

# Impact of Interactive Lecture Instruction on Lesson Plan Development for General Embryology: A Study in Bangladesh

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## Abstract:

**Background:** Background: In Bangladesh, traditional, teacher-centered lectures are still widely used. Structured, interactive lectures with well-designed lesson plans are recommended to improve engagement. This study aimed to compare the interactivity of lesson plans on General Embryology prepared by Bangladeshi Anatomy teachers before and after receiving instructions on interactive lecture techniques.

**Methods:** This cross-sectional analytical study was conducted on December 22, 2018, at BSMMU, Dhaka, with 31 purposively selected anatomy teachers. Participants prepared lesson plans for two General Embryology topics using Format-A (no interaction instruction). After attending a presentation on interactive lectures, they prepared plans using Format-B (with interaction instructions). A researcher-developed evaluation rubric scored the plans, and paired t-tests ( $p \leq 0.05$ ) compared pre- and post-instruction plans. Data were analyzed using SPSS version 23. Mean interactivity scores increased in four out of five lesson plan components, with two showing significant improvement ( $p = 0$  and  $p = 0.001$ ), indicating that interactive lecture training improved lesson plan quality and interactivity.

**Result:** In the case of five (5) criteria of a lesson plan, the significance reached at 5% level. The mean interactivity scores of the different parts of the lesson plans prepared by the participants after getting instructions were higher in four (4) out of five (5) parts of the lesson plans.

**Conclusions:** The findings suggest a notable uptick in the level of interactivity within General Embryology lecture lesson plans prepared by Bangladeshi Anatomy educators after receiving comprehensive instruction on interactive lecture techniques.

**Keywords:** interactivity, lecture, lesson plans, rubric, anatomy teachers.

## 1. INTRODUCTION

The lecture has been one of the classical, mostly used didactic processes of teaching in medical institutions around the world. This approach was especially relevant when the availability of text-based information was limited. Interactive lectures have gained significant importance in modern teaching, particularly in specialized fields like embryology, where visual understanding and critical thinking are crucial. Unlike traditional didactic methods, interactive lectures actively engage students through real-time participation, such as quizzes, polls, case-based discussions, and problem-solving activities. These methods cater to different learning styles, helping students better retain

complex information by fostering a hands-on, collaborative learning environment. In embryology, where students must understand complicated developmental processes, interactive techniques allow them to visualize and analyze concepts more effectively. Chilwant (2012 p.365), found from his research work that the teaching method of didactic lectures has many lacunae that need to be modified<sup>1</sup>.

According to Shenwai (2013, p. 8) while some students are too busy to copy the lecture notes or a text, other students prefer to read them from the books rather than attending classes, because of lack of interactivity in the lecture<sup>2</sup>. Medical educators are actively seeking alternatives to traditional didactic lectures. As the medical

curricula are usually vast and changeable, it is necessary to teach in a welcoming manner so that the concentration of the students can be maintained all through<sup>3</sup>. Nevertheless, many teachers are not aware of the teaching process, interactive lecture, and their application whether they are teaching clinical or basic sciences<sup>4</sup>.

Interaction in lecture-based classes is often seen as an additional rather than a core part of anatomy lectures, and General Embryology lectures follow this trend. In Bangladeshi undergraduate medical programs, it's also notable that the teaching of General Embryology relies almost entirely on lecture-style instruction. In traditional lectures, students are frequently seen as passive recipients of information. When interactivity is effectively done, the lecture can transmit new information in an efficient way<sup>5</sup>. A lesson plan can be considered as a written guide that is utilized to achieve learning outcomes. It is an integral part of the planned teaching and learning activity<sup>6</sup>. Taking this assumption into account, an analytical study on Bangladeshi Anatomy teachers' lesson planning of General Embryology lecture classes was done.

As per "Oxford Languages", a lesson plan means, a teacher's plan for teaching an individual lesson<sup>7</sup>. In traditional teaching manner, the level of teacher-student interaction is very low. It is observed that active learning methods and modeling by masters can change the traditional roles of students from passive learners to active learners<sup>8</sup>. The author stated that choosing a teaching technique must be done carefully, with an understanding of the goals of the class session<sup>9</sup>. All these activities need learning materials, through which a facilitator of learning does their job i.e., 'teach the students' how to acquire knowledge and skills and apply those thoughts meaningfully<sup>10</sup>.

Before starting any activity, the plan should be kept in mind as it would help in the proper and smooth functioning of that activity. Similarly, for teaching purposes, before starting any class, the teacher should keep the plan of teaching ready in a physical medium (i.e., in the diary, electronic media, etc<sup>7</sup>).

Questions may be arisen, why lesson plan is important? A lesson plan helps both teachers and students in multiple ways, such as it will help the teachers in meeting the educational goals by providing a historical record of educational activity for validation of inclusion topics in question<sup>11</sup>. A lesson plan can also help in

formulating a new class on the same topic. It also helps in communication among teachers of any topic so that in the absence of a predesignated teacher, any other teacher can take the class<sup>12</sup>.

In the above context, it was assumed that through such studies, insight into the Bangladeshi situation with the lecturers and lectures regarding interactive lectures can be developed. This in turn would help in designing guidelines for teachers regarding their planning and implementation of interactive lectures in General Embryology and thereby, in any other subdivisions of Anatomy and other disciplines.

## **2. METHODS AND MATERIALS**

This cross-sectional analytical study was conducted on December 22, 2018, at BSMMU, Dhaka, with 31 purposively selected anatomy teachers. A workshop was organized with Bangladeshi anatomy teachers to develop lesson plans for lecture classes on General Embryology, where they were engaged in preparing lesson plans, before and after attending a presentation, some instructions and receiving some documents on 'interactive lecture'. Ten topics on General Embryology were selected following the MBBS curriculum, 2012. Each Anatomy teacher prepared two lecture lesson plans on selected topics using Format- A in the workshop (containing no instruction for interaction). A short PowerPoint presentation and some instruction materials on the usefulness of interactive lectures were presented to them which acted as intervention. After that each Anatomy teacher prepared two lecture lesson plans on the earlier topics using Format- B (containing instructions for incorporating interaction). Then, four lesson plans of each anatomy participant were evaluated, scored and compared using a lesson plan evaluation rubric by using a paired t-test taking  $p \leq 0.05$  as significant. Data analysis was done by using SPSS, version 23

A lesson plan evaluation rubric was prepared by the researcher for evaluating the lesson plans constructed by the participants. In the terminology of education, the term 'rubric' means "a scoring guide used to evaluate the quality of student's constructed responses". Rubrics usually contain evaluative criteria, quality definitions for those criteria at particular levels of achievement, and a scoring strategy. They are often presented in the table format and can be used by teachers when marking, and by students when planning their work. Rubrics when used for formative assessment purposes, show to

have a positive impact on student’s learning (‘Rubric’ 2018)<sup>13</sup>.

Study was carried out in the department of anatomy, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, from January 2018 to January 2019. Workshop was conducted on 22th December 2018, after getting approval of the protocol from the Institutional Review Board (IRB) of BSMMU.

The selection of the participants of the workshop for the research was done following some inclusion criteria. The list of prospective participants was collected from the latest souvenir of the Anatomical Society of Bangladesh and the heads of the departments of

Anatomy of different medical institutions. Information about the Anatomy teachers were collected through personal communication with them. All eligible participants were approached through a phone call. Then an invitation letter was sent through e-mail. Among the anatomy teachers, 31 participated in the workshop, from different medical colleges and institutions of the Dhaka division of Bangladesh.

**3. RESULTS**

The research comprises the performances on the preparation of lesson plans by Bangladeshi Anatomy teachers in General Embryology lecture classes.

**Table 1.** Comparison of interactivity in the lesson plans (different parts) prepared by the Anatomy teachers before and after attending a presentation and instructions on interactive lecture based on a rubric-based scoring

Part of the lesson plan	Mean score ± SD (95% CI) (n = 31)		Significance of difference † (p-value)
	Before instruction	After instruction	
1. Prerequisites	1.306 ± 0.62 8	1.209 ± 0.496	0.110
2. Introduction	1.129 ± 0.364	1.548 ± 0.767	0.001 (S)
3. Body	1.306 ± 0.527	2.112 ± 0.641	0.00 (S)
4. Summary	1.096 ± 0.271	1.241 ± 0.514	0.071
5. Class assessment of students	2.064 ± 0.309	2.209 ± 0.512	0.119

*p-value* obtained by using the paired *t*-test (two-tailed) taking  $p \leq 0.05$  as significant.

S, significant

Table I shows a comparison of interactivity between the lesson plans (different parts) prepared by Anatomy teachers before and after getting instructions on interactive lectures. The mean value was higher after instructions in the case of four (4) out of five (5) different parts of the lesson plan. Two of these differences reached a significant level ( $p = 0$  and  $p = 0.001$ ).

**4. DISCUSSION**

The lesson plans prepared by a sample of Bangladeshi Anatomy teachers were evaluated following a lesson plan evaluation rubric, for evaluation of different parts of a lesson plan. Regarding the ‘introduction’ part of a lesson plan, the scores obtained by the anatomy teachers before ( $1.129 \pm 0.364$ ) and after ( $1.548 \pm 0.767$ ) attending the presentation and instructions on the interactive lecture. After getting instruction, the mean score in the study showed a significant improvement ( $p = 0.001$ ). Although in the ‘prerequisites’ part of their lesson plans, they did not obtain the scores significant level after attending the presentation and instructions on interactive lecture. During the analysis of lesson plans in this research, based on different levels of interaction (basic, intermediate, and advanced),

the anatomy teachers obtained significantly higher scores ( $p = 0.031$ ) after attending the presentation and instructions on interactive lecture, and lesson plan than before having them. Some authors found positive feedback in medium-to-high levels of performance in problem-solving skills, tested by two clinical cases.

Their study showed that the interactive lecture designed by them was effective, more meaningful, and interactive learning in a large group session<sup>14</sup>. Other authors carried out a cross-sectional interventional study to compare the effectiveness of a teacher-training workshop where the training involved a combination of different types of teaching materials, lectures, and teaching methods like group activities and team-based learning, which indicated different levels of interactions. The post-test score showed a significant improvement ( $p < 0.001$ ) compared to the pre-test score<sup>15</sup>.

Regarding the ‘Body’ part of the lesson plan, the scores obtained by the anatomy teachers before ( $1.306 \pm 0.527$ ) and after ( $2.112 \pm 0.641$ ) attending the presentation and instructions on the interactive lecture. After getting instructions the

mean score in the study showed a significant improvement ( $p = 0$ ). Although in the 'summary' and 'class assessment' part of their lesson plans, anatomy teachers obtained the scores slight increase (non-significant) in the mean score after attending the presentation and instructions on the interactive lecture. According to Gupta et al. (2015, p. 197), among various types of interactive methods, quizzes were the most favored, with 36% of participants preferring this form of engagement<sup>16</sup>. During analysis of lesson plans in this research, researchers found, anatomy teachers rarely use interactive 'MCQ', 'quiz' for assessment of the students, in their embryology lecture classes. In contrast, Buch et al. (2014, p. 693) found that MCQ was the most popular interactive mode<sup>17</sup>.

Research has identified various methods to assess cognitive engagement, including activities such as class discussions, structured note-taking, tutorials, and comprehensive resources like charts and Power Point slides. Other effective tools include real-world examples, self-assessment quizzes, project-based or problem-solving tasks, course seminars, practice questions with solutions, and explanations from experts. Research indicates that interactive teaching not only improves comprehension but also boosts student motivation and satisfaction. By encouraging students to actively participate and ask questions, teachers can address knowledge gaps on the spot, making lectures more personalized and responsive to student needs. For educators in embryology, incorporating interactive components into lectures can transform a passive learning environment into an engaging experience, promoting a deeper understanding of both theoretical and practical aspects of embryonic development. The authors also encouraged medical teachers to raise the level of the cognitive domain, especially to 'evaluation'. Collaborative assignments requiring students to engage in problem- or project-based activities serve as an important way to determine whether the students have achieved that level of learning or not- the authors suggested<sup>18</sup>.

## **5. CONCLUSION**

This study mainly examined whether Bangladeshi Anatomy teachers conduct their lectures in a structured, formal manner by using lesson plans, rather than delivering them informally. It was found that lecturers could design their lecture lesson plans to be more

engaging and participatory. Interactive learning activities may take longer than purely didactic teaching. Lesson plans may need to allocate time for breaks and possible technological issues.

## **LIMITATIONS**

Sample size was small. For the convenience, only the Anatomy teachers of Dhaka division of Bangladesh were invited to participate in the workshop. It would have been better to have representation of the total population of Anatomy teachers of Bangladesh.

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