



EMBRYOLOGY MADE FASCINATING FOR UNDERGRADUATE STUDENTS THROUGH IMPLEMENTATION OF INNOVATIVE TEACHING METHODS.

Anatomy

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ABSTRACT

INTRODUCTION: Embryology is the core subject for medicine and current research, although interesting, understanding embryology has never been easy for first MBBS students. So responsibility of a medical teacher is to facilitate interest in learning and studying embryology in an easy and enjoyable way by using different effective teaching methods. To achieve this goal different innovative teaching-learning methods were implemented throughout the academic year 2018-19. Feedback was taken from students, which indicated the usefulness of the innovative teaching methods.

MATERIALS AND METHODS: Following innovative teaching methods for teaching embryology were implemented for first MBBS students.

1. Self-directed learning (SDL) : Certain topics were given to students to study on their own and were asked to present the same in the succeeding class.

2. Embryology Seminars by undergraduate students: It was organized on different topics taught.

3. Use of 3 dimensional videos : Videos was used in understanding the complex development of different systems.

4. Embryology practical workbook : instead of the routine journal new embryology practical workbook was developed in which students instead of drawing diagrams labelled the photographs of embryo models and answer the questions related to that particular model.

Questionnaire was framed to take feedback from the students and five point Likert's scale was used to interpret the results.

RESULTS: All the students made varied positive efforts for the given activities and appreciated this newer method of teaching learning as it became an interactive session. More and more interactive, thought provoking ideas were seen used by undergraduate students which arose interest in learning embryology with the new innovative teaching methods as compared to the conventional didactic lectures. It helped to achieve the higher level of cognitive domain.

KEYWORDS

Embryology, Self-directed learning, Seminars, Embryology workbook.

INTRODUCTION

Study of development of human embryo is very much interesting as well as it is the core subject of medicine, still understanding embryology had never been easy for first MBBS students.

Though didactic lectures are powerful tools for delivering a large amount of theoretical information and are especially useful while teaching large number of students. However, anatomy is a subject where learning is not only possible either by lectures or by study from books alone. With the advances in medical education, numerous teaching tools are also upcoming. Educators are using advanced technologies as powerful pedagogical tools. The ultimate goal of using different innovative teaching technologies is to enhance student learning⁽¹⁾

The traditional method of didactic lectures in medical education involves a single professor delivering lecture to a large group of students with the help of audiovisual aids like a blackboard or PowerPoint presentation. Being medical teachers when we are expecting students to achieve higher levels of cognitive domains, we must facilitate the interactive teaching learning methods which involve active participation of students. Hence for students to actively participate in learning, new learning methods like self-directed learning (SDL) have emerged in medical curriculum.

The present study involved the two basic steps for encouraging the study of embryology in undergraduate students. These were

- Implementation of New Embryology Teaching methods
- Creation of New study Material for students

Implementation of new teaching methods were SDL, embryology seminars by undergraduate students and use of three dimensional videos, while new study material was provided which included the changes in practical record book and embryology practice workbook.

SDL was implemented as a process of learning in which students take initiative for learning. As medical profession is the process of lifelong learning, SDL also enables health professionals to continue the process

of learning and updating knowledge during their careers⁽¹⁾⁽⁷⁾

SDL is now days advocated for effective and efficient learning by medical students. Numerous studies have proved that SDL is valuable in terms of acquiring the knowledge for learning anatomy. SDL enabled improved communication skills amongst students, it increased their confidence and also encouraged reading amongst students.

Embryology seminars were conducted for the first time in the department, as for undergraduate students it is difficult to teach embryology in seminars. For this activity students read the topic thoroughly as they had to teach the topic. They used chalk and board, power point presentations, oral speech, videos, animations, handouts, and working model. This also showed the teamwork amongst the students as well as their creativity.

Embryology practice workbook was very much helpful as it included the photographs of embryology models. It helped students to revise the subject in precise manner.

Use of animations as a teaching method imparts a better understanding in studying the basis of Embryology in 3 dimensions. Whereas in the conventional method of teaching embryology the use of models which enables the students to handle, and visualize the process of development.^{(2),(8)} So, the present study aims at finding out the most convenient method in teaching embryology

MATERIALS AND METHODS

Following innovative teaching methods for embryology were implemented for first MBBS students.

1. Self-directed learning (SDL) - Based on the teaching methods in medical education technologies (MET), some topics were selected and given to students one week prior to the activity. They were asked to study the topic from certain prescribed books, or they could use the information available on the internet. After finishing the self-study of the topic few students were asked to present the same topic in the class followed by question answer session. On completing the activity as

well as after teaching the topic by the subject teacher , MCQ test was conducted on the given topics.

Materials - Embryology reference books, Internet.

2. Embryology seminars by undergraduate students- Seminar on various Embryology topics by the students, was organized in the department for the first time, participants were in large numbers, Six groups were formed each comprising of four students. Two student speakers were asked to present a topic of normal embryological development and third spoke about anomalies. This brought out the creativity aspect in the students and made learning embryology a hand on experience for all who attended. It was commendable that one group even made a "Working Model".

At the end of the seminar, all students were awarded certificate of participation and the best team and best speaker were awarded by senior faculty members. This public appreciation of the students boosted the morale of students.

Materials -Embryology textbooks, Videos, Materials like clay, color tubes, color threads, drawing sheets, card board sheets, and thermacol sheets were used for preparing embryology models for seminar by students.

3. Use of 3 dimensional videos –Videos was used in understanding the complex development of different systems.

Material-Videos from internet.

4. Embryology practical workbook – Instead of the routine practical record book new embryology practical workbook was made in which students instead of drawing diagrams labelled the photographs of embryo models and answered the questions related to that particular model. To make the study of embryology more interactive, a practice embryology workbook was created. It includes photographs of all the models that have been shown to the students as a part of the curriculum of embryology. All photographic images were labeled with blank spaces for answering after the practical was complete, the students were asked to fill in blanks against the relevant pictures /images.

Material-Photographs of the Embryology models in the Anatomy museum.

Questionnaire was framed to take feedback from the students and five point Likert's scale was used to interpret the results.

RESULTS

All the innovative teaching methods used to make embryology easy to understand for undergraduate students and to make it interesting were very much effective. Students actively participated in these different activities, studied the different topics with interest, because of which learning embryology became easy for them.

For all the activities conducted ,feedback was collected from students by giving them the questionnaire

All the students made varied positive efforts for the given activities like SDL and seminar. Students participated in SDL, gathered lots of information on the given topics and appreciated this newer method of teaching learning as it became an interactive session. The topics for the study involved the interesting and clinically important topics of embryology like twin pregnancy, invitro fertilization, neural tube defects, surrogacy, contraception methods, medical termination of pregnancy, were given in advance to students, one week prior to the day of activity.

Student's participation in these activities was appreciable. As students presented it increased their confidence and also encouraged reading amongst them. Also at the end of the session when some students asked them questions on the given topics ,it indicated participation of all the students and also all had studied the topic thoroughly .MCQ test was conducted at the end of the activity more than 75 percent of students secured 80 percent marks in this test.

Active participation of students in seminar provoked thought processes of students, brought out the creativity of the students as they made different "Embryology Models" which made learning

embryology easy and interesting. Also as they had to present it in front of everyone students had studied the topic with proper understanding, this helped them to understand the complex developmental process .

This also changed attitude of students towards learning embryology and attributes like teamwork,communication skills ,respect other's opinion and information sharing were observed.

Use of 3 dimensional videos was very much useful for better understanding of the development of complicated systems and helped students for retention of developmental aspects by visual memory.

Embryology practical workbook was of immense help to the students as it was the concise revision of theory as well as practical and better memory recall. This allowed a more interesting, thought provoking approach.

Table No.1- Feedback from students using five point Likert's scale.

Sr No	Attributes	Strongly disagree	Disagree	Un-decided	Agree	Strongly agree
1	Innovative methods helped for better understanding of the subject	0%	0%	13(5.2%)	63 (25.2%)	170 (68%)
2	It helped to arose interest in the subject	0%	0%	10(4%)	78 (31.2%)	160 (64%)
3	It made learning Embryology easy and enjoyable	0%	0%	0%	88 (35.2%)	155 (62%)
4	It will help for theory as well as viva preparations	0%	0%	8(3.2%)	87 (34.8%)	150 (60%)
5	It should be included in routine teaching of Embryology along with traditional methods	0%	0%	0%	62 (24.8%)	175 (70%)

DISCUSSION

The use of technology has increased now a days in learning various subjects in medical field and it has been proved to be an effective teaching tool for better understanding of complicated subjects. Papanna et al. carried out a cross-sectional study at Kasturba Medical College, Mangalore A semi-structured questionnaire was used to collect the information in relation to preferences and perceptions of students regarding different teaching methods which were used for theory and clinical teaching. The study revealed that the didactic lectures were least preferred (32.8%). In learning rare signs and cases, students preferred video lectures (41%) and mannequins (75.9%) in learning clinical skills.

Baxi et al. conducted a study to explore the views of 5th-semester students at Government Medical College, Bhavnagar, on the advantages and disadvantages of different teaching tools. A multimedia approach was appreciated by most of the students and has been shown to be effective for classes with students from different backgrounds because multimedia material was helpful to explain complicated topics with the help of pictures, animations, and simulations. The incorporation of video was also reported to positively influence most of the domains identified in classroom learning⁽¹⁾

Lakshmi kantha in her study made an attempt to find out students level of perception and the use of animations and videos in teaching the developmental concept in embryology. Their study showed that animated teaching was much better to understand as it gave three dimensional view⁽²⁾

Kirtana Pai et al in their study observed that Self-directed learning can be considered as an alternate form of learning in acquisition of knowledge. As SDL was equally effective as lecture, drawback of SDL was it could cover only a few topics from the total syllabus.⁽³⁾

Teaching embryology has changed considerably in the recent decades. It has become very easy to visualize the complicated Anatomical structures as well as complex developmental aspects with the use of three dimensional videos.⁽⁴⁾

Thus use of different teaching learning methods were found to be very effective and useful for teaching embryology, the most complicated part of Anatomy. Different methods used for teaching not only made the subject easy but also arose interest amongst students about the subject. It also stimulated them to think, read and study the subject thoroughly. As all the teaching learning methods used included active participation of students, these methods were very much helpful for teaching the subject as well as for understanding the subject for students.

CONCLUSION

For first-year medical students, SDL is an effective teaching strategy for learning embryology. However, no additional benefit is gained by supplementing SDL with a lecture to facilitate learning.

The vast majority of medical students in this study valued embryology teaching, found the application to clinical scenarios useful for learning and believed it would assist them with clinical management. Students differed in their beliefs about when embryology should be taught in the medical curriculum and whether they considered the additional work load problematic. Medical schools would seem well advised to ensure embryology teaching is both included in their programmes and integrated into the appropriate clinical disciplines.^{(5),(6)}

The present study shows effectiveness of animated embryological teaching. Students felt animated teaching was better to understand the rationale, concept, relations, basis of anomalies in the development of pharyngeal apparatus and respiratory system when compared to teaching by clay models.^{(9),(10)} This may help teachers to incorporate these both innovative teaching methods in teaching embryology for better understanding along with routine lectures.

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