physiology at the end of the physiology course.

The present study was conducted in the academic year between April 2010 and May 2011 for the first year dentistry students at the Physiology Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt. Ethical approval (FMASU 1019/2011) was obtained for the study from Research Ethics Committee,

Faculty of Medicine, Ain Shams University, Ain Shams, Egypt.

**Distribution of cases.** Two hundred and sixty-two dental students participated in the present study and they were divided into groups according to their distribution in the practical classes. Subsequently, there were 11 groups, and each problem case was assigned to one group serially. The cases were collected to cover the following body systems: cardiovascular, blood, nerve and muscle, respiratory, autonomic nervous system, endocrine and gastrointestinal. In each case, the student was faced with a clinical situation and at the end of each case several questions were posed to the students to encourage thinking about mechanisms and relationships to reinforce concepts or introduce related topics. The cases were selected with modifications to be suitable for our students from Case Files Physiology book.<sup>3</sup>

**Student evaluation of the problem case.** To assess the students' opinion regarding the assignment; we constructed a survey of 5 questions written in English, selected and modified from Abraham et al<sup>1</sup> method, which was distributed to all students (262 students [98 males and 164 females]) directly at the start of this project. The students were asked to complete the evaluation form (Table 1). Then, the forms were collected after their final presentations, and all students returned the questionnaire (response rate was 100%). Results were expressed in numbers and percentages of respondents to each question and presented in a table. Non-parametric Chi-square test was used. A p-value less than 0.05 was considered statistically significant.

**Evaluation of students presentations.** After 2 weeks, the students presented their cases and they were evaluated according to these criteria: description of the case regarding history, symptoms, signs, investigations and diagnosis, clear power point slides, clear story line, answering questions, and discussion with the audience. Finally, they were evaluated as: good, intermediate, or poor. Student evaluation of the problem case is represented in Table 1. The reliability of the questionnaire alpha Cronbach's was 0.982, and the validity of the questionnaire inter-item correlations mean was 0.929.

**Evaluation of students presentations (Table 2).** Each group choose one or more participant students to present the case in front of other groups in a pre-scheduled appointment by the department. The grade was calculated as total of 10 marks where grade "poor" indicates marks less than 5.5, grade "intermediate" for marks between 5.5 and 7.5, and grade "good" was obtained when more than 7.5 marks were achieved. The results of the present study showed that most of

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**Table 1** - Results of the students evaluation of the study cases.

Evaluation	Fully agree		Agree		Partially agree		Disagree	Completely disagree		P-value	Chi-square	
	n	(%)	n	(%)	n	(%)		n	(%)			
The problem case strongly supplements the theoretical lectures	73	(27.8)	117	(44.7)	57	(21.8)	12	(4.6)	3	(1.1)	0.0001*	73.438
The problem case increases the understanding of the physiology of covered areas	72	(27.4)	125	(47.7)	46	(17.6)	17	(6.5)	2	(0.8)	0.0001*	72.701
The problem case enhances the ability to explain clinical data	98	(37.4)	115	(43.9)	37	(14.1)	11	(4.2)	1	(0.4)	0.0001*	88.514
The problem case helps understanding how basic science mechanisms can be used to explain clinical data	82	(31.2)	114	(43.5)	57	(21.8)	7	(2.7)	2	(0.8)	0.0001*	87.398
The problem case should be included in next year's course	94	(35.9)	98	(37.4)	48	(18.3)	9	(3.4)	13	(5.0)	0.0001*	55.373

\*P-value is significant at <0.05 level

**Table 2** - Results of the evaluation of the presentations of the study cases.

Evaluation	Good	Intermediate	Poor	P-value
	%	%	%	
Description of the case regards: history, symptoms, signs, investigations and diagnosis	72.7	27.3	-	0.0031
Clear power point slides	99.0	1.0	-	<0.0001
Clear story line	65.0	35.0	-	0.0449
Answering questions and discussion with the audience	70.0	30.0	-	0.0059

the students were satisfied with the problem cases for supplementing the theoretical lectures, increased their understanding of the physiology of the covered area, enhanced their ability to present clinical data, enhanced their understanding on how basic science mechanisms can be translated into clinical data and agreed on including the problem cases in the next year's course. A few students were found to be unsatisfied with this type of teaching. Throughout the presentation, it was evident that the students were the ones who did the work for the presentation and were the ones who formulated the goals and objectives according to the instructions given to them. At the beginning of each case, a brief description was mentioned on the first slide including symptoms, signs, investigation, and differential diagnosis. This was carried out in the absence of a tutor and only instructions were supplied. The students worked together and there was cooperation to divide the work among themselves; who would look up the information required and who would prepare the presentation. Even with a large group size of 20 students, it was noticed that some participated more than others. Case study learning stimulated their thinking and improved their reasoning skills. Students felt that it had provided motivation for them to study physiology and that problem cases helped them to

improve their reasoning skills. The present study indicates that the students were able to think better and also apply theoretical knowledge in diagnosing the disorders as in clinical case studies, as evidenced by their performance in the presentations. It was an amazing experience for us and for the students as well. Each group presented their work in a different way reflecting a wealth of creativity.<sup>4</sup> The experience showed positive effect on the students as it was the first time they applied teamwork skills and cooperated to produce interesting presentations. It is worth to mention that one of the groups had a problem case concerning bronchial asthma. They supported their presentation with an embolizer and explained to others how to use it. Another group presented their case as a magazine presentation. It included many tips on how to keep the teeth healthy and other medical information. They expressed their satisfaction with this experience in an interesting way.

Our results are in agreement with the study of Abraham et al<sup>1</sup> who found that clinically oriented physiology teaching was useful adjunct to didactic lectures in teaching physiology curriculum for the undergraduate. Also, medical education is concerned with training students to have appropriate attitude and a sense of value.<sup>5</sup> The present study showed that

basic science knowledge learned in the context of a clinical case is actually better comprehended and more easily applied by dentistry students than basic science knowledge learned in isolation and also creates more excitement in the process of learning. Moreover, it is intellectually challenging as first year dentistry students were not too sure about how much they were expected to know and deliver in their presentations. Some students stated that they spent 8-9 hours to prepare for the presentation. Others spent 2 days to prepare a very interesting one in the form of a magazine. They showed a sense of pride in such a learning environment as they learned how to acquire knowledge on their own. Time is also more effectively used. Students are exposed at an early stage to a learning environment conducive to their professional future environment. In small group discussions, students also learn to communicate and to work as a part of a team. Sometimes students at the early higher education are shy in expressing themselves because of the new teaching environment. They fear asking questions in class. When this approach is applied, the students will adapt easily and they will cooperate with their lecturers and express themselves easily.

**Study limitations.** The time for the case study was planned to be 4 weeks but because of the unstable political situation due to the Egyptian revolution which shortened the second semester time, it was only 2 weeks. The students were coming from a variety of backgrounds, namely, some came from the secondary schools (new system) and others from the first year science (old system). Interestingly, such heterogeneity in students' background did not seem to pose much of a problem in their learning process.

In conclusion, introducing case study learning in an environment like ours at Ain Shams University where a huge number of students versus the number of laboratory or classes with the least possible facilities was a very positive experience. It confirms that reaching a good standard of interactive learning between professors and students even if we lack the most recent technologies in teaching could be achieved in some way or another. The main target is to let students participate in obtaining knowledge and information and hence motivate their

potentials, increase their eagerness to learn and create an interesting environment where their creativity and analytical thinking are stimulated, and therefore ceasing as much as possible passive teaching. In this experience, it only required dividing students into several groups, a survey to know their feedback, supervision and an evaluation of their presentation that reflects their understanding. These were only human efforts that can be even developed further in the coming experience.

Learning is a mandatory component throughout the entire medical curriculum at the earliest possible time but the tutorial group can be comprised to 7-10 students under the supervision of one tutor to achieve even better results.

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