

## M.B.B.S. Undergraduate Learner's Perspective Regarding Embryology Teaching Learning Methodologies

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### Abstract

*Introduction:* The most challenging aspect in anatomy curriculum is to understand, imagine and learn the concepts in human embryology because of the complexities involved in the events and processes in the development of an embryo. It is always a challenge for the teacher to act as a facilitator and unveil the human embryology topic to the students and instigate a learning process. *Materials and Methods:* A questionnaire with 12 questions was prepared for 200 students of the class of phase I MBBS and administered after their preliminary practical and viva-voce exam. It was informed that the questionnaire based study would be undertaken for analysis of students' views and would be used in planning effective teaching learning strategies and also for research purpose in medical education. *Results:* The feedback questionnaires were compiled and analysed. *Conclusion:* Students prefer more of interactive and clinically relevant teaching of embryology which would make learning embryology more effective. Animations and videos should be incorporated in lectures which help in assimilating of the sequence of events in human development in 3-Dimensional form which definitely improves retention of embryological knowledge better.

**Keywords:** Embryology; Teaching Learning Methodologies; 3D Animations and Videos.

### Introduction

Medical education is a continuously evolving arena with scope of specific structured curricula to compress and concise the vast subject course content of pre-clinical subjects in the limited 10 months duration allotted to Phase I MBBS. The most challenging aspect in Anatomy curriculum is to understand, imagine and learn the concepts in human embryology because of the complexities involved in the events and processes in the development of an embryo. It is always a challenge for the teacher to act as a facilitator and unveil the human embryology topic to the students and instigate a learning process.

Embryology is often difficult to teach because of the rapid, three-dimensional changes that occur simultaneously on a microscopic scale. Knowledge

of normal and abnormal human development is important for understanding pathophysiology, clinical treatment and surgical repair of malformations [1].

Most medical colleges in India rely on the traditional teaching learning method of didactic lectures to impart education in embryology. The learning process in embryology is assessed by short answer questions in both interval and summative assessments. Practical evaluation of students includes identification of various models on embryology and a viva voce. The reduction in time frame for Phase I MBBS course without a corresponding reduction in the syllabus has resulted in severe time constraint for the teaching faculty in completing syllabus and translates into a heavy academic burden for the students. Very few students have a full grasp of embryology and its application in the clinical field [2].

It is necessary to know the views of the students while revising the curriculum and to know the best teaching methodology which will facilitate learning process [3]. The concept of medical education has changed as knowledge is no longer restricted to textbooks and lectures. Nowadays access to internet, electronic journals, educational videos and conferences are the newer concepts of teaching.

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Through feedback we can identify the areas of strength and /or weakness of teaching methodology used so that steps can be taken to rectify deficiencies and to evolve the curriculum and achieve intended goal [4].

It is always difficult for the teacher who has gathered the knowledge after years of reading many books and reference journals to concise the essence of the topic from a undergraduate learner point of view in one hour class, more so, over 45 minutes of attention span of the student. Our aim should be to grab the attention of each every student so that essentials of the topic are presented in an interesting and effective manner, catering to the entire class rather than just lecturing to an interested and attentive few, amongst the audience. Traditional didactic lecture can be made more interesting and effective by employing newer teaching learning and assessment strategies as perceived by the learners themselves.

This was the sole reason for undertaking this study, to facilitate and ensure that the learning process is actually occurring effectively, as it was intended for to be, for the learners.

**Materials and Methods**

After the end of the academic year, where Human Embryology Curriculum was covered over 30 lecture classes and 2 revision classes for embryology models, it was planned to evaluate the students' perspective regarding teaching methodology and effective learning strategies. The embryology lectures taken were didactic with incorporation of audio-visual aids basically power points on LCD supplemented with black board teaching to explain relevant details and also for shifting focus and increasing concentration of students.

With permission from the Principal to conduct the study, the institutional ethical clearance obtained and the students were informed about study and their consent was taken. A questionnaire with 12 questions was prepared for students and administered after their preliminary practical and viva voce exam. It was informed that the questionnaire based study undertaken for analysis of students' views and used in planning effective teaching learning strategies would be used for research purpose in medical education.

Feed-back response forms were gathered from 200 students of MBBS phase-I class of MBBS which comprised of points relating to the present Embryology curriculum, teaching methodology and

assessment techniques, preference for teaching aids in embryology classes, preferred periodic evaluation pattern with the intention of incorporating learner's perspectives in further classes.

**Results**

The feedback questionnaires were compiled and analysed. There were total 12 questions with multiple choices to answer, in the questionnaire.

*Question 1:* Time allotted to embryology teaching in the academic year 32 classes [Figure 1].

*Question 2:* Preferred teaching module for embryology [Figure 2].

*Question 3:* Table wise discussion (in small groups of 10) of embryology models (in preparing for embryology viva)

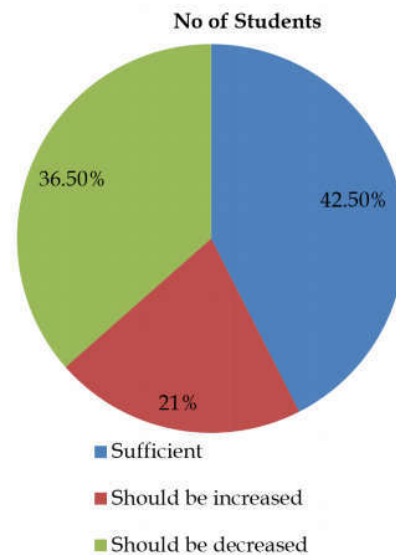


Fig. 1:

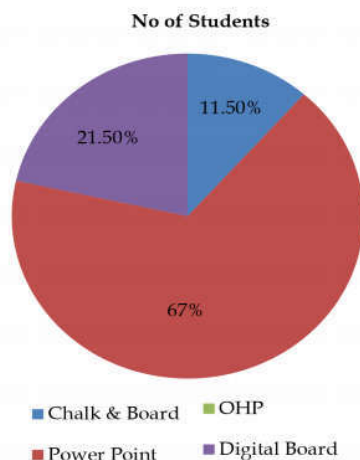


Fig. 2:

a. Beneficial	89%	b. Not beneficial	4%
b. Not beneficial	NIL	c. No idea/neutral	27.5%
c. No idea/neutral	11%		

*Question 4:* Intercollegiate quiz planned during the academic year was

a. Beneficial	81.5%
b. Not beneficial	NIL
c. No idea/neutral	18.5%

*Question 5:* During lecture classes Incorporation of Case scenarios and problem based learning in embryology as employed in the quiz (more of clinical orientation)

a. Beneficial	76%
b. Not beneficial	1.5%
c. No idea/neutral	22.5%

*Question 6:* Teacher asking questions to recapitulate things taught during previous class

a. Beneficial	61.5%
b. Not beneficial	4.5%

*Question 7:* Use of More of animations and videos in embryology during lectures

a. Beneficial	97%
b. Not beneficial	1%
c. No idea/neutral	2%

*Question 8:* More of group activities to make embryology learning easier and interesting

a. Beneficial	79.5%
b. Not beneficial	3.5%
c. No idea/neutral	17%

Most interesting Group activities of your choice: please tick

• Models discussion with peers	79%
• Short seminars	1.5%
• Quizzes	3%
• Case discussion in groups	16.5%

*Question 9:* Teacher asking questions at the end of the lecture to increase attentiveness and focus

a. Beneficial	68.5%
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*Question 10:* Recommended module for assessment of students compliance in reading embryology on regular basis

*Recommended module*

a. MCQ test	35.5%
b. Written test (short essays and short notes)	18%
c. Embryology Models viva voce	46.5%

*Regular basis*

• Fortnightly	3.5%
• Monthly	32%
• Only during internal assessments	64.5%

*Question 11:* Teacher mentioning every important topic as frequently asked short note, short answer, MCQ, viva- voce questions

a. Beneficial	96.5%
b. Not beneficial	2.5%
c. No idea/neutral	1%

*Question 12:* Drawing more of embryology diagrams in embryology record books

a. Beneficial	43.5%
b. Not beneficial	24.5%
c. No idea/neutral	27%

### Discussion

Anatomy has been the core subject of First year medical education curriculum; always recognized as an essential foundation for clinical sciences. It has been the keystone of medical education for years together. It provides a platform of knowledge indispensable to all branches of medicine. However, there is a continuing debate on how much to teach, when to teach and how to teach anatomy [5]. The embryology lectures at present in our country still are taken as didactic lectures with incorporation of audio-visual aids power points on LCD supplemented with black board to explain relevant details.

In one study, 64% students indicated that problems in understanding embryology stemmed from an inability to visualize, comprehend the sequence of events which characterize developmental process, particularly 3D and inadequate time and sequence followed in lectures [6]. In another study by Reenu Kumari et.al., students faced specific problem in understanding embryology due to inability to visualize, inability to comprehend sequence of events and inadequate time, they find use of more audiovisual aids (56%), simplified information (24%). With regards to evaluation methods, the students found that the grand stage test taken at the end of each system is the most useful method in preparing for the final university examination [7]. In a study by Nayak et al., have concluded that integration of newer teaching modalities and modern technology will encourage interest and retention of anatomical knowledge and its clinical relevance. They state that combined medical teaching (classical black board based and audiovisual assisted teaching) was the most effective method. Particularly for embryology classes use of 3D animations were very helpful in understanding and igniting curiosity in the minds of students [8]. An obvious advantage of anatomical 3D models is the ability to demonstrate the spatial relationships between structures. During classroom presentations, some items such as the spatial structure of morphogenetic changes of the human embryo or the connecting pathways between certain brain regions are usually hard to represent graphically on the blackboard or by projected illustrations, and often histological material or schematics diagrams are required for further demonstration [9].

In another study evaluation questionnaire established that a large majority of student respondents thought that use of power point teaching on LCD was the ideal teaching methodology for future classes and this was one of the most encouraging findings (66.6% students preferred LCD teaching for embryology lectures). When asked about the reason for their preference students opined that embryology lectures had 3D images to understand the whole morphology of the developing embryo, some videos on different stages of development in respective systems were shown which was very informative and cross-sectional study of embryos were better understood by LCD than black board teaching [10]. Similarly a study opined, an overall 98% students strongly agreed that the e-learning embryology module was a highly innovative, interactive and useful method of learning embryology. About 64%

students opined that the computer based e-learning module was much better than traditional method of didactic lectures. The mean score favouring the e-learning resource in comparison to the traditional didactic lecture was 4.58 ( $\pm 0.65$ ) out of scale 5 [2]. The use of multimedia-supported teaching will open new horizons to shift to more problem-based and independent learning, integrative learning or even distance learning [11]. Virtual three-dimensional models and animations are becoming more widely used in medical education. They allow students to visualize in greater detail the spatial relationships between embryonic structures and their development over time [12].

In present study 134 (67%) students opined use of power point lectures for teaching embryology. All the students were exposed to Small group teaching (in groups of 10) in dissection hall, 15 minutes at the end of routine dissection time of two hours, about development of related structures, at least once a week with demonstration of embryology models. When asked about student's view on incorporating small group teaching as a supplementary teaching to increase their understanding and recapitulation of things taught in class, 178 (89%) found it to be beneficial and increased their confidence for appearing the viva-voce. Another noticeable observation in our study was that More than 75% students were opinion of, following were beneficial, [a] Table wise discussion of embryology models with peers (89%); [b] Intercollegiate quiz on embryology (81.5%); [c] Clinical scenario & problem based learning (76%); [d] Use of animations & videos (97%); [e] Small group activity with models (79%) and [f] Teacher mentioning about the probable question in exams (96.5%).

In fact in a study the authors have opined that the weightage given to embryology in summative assessments is relatively meagre, accounting for a paltry 5-7% of the total marks in a theory exam. Most students end up learning just a few topics only with exam point of interest. Eventually the entire exercise undermines the learning objectives [2].

In our Institution, weightage for Embryology in Human Anatomy University examination is one short note of 5 marks, one short answer of 3 marks and 3 MCQs, (i.e. in each of the two written papers) which amounts to 22 marks out of 200 marks theory paper and in practical just one spotter on embryology model of 2 marks out of 10 marks and viva-voce one station on embryology of 10 marks out of 4 stations. Therefore embryology amounts to 34 marks which summate

up to 10% out of total marks. Entire embryology is covered over 30 teaching hours (genetics is an additional 8 marks taught in over 5 teaching hours).

Traditional teaching methods are unable of creating motivation and positive attitude in learners: therefore, identification of new, innovative and even exciting methods seems necessary. While application of methods like PBL in education has been highlighted in recent years, it seems, however, that because of abundance of information and necessity of teaching various materials of one subject in medical sciences, this method and group discussions are not enough. Thus it is suggested that well-known methods be used with appropriate changes [13]. With regards to evaluation methods, the students found that the grand test taken at the end of each system is the most useful method in preparing for the final university examination [14].

Blended learning strategies have been shown to improve students' academic performance, motivation, attitude, and satisfaction, and to provide convenient and flexible learning. Implementation of blended learning strategies has also proved cost effective [15].

### Conclusion

Students prefer more of interactive and clinically relevant teaching of embryology which would make learning Embryology more effective. As medical students in our undergraduate time, teachers of embryology have actually struggled to explain the concepts of embryology by black board teaching and even the diagrams in the texts being black and white then. But now, with the actual improvised audio-visual aids with coloured diagrams and animated videos it is much easier for the teachers to make the students understand embryology and clinical manifestations which instantly get captured by the visual memory and immensely prove beneficial during recall.

Animations and videos should be incorporated in lectures which help in assimilating of the sequence of events in human development in 3-Dimensional form which definitely improves retention of Embryological knowledge better.

In my personal opinion as for students who find embryology tough a friendly suggestion is after reading other subjects throughout the day, Embryology can be interesting and easy if one reads it for at least fifteen minutes before one sleeps, like a bed time story daily, so one can recapitulate diagrams and embryology animations till one falls asleep and

the next day discuss the same amongst their study group with friends which help in better retention and easier recollection in exams and viva voce.

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