

# A Method of Teaching Learning Embryology Models by Preparing the Labeled Photographs with a Set of Questions and Students' Perception

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## Abstract

**Introduction:** Embryology forms an important part of Anatomy in medical curriculum. Knowledge of embryonic development is crucial to grasp the intricate topographic relations of organs in the human body and to understand congenital malformations.

Embryology is not only difficult to imagine and understand by the students, also difficult to comprehend & reproduce in exam.

In classes for human embryology, it is common to use artificial models to represent the different phases of development. The use of this tool has the purpose of facilitating learning, since the students can see and touch the models. Use of artificial models enables learning, since the students can appreciate the three-dimensional (3D) aspects of the structures.

To facilitate the learning of embryology and improve the performance of the students in examinations new method of teaching-learning embryology models is introduced. To implement this method, each embryology model in the Department of Anatomy was photographed. In the photograph, parts of the model were labeled. The print out of the labeled photograph was taken. Based on each model, a set of questions on topics of 'Must know' part of curriculum was prepared.

When practicals of embryology models were conducted, to study the model students were provided with a labeled photograph along with a set of questions.

To get feedback of this teaching method the questionnaire was given to the students. The questionnaire was based on five point Likert scale.

**Conclusions:** A method of Teaching-Learning embryology models by preparing the labeled photographs with a set of questions is beneficial to the students to prepare for theory and practical examinations. It enhances and improves the understanding of the subject and thinking ability.

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## INTRODUCTION

Embryology refers to prenatal development of Embryos and fetuses.<sup>1</sup> Prenatal development



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produces many ramifications affecting health, making study of embryology, an important topic for health care professionals.<sup>2</sup> Embryology bridges the gap between prenatal development and obstetrics, perinatal medicine, pediatrics as the understanding and correction of most congenital anomalies depend on knowledge of normal development and of the deviation and variation that may occur.<sup>1</sup>

Aside from clinical relevance, an understanding of embryology can improve and enrich students' understanding of human anatomy.<sup>3</sup> Knowledge of embryonic development is crucial to grasp the intricate topographic relations of organs in the human body and to understand congenital malformations.<sup>4</sup> Embryology forms an important part of Anatomy in medical curriculum. With the advent of increasing research and change in concepts in human embryology, the basics of human development needs to be thoroughly understood in the first year of medical career.<sup>5</sup>

Embryology deals with minute structures and includes vibrant changes in an embryo's growth.<sup>6</sup> As a subject embryology is hard for the first year students. Embryology is not only difficult to imagine and understand by the students, also difficult to comprehend & reproduce in exam.<sup>5</sup> In classes for human embryology, it is common to use artificial models to represent the different phases of development. The use of this tool has the purpose of facilitating learning, since the students can see and touch the models.<sup>7</sup> The students can appreciate the three-dimensional (3D) aspects of the structures with the help of models and can have spatial visualization which is crucial to understand embryology because students ought to know the inter-structure relationships in various views and planes. Comprehending the development of the human embryo from two-dimensional (2D) figs. in text books has its limitations.<sup>8</sup>

It is always a challenge for the teacher to act as a facilitator to unveil the developmental process to the students and instigate a learning process.<sup>9</sup>

As per a teacher's perspective, it is observed that it becomes time consuming for a teacher to show parts of the model to each and every student during practical hours. Also it is difficult for the students to revise or do self directed learning of embryology models which is affecting their performance in the practical examinations. So it is felt that to facilitate the learning of embryology and improve the performance of the students in examinations new method of teaching-learning embryology should be introduced.

## MATERIALS & METHODS

The permission of ethical committee of the Institute was obtained before conducting the study.

We have total 114 embryology models of General Embryology and Systemic Embryology in the Department of Anatomy and most of the models are 3-Dimensional.

System wise and as per stages of development embryology models were segregated (Table 1). Each model was given a code. (Table 2 and Table 3) Each embryology model in the Department of Anatomy was photographed. In Microsoft word; parts of the model were labeled. The colored prints of the photograph on an A4 size paper was taken.

**Table 1:** Showing system wise segregation of embryology models

System	Number of embryology models
General embryology	25
Face and neck	16
Central nervous system and special senses	22
Respiratory system and and coelomic cavities	4
Cardiovascular system	23
Gastrointestinal system	14
Genitourinary system	10

**Table 2:** Listing exhibits and codes

Exhibit	Code
General embryology	EM1
Systemic embryology	
Development of face and neck	EM2
Development of central nervous system	EM3
Development of respiratory system and coelomi cavities	EM4
Development of cardiovascular system	EM5
Development of gastrointestinal system	EM6
Development of genitourinary system	EM7

**Table 3 List of model code of general embryology model and its location**

Model no.	Title of embryology model	Location
EM1.1	Endometrium showing cyclical changes	Cupboard A Shelf 1
EM1.2	Development of placenta	Cupboard A Shelf 1
EM1.3	Yolk sac, amnion with embryonic disc	Cupboard A Shelf 2
EM1.4	Fetal membranes (5mm. Embryo)	Cupboard A Shelf 2
EM1.5	Fetal membranes:, umbilical cord is dissected.	Cupboard A Shelf 2
EM1.6	Developing embryo :(25 <sup>th</sup> day) 14 somites stage.	Cupboard A Shelf 3
EM1.7	Developing embryo 4 <sup>th</sup> week (25 somites stage).	Cupboard A Shelf 3
EM1.8	Folding of embryo showing head & tail folds	Cupboard A Shelf 3
EM1.9	Embryo 5 <sup>th</sup> week appearance of upper & lower limb buds.	Cupboard A Shelf 3
EM1.10	Embryo in late 5 <sup>th</sup> week with distinct pharyngeal arches & appearance of cervical sinus.	Cupboard A Shelf 3
EM1.11	Developing embryo-6 <sup>th</sup> week with upper limb bud developing into arm, forearm & hand	Cupboard A Shelf 4
EM1.12	Development of embryo 6-7 weeks with appearance of ear hillocks	Cupboard A Shelf 4
EM1.13	7 weeks embryo with developed neck region	Cupboard A Shelf 4
EM1.14	19 weeks fetus attaining definite human shape	Cupboard A Shelf 4

**Table 4:** Feedback of 165 first MBBS (2020-21 batch) students to the questionnaire

Sr. no	Questionnaire pertaining to practical of embryology models with its labeled photo print and a set of questions	SA % of the students responded	A % of the students responded	UC % of the students responded	DA % of the students responded	SDA % of the students responded
1	Improves the understanding of the subjects	46.66	48.48	4.26	0	0.6
2	Make learning more interesting because of active participation	34.56	53.34	10.9	0.6	0.6
3	Helps to develop skills which will improve performance in examinations	43.03	53.33	3.04	0	0.6
4	Improves thinking ability	30.3	58.18	10.32	0.6	0.6
5	Saves time for preparing for exam	49.09	36.96	10.9	2.42	0.6
6	Improves the quality of the teaching-learning process during practical hours	33.93	59.39	5.45	0.6	0.6
7	This will be helpful in theory exams also	53.33	40.6	4.86	1.21	0
8	It will give better understanding the congenital anomalies	36.96	50.3	9.09	2.44	1.21
9	In future, the study of the embryology with the models will form the basis in understanding clinical and applied embryology such as variations of a structure and surgical corrections of the congenital anomalies.	38.78	53.33	6.08	1.81	0
10	Department should provide hand book to the students.	56.96	41.23	1.21	0	0.6

According to the developmental stages all models were displayed in the cupboards with the glass doors. (Fig 1) Cupboards were labelled as A, B,C ...and shelves of each cupboards as 1,2... for proper localization of the model. To facilitate learning also in the museum each model was kept along with colored labeled photograph, mounted on standee or placard. (Fig 2)

The catalogue of embryology models was prepared as a tool to find the particular model and its location easily. (Fig 3)

Based on the model, a set of questions on topics of 'Must know' part of curriculum was prepared.

Practical classes for embryology models were conducted in small groups for I MBBS Students of 2020-21 Batch.

During practical sessions of embryology models, to study the model each student was provided with colored labeled photograph along with a set of questions. (Fig 4) Answers to the questions were assessed and improvisations in the answers if any were suggested.

To get feedback of this teaching method the questionnaire was given to the students. The questionnaire was based on five point Likert scale. Students were asked to tick mark in the appropriate box (SA/A/UC/DA/SDA) 1) strongly Agreed (SA), 2) Agree (A), 3) Uncertain (UC), 4) Disagree (DA), 5) Strongly Disagreed (SDA). as per the feedback.

Percentage of the responses to each question was calculated and analyzed. (Table 4)



Fig. 1: Display of embryology models in cupboards with glass doors

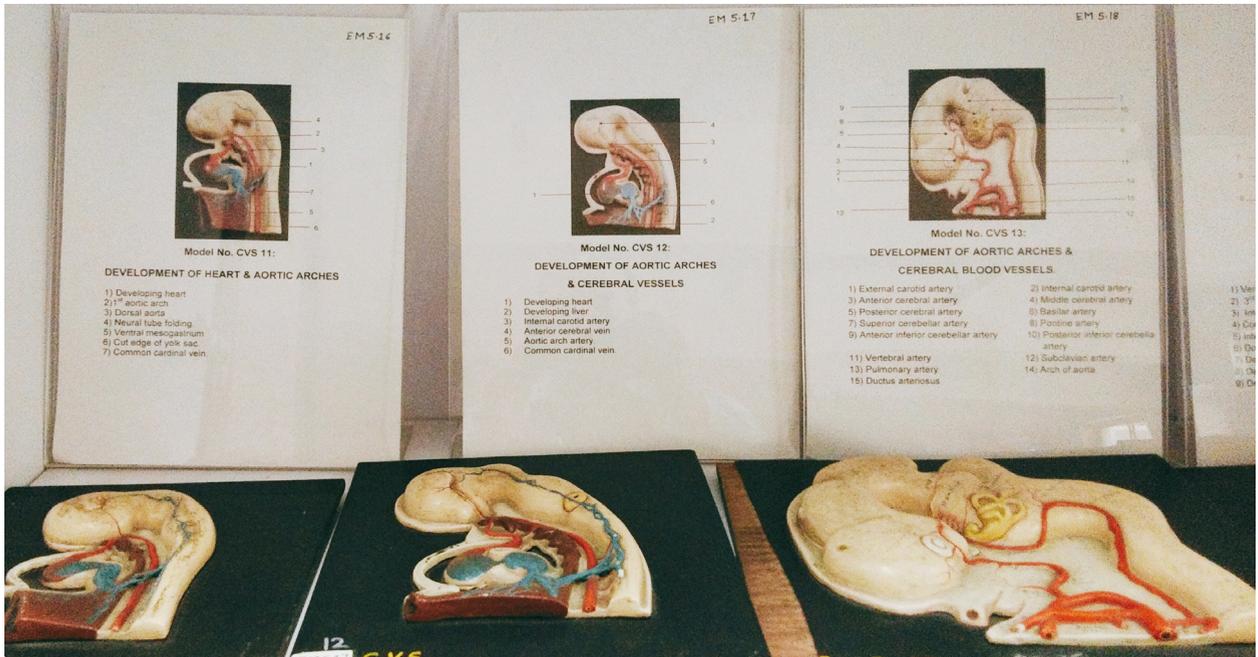


Fig. 2: Each embryology model kept along with labeled photograph mounted on standee



Fig. 4: Each student was provided with labelled coloured photograph of embryology model

## RESULTS

Feedback of 165 first M.B.B.S. students of (2020-21 batch) to the questionnaire was obtained. Percentage of the responses to each question in the questionnaire was calculated as shown in (Table 4)

## DISCUSSION

From the responses to the questionnaire it can be inferred that:

95.14% first MBBS students felt that embryology models with its labelled colored photo print and a set of questions improves the understanding of the subject.

87.9% first MBBS students actively participated in practical sessions and found learning more interesting because of labelled colored photo print and a set of questions.

96.36% first MBBS students felt that the newly introduced method improved their performance in examinations.

88.48% first MBBS students felt that this method of teaching learning embryology models improved thinking ability.

86.05 % first MBBS students opined that due to active participation during practicals, time of preparation for exams was saved.

93.32% first MBBS students felt that the quality of the teaching-learning process during practical sessions of embryology models with its labeled photo print and a set of questions was improved.

93.93% first MBBS students realised that studying embryology models with its labeled photo print and a set of questions was helpful in theory exams also.

87.26% first MBBS students were of opinion that they better understood the embryological basis of congenital anomalies due to this method of teaching- learning.

92.11% first MBBS students felt that in their future career, the study of the embryology with the models will form the basis in understanding clinical and applied embryology such as variations of a structure and surgical corrections of the congenital anomalies.

98.19% first MBBS students opined that Department should provide hand book to the students containing embryology models with its labeled photo print and a set of questions.

## CONCLUSIONS

A method of Teaching Learning embryology models by preparing the labeled photographs with a set of questions is beneficial to the students to prepare for theory and practical examinations. Active participation of the students is enhanced by asking them to solve a provided set of questions It improves the understanding of the subject which forms the basis of clinical and applied embryology.

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