

Present status of laboratory teaching in the department of Pathology of undergraduate medical education in Bangladesh

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Abstract

Introduction: Effective laboratory teaching and practical work has an important and time-honored place in the education of students and researchers. The main principle underlying laboratory work is that students learn effectively through doing practical tasks (learning by doing). The laboratory courses offer students the opportunity to gain manipulative skills, observational skills, and the ability to plan experiments and to interpret experimental data.

Justification: There is less involvement and less active participation in the pathology practical classes by the students. Little has been published about the actual problem. Therefore this study was designed to investigate the ways of conduction of laboratory teaching in different medical colleges of Bangladesh.

Objectives: The aim of this study was to explore the present status of laboratory teaching in the department of Pathology of undergraduate medical education in Bangladesh.

Materials and methods: This descriptive cross sectional study was carried out to determine the ways of conduction of laboratory teaching in Pathology department of undergraduate medical education in Bangladesh. The study was carried out in Eleven (Five Government and Six Non- Government) medical colleges in Bangladesh over a period from July 2014 to June 2015 by adopting convenience sampling. 'Triangulation' technique was used in this study to ensure the validity and reliability of research findings. For each variable of structured observation and structured questionnaires, the mean score was calculated.

Results: From observation of the study, it was found that among physical environment factors, the mean score of seating arrangement, space available for practical work in the class and teacher student ratio were >3 but <4. Regarding teaching methods, the mean scores on different items were >2 but <3. Similarly the mean scores on group activities and laboratory safety measures items were >2 but <3. Mean score on teachers' abilities were just 3.

Students' were unhappy with available space for their practical work, inadequate sitting arrangement, insufficient number of teaching learning materials especially reduced number of microscopes, other instruments and photomicrograph and the mean scores were just around 3.

Though the teachers were satisfied with their teaching abilities but admitted failure in integrating the class with other subjects. The majority of items showed that the teachers rated themselves as more frequently engaging in standards-based behaviours than the students rated them and the mean scores were around 4 and >4but <5.

Conclusions: The findings revealed a gloomy picture of existing teaching learning situation in Pathology department of undergraduate medical education in Bangladesh from observer's and students' perspective. Findings from this study may give guideline to curricular planner and faculties/administrators of medical college for further improvement of laboratory teaching.

Key Words: Laboratory teaching, Laboratory teaching session, Teaching aids, Active participation, Integrated teaching.

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Introduction

The main principle underlying laboratory work is that students learn effectively through doing practical tasks (learning by doing). But the principle 'Learning by Doing' needs two qualifications: First, the tasks have to be perceived as relevant and meaningful by the students-- otherwise the interest and learning may be minimal. Second, students (and lecturers too) have to receive constructive feedback on their performance to improve the learning. Practice does not itself make perfect but practical work with appropriate feedback almost always improves performance. These points should be borne in mind when designing

laboratory course and marking laboratory work¹.

Laboratory teaching often involves giving brief explanations and instructions to the whole class and then dividing class into pairs or small groups who work on a particular experiment, which means that laboratory teachings is a kind of small group teaching. The instructor has to create interest, explain technical information, ask the students the right questions, exercise control, adjust performance of students and assess the students' performance. Most important of all, we need to put ourselves in the place of the students, so we can choose the appropriate experiments, give the right instructions and make laboratory work into a challenging and rewarding experience for reaching set outcomes of the course. Laboratory teaching also involves skills concerned with giving directions, with helping demonstrators and technicians, and with designing, organizing, and implementing laboratory work².

Ideally, laboratory teaching should impart information and skills which cannot be conveyed through lecture or didactic presentation and which specifically equip the student for the practice of medicine. Specifically, it has three functions that justify its inclusion in any medical teaching program. First, it serves to divide the class into smaller groups so as to increase student-faculty interaction. Second, certain laboratory exercises increase the psycho-motor skills of the student, including anatomical dissection, microscopy, biochemical manipulations, and physiological measurements. Third, it provides a means of illustrating concepts and actualizing the operational definitions encountered in lectures and texts of such activities as measurement of ESR and Haemoglobin estimation. If it does not fulfill these functions, laboratory teaching is a very inefficient and expensive instructional mode in terms of faculty and student times³.

The aim of this study was to explore the present status of laboratory teaching in the department of Pathology of undergraduate medical education in Bangladesh. This study was done to observe the physical environment of laboratory teaching class, to determine respondent's views regarding laboratory teaching session, to observe the teacher's abilities about laboratory teaching, to observe the laboratory safety measures, to compare the curriculum on paper with curriculum in action and curriculum students' experience regarding laboratory teaching hour and coverage of topics in practical classes as per curriculum, to identify the major problems of laboratory session by the respondents and to find out respondents' suggestions to make laboratory teaching more effective.

Materials and methods

This descriptive cross sectional study was carried out to determine the ways of conduction of laboratory teaching in Pathology department of undergraduate medical education in Bangladesh. The study was carried out in three government and five non-government medical colleges of Dhaka city, two government and one non-government medical college outside of Dhaka city (Total Eleven) in Bangladesh over a

period from July 2014 to June 2015. Convenience sampling technique was used for data collection.

'Triangulation' technique was used in this study to ensure the validity and reliability of research findings. Total 30 laboratory teaching sessions (LT) conducted in the laboratory/practical classes of pathology departments were observed by researcher herself and data collected in a structured check list by using 5 points rubric. A survey was undertaken by using similar variables from 577 third year and fourth year MBBS students and 30 pathology teachers in a self administered structured questionnaire by using 5 points Likert scale (1-strongly disagree, 5- strongly agree) to minimize researcher's biasness and for easy comparison of observational data and questionnaires data.

Data processing and analysis was done in the following ways- Checklists and questionnaires were edited after collection, coded manually and were undergo processed and analyzed by using SPSS computer software version 17.0 (Statistical Packages for the Social Sciences, Chicago, IL,USA) according to the objectives. For each variable frequency distribution and mean score with SD was calculated. Interpretation of mean score were as follows- (arbitrarily set up by the researcher)

5 = No need of further improvement, as it covered all the required criteria.

4 to < 5 = Very minimum efforts are needed to fulfill the required criteria

3 to < 4 = Some efforts are needed to fulfill the required criteria

2 to < 3 = Moderate efforts are needed to fulfill the required criteria

1 to < 2 = Considerable efforts are needed to fulfill the required criteria

Confidentiality of the data was maintained. Name of the college, teacher and student was not disclosed. Findings of the study was used only for research purpose.

Results

Mean scores of observers' and students' about seating arrangement, space available for practical work and teacher-student ratio were around >2 to >3 but <4. Mean scores of teachers' about lighting in classroom was >4 (Table-I).

Regarding teaching methods, the mean scores on mentioning the learning objectives by the teacher, supervision of students during their practical work, scope of application of knowledge during practical work by the students, scope of practicing the skills during practical work by the student, interaction between teacher and student and teacher makes integration with other subjects to generate interest in the class from observers' and students' point of views were >2 and >3 respectively. From the teachers' survey, mean scores were >4 except on integration with other subjects (<4) (Table II).

Mean scores on group formation and active participation of the students by observers' were >2 but <3 (Table III).

The average mean for laboratory Teaching / learning materials from observers', students' and teachers' perspective were similar i.e. >3 but <4 except students' mean scores about the adequate number of microscopes differs (<3) (Table IV).

The average mean for teachers' abilities from observers' and students' perspective were around 3.00 and >3 but <4 . But teachers' mean scores were >4 (Table V)

The mean scores of observers' (<3) differs from mean scores of students' and teachers' (>3 but <4) (Table VI).

Teachers' opinion differs slightly from observers' and students' opinions about whether the practical teaching hours present in the academic calendar in all the terms corresponds with curriculum teaching hours or not (Figure 1).

About whether all the topics of the class performance record cards as per curriculum are covered in the practical classes or not, Observer found that all the topics of the class performance record cards as per curriculum are covered in the practical classes in 100% cases but students' and teachers' findings differ (Figure 2).

Regarding the major problems they face in their laboratory session, the students' opinions were: 61.1% students of government medical colleges on the other hand 61.2% students of non government medical colleges said time constraints was a problem. 69.4% students said lack of working space and 53.9% students of non government medical colleges said inadequate seating arrangement on the other hand 58.7% and 58.1% students of government medical colleges said inadequate seating arrangement and lack of teaching materials were the other main problems (Table VII).

The suggestions to make laboratory teaching more effective by the students were: the commonest suggestions were provision of adequate facilities in the laboratory for laboratory teaching by both the government (88.6%) and non government (90.2%) medical college students. Other suggestions were incorporation of more qualified teaching staff (65.4%) and proper seating arrangement for group work (58.9%) by the government and providing adequate working space for the practical class (62.0%) and proper seating arrangement for group work (54.3%) by the non government medical college students (Table VIII).

Regarding the distribution of the teachers by their opinion on the major problems they face in laboratory session were: 66.7% teachers of government medical colleges on the other hand 53.3% teachers of non government medical colleges said lack of training of teachers on laboratory teaching methods was a problem. 60% teachers of government medical colleges said inadequate seating arrangement and 53.3% teachers said lack of teaching materials and lack of working space, on the other hand 40.0% teachers of non

government medical colleges said time constraints and 33.3% teachers said lack of working space were other main problems (Table IX).

The suggestions to make laboratory teaching more effective by the teachers' were: the commonest suggestions were training of teachers on medical education including laboratory teaching and provision of adequate facilities in the laboratory for laboratory teaching by both the government (93.3% and 86.7% respectively) and non government (66.7% and 60% respectively) medical college teachers. Other suggestions were providing adequate working space for the practical class and merging departmental laboratory with hospital laboratory (53.3% by both medical college teachers).

Discussion

There are three common measures of classroom practices: Classroom observations, teacher self-report surveys and student self-report surveys. Each approach has its own strengths and weaknesses. One technique for helping to ensure the validity and reliability of research findings is triangulation⁴. It is useful to triangulate in order to compensate the weaknesses of other methods so as to have a holistic view of social realities⁴. It appears that both student and observer ratings of the classroom may be more effective measures of classroom practices in relation to the standards and ultimate student achievement than are teacher ratings⁵. Regarding Physical environment of laboratory teaching in practical classroom the mean score of 3.67 for available space was found by the students in a study in Malaysia⁶ which was dissimilar to this study (mean score was 2.89). The higher learner to staff ratios results in a decrease in the interaction⁷. In this study in 63.3% classes, teacher-student ratio was 1:20-1:30. It is usually much lower than in lectures for laboratory/ practical classes (? or even ? of the student-teacher ratio in lectures⁸). For lab classes, there is a ratio of 1 teacher to 15 students⁹.

It was observed that most of the instructors mentioned learning objective in improper way in 60% classes (mean score was 2.97). Study findings of Rahman¹⁰ revealed that 54% teachers were unsatisfactory in mentioning objectives. Nahar et al.¹¹ found similar result.

Teachers and students findings regarding instruction given by the teacher (with/without LCD aided) in a study¹² were rated as good to very good in a five point Likert-type scale (Poor, Fair, Good, Very Good, Excellent). In this study, the mean scores were >3 and >4 by the students' and teachers' respectively.

The mean scores on supervision of students were <3 by the observer. For running an effective lab session, Migabo advised the teachers to circulate throughout the room and see how students are doing¹³.

Teachers and students findings regarding scope for application of knowledge during practical work by the

students in a study¹² were rated as good to very good. The mean scores in this study were >3 and >4 respectively.

Regarding Scope of practicing the skills during practical work by the students, finding is dissimilar to a study¹² by the students and teachers, which were rated as poor to fair. In this study, mean scores were just around 3 and >4 by the students and teachers respectively.

Regarding interaction between teacher and student, observer's finding is dissimilar to a study¹² by the students and teachers, which were rated as very good to excellent and very good respectively.

Regarding integration with other subjects, observer's finding is similar to a study¹² by the students and teachers' findings are similar to the teachers, which were rated as fair to good and good respectively.

About group activities, it was observed that in 73.3% classes groups were formed with 8-12 students. The optimum group size is 3 or 4¹⁴. Research and practical experience has established that between five and eight students is ideal for most small group teaching. A group of over twenty students hardly qualifies as a small group¹⁵.

The mean scores of active participation by the students during group works were <3 and <4 respectively by the observer and by the students. The major benefits of active participation include fostering development of critical thinking, communication, and cooperative learning skills, attitudes and values ; promoting concept formation; providing an avenue for discovering misconceptions ; and enhancing motivation¹⁶.

Mean score of 3.53 were observed by Ahmad Che et al.⁶ about teaching/learning materials. It was 3.27 in this study. The gross specimens and microphotographs used in teaching were both rated as good to very good by more than 83% of those polled, while the microscopy slides and laboratory microscopes were each rated as poor to fair by more than 67% of the students¹² which were similar to this study. But 87.5% of the tutors stated that the A-4 size microphotographs were very good to excellent. All the tutors agreed that the quality of the gross specimens used in teaching was good to very good; A majority (87.50%) of the tutors rated the microscopy slides and laboratory equipment between fair to good¹² which were dissimilar to this study.

In a study¹², the teachers' abilities including knowledge base, communication skills and approachability were rated between good to very good by more than 70% of the students, while their sincerity of purpose and commitment was rated the same by 63.89% of the respondents in a five point Likert-type scale (Poor, Fair, Good, Very Good, Excellent). It was similar in this study (mean scores were >3 but <4).

Among the tutors polled, 62.5% rated the sincerity of purpose and commitment of the teachers as excellent, 75% said the knowledge base of the senior teachers was good and

62.5% of the tutors stated that communication skills and approachability of senior faculty and the interest generated during teaching were good¹². In this study mean scores were >4 but <5.

The mean score was 2.70 about lab safety measures from the observation of this study. The mean score by the students' and teachers' were >3 but <4. Similar results (mean score 3.37, SD 0.86) were also shown by Ahmad Che et al.⁶. Laboratory safety is a definite requirement in medical academics¹⁷.

The teaching hour for pathology in 2002 curriculum, in total is 250 hours. Out of this, practical class hour is 82 hours in total (32.8% of total teaching hours) . But in 2012 Curriculum, the total teaching hour for pathology is 228 hours and practical class hour is 28 hours only in total (only 12.28% of total teaching hours).Kumar et al.2001¹⁸, shows decrease of teaching hours in USA curriculum also, but it was 27% in 1993 to 24% in 1999. This decrease may be accounted for by a shift toward use of laboratory materials in various other formats and venues not included in the traditional laboratory instruction e.g, small group sessions, clinicopathologic correlation conferences, study of kodachrome slides, and computer programs.

Conclusion

From the researcher's point of view, large number of students in a class with inappropriate number of teachers were found. The classes were not conducted properly. Teachers were also very reluctant about integrating the class with other subjects to generate interest in the class as well as providing specific feedback for the students and checking their practical notebooks. Also, time management during the practical class was rated below par. There were large number of students in a group, students were not actively participating in the classes and were also very casuals about setting time limit for their allotted tasks. The equipment used in teaching was plainly regarded as inferior, which is a lacuna that needs to be addressed. On average the teachers lack good communication skill, were less approachable, cooperative, sincere and committed to the students. Students were not keenly supervised by the instructors regarding obeying of laboratory safety measures.

Students' were unhappy with available space for their practical work, inadequate sitting arrangement, insufficient number of teaching learning materials especially reduced number of microscopes, other instruments and photomicrograph.

Though the teachers were satisfied with their teaching abilities but admitted failure in integrating the class with other subjects. The majority of items showed that the teachers rated themselves as more frequently engaging in standards-based behaviours than the students rated them. The teachers had complaints about lack of training in medical education as well as in effective laboratory teaching.

Findings from this study may give guideline to curricular planner and faculties/administrators of medical college for further improvement of laboratory teaching.

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