

Role of an Interactive Session in the Improvement of Academic Performance in Pre-clinical Subjects of the Second Year BDS

Atiya Abdul Karim¹, Nazish Fatima², Sidra Mohiuddin³

Abstract

Objective: To evaluate the improvement in students' academic performance from two consecutive batches taught through two different teaching strategies during their pre-clinical years.

Methods: It was a quasi-experimental study conducted on second year BDS students. Students of two batches were selected by convenience non-probability sampling from a private dental college. These study subjects were compared in two basic dental subjects (I & II) of second-year BDS. The mode of intervention for the current batch was via interactive lectures compared with didactic lectures delivered to previous batch. Both batches were assessed by the Continuous Assessments test (CAT) in mid of the semester followed by semester examination. Normality of data was checked by the Kolmogorov Smirnov test. Later two independent t-tests were used to measure the mean difference in academic scores between two batches of students who received teachings through an interactive session and didactic lectures respectively. The significance level was kept at $p < 0.05$.

Results: Total of ($n = 84$) students were included in the current study. The mean age of the students was 20.5 ± 0.93 . Out of the total $n = 84$ (100%), $n = 71$ (85%) were girls and $n = 13$ (15%) were boys. The students of the current batch ($n = 41$) obtained better mean academic scores during the continuous assessment test (65.1 ± 11.01) as compared to their counterparts from the (55.3 ± 11.80) old batch ($n = 43$) at $p < 0.001$. Similarly, the mean academic score of the semester exam of the current batch was found to be higher (72.0 ± 8.08) than the old batch (68.3 ± 9.04) in the subject I at $p < 0.004$. However, in subject II mean academic scores were improved but not found to be statistically significant.

Conclusion: It was concluded as with an interactive session the mean scores and academic performance of the current batch have improved as compared to their counterpart batch.

Keywords: Academic performance, Assessment, Educational measurement, Lecture.

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Introduction

In the field of medical education, didactic lectures are considered to be an essential component and one of the regular aspects of the teaching strategy. However, didactic lectures are found to be the passive mode of teaching, therefore, neither they retain students' interest during the cl-

ass, nor do they make them think critically during or at the end of the lecture class¹. Data based on adult learnings reported that the attention span in didactic lecture of the typical learner diminishes after 15 to 20 minutes thus making lectures less effective depending on two primary reasons i.e., working memory and interference². Thus, as a result students are unable to maintain their attentiveness, as a result, they cannot concentrate on the content being delivered to them. A didactic lecture is also teacher-centered whereby a teacher speaks and students listen passively without being actively involved in the class.

The conventional method i.e., traditional, or didactic lecture has a restricted role in transferring conceptual knowledge to students in an efficient

^{1,3}Community and Preventive Dentistry Ziauddin College of Dentistry, Ziauddin University

²Science of Dental Materials, Ziauddin College of Dentistry, Ziauddin University

Correspondence: Dr. Nazish Fatima
Science of Dental Materials,
Ziauddin College of Dentistry, Ziauddin University.
Email: nazish.fatima@zu.edu.pk

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manner. The constructivist approach should be used in the best interest of the student so that they can participate actively in building complex concepts on their already existing previous knowledge with the help of the teacher who will act as the facilitator³.

Unfortunately, in our region, conventional this mode of teaching has become dominated and regular practice in most medical and dental colleges for many decades. However, in some recent years, a change in teaching mode has been observed as experts in medical education have felt the limitation of conventional methods although the progress of this change is still slow. Many public and private sector universities are far behind in introducing new tutoring techniques such as problem or case base learnings, small group sessions, self-directed learning, interactive sessions, etc⁴.

Studies have reported that active participation of the students in the classroom resulted in improved academic achievements when it is compared with the passive role of the students. In addition, students themselves showed more satisfaction in the learning process. Thus, for the success of an instructional strategy and prospective personal development active participation of students with an interactive mode of learning in the classroom plays a vital role⁵.

Similarly, the constructivist approach to learning that is based on theories indicates that learning is an active process and for an effective learning student-teacher interaction is required⁶. In medical teaching many methods of interactions have been suggested such as brainstorming, case-based examples, thinking pair and sharing, asking and inviting questions, demonstrating, problem-solving, role-playing, and directed listening⁷.

The process of interactive learning plays an important role in the exchange of ideas among teachers, students, and the content that is to be covered thus facilitating and encouraging the learner in effectively gaining the knowledge. In addition, the interactive mode also aids in a higher level of thinking in cognitive and psycho-motor as well as covering the learning to an affective domain

In the field of medical education researchers have found that learners who are involved actively in the teaching-learning sessions, learn more effectively than the learners who just passively received the knowledge.

Furthermore, interactive lecturing encourages the evaluation of the subject content as well as application to other types of situations. It can assist in problem-solving, decision-making, and communication skills as this is the vital aspect of medical education. Other than the retention and recall of facts application of knowledge is also important and it can be enhanced by interacting with students⁸.

Dentistry is an important discipline of the health sciences where pre-clinical concepts, basic dental terminologies as well as anatomical and morphological structures of the head and neck region bring complexity to learning process of a student. The reason behind this difficulty may be due to the conventional and teacher-centered learning process and students being the passive recipients thus making this process of learning more challenging for students to understand and retain simultaneously. On the other hand, the active participation of the students makes them understand their learning gaps to modify learning strategies and to achieve their goal which will facilitate them in the deep learning process⁹.

To improve comprehension, sense of responsibility, greater learning, and better retention of cognitive concepts this discipline need to be taught by using concrete strategies to promote active participation among students in terms of addressing learning gaps, the advent of an interactive session plays a vital role in reducing the barriers between students and the facilitator's interaction as well as will improve the understanding of the students of the subject.

There is a dearth of literature related to the importance of an interactive session and its effects on summative scores of students in pre-clinical years therefore lack of using this mode of teaching at the university level. We support the need to implement learner-centered and interactive teaching

methods in our curriculum. Thus, there is a need to perform a study to evaluate the improvement in students' academic performance from two consecutive batches taught through two different teaching strategies during their pre-clinical years.

Subjects and Methods

A quasi-experimental research was performed among the students in the second-year BDS Program of a private dental college in Karachi from January to June 2019. The students were selected through non-probability convenience sampling. A total of n= 84 students were selected from two batches. Approval was taken from Ethical Review Committee Ziauddin University Reference Code# 0810219SMOM. Student's verbal consent was taken for research.

The sample size was calculated by an open epi using the following parameters i.e., mean score of group 1 was 9 ± 2.92 and the mean score of group 2 was 13.06 ± 1.74^{10} . The power of the test was 80% at the confidence level of 95% and the level of significance was set as $p=0.05$. The minimum sample in each group was calculated to be n= 6. However, we had included whole class students therefore, the selected sample size was n=84 in both groups, n= 41 and n= 43 respectively. Students from both genders, age range 18-22 years, studying in second year BDS of a private dental college were included. All those students from group 1 were excluded who were absent from any of the interactive sessions of a subject I & II.

In the current study, subjects consisted of dental students who were studying in their second year of undergraduate studies at the time of the research and were referred here as group 1. These students of group 1 (current batch) were given two sets of interactive sessions, before and after their first Continuous Assessment Test (CAT) for Subject I: Community Dentistry and Subject II: Science of Dental Materials of basic dental sciences. Then the performance in terms of mean academic scores was assessed among the students who attended an interactive session and compared with the mean academic scores of group 2 (old batch

who were taught by didactic lecture). The examination scores of the old batch were collected from the examination department after getting the permission from the examination department.

The outcome was assessed for a given semester through their Continuous Assessment Test CAT 1 and CAT 2 for Subject I and Subject II of basic dental sciences separately for both old and current batches. This was later followed by the Semester III examination scores. All interactive sessions' content and mode of delivery were aligned with each other and a uniform pattern of (a) recalling concepts and (b) application of concepts to solve scenarios was followed throughout all sessions. Two subject experts were involved in delivering interactive sessions to the students for subject I and subject II.

Analysis was performed by using SPSS version 20. Means and standard deviations were used to report descriptive of an academic score. Frequencies and percentages are used to report qualitative variables. Normality of data was checked by using the Kolmogorov Smirnov test. Later, a two-independent sample t-test was used to assess the mean difference between CAT I and II scores, and semester scores between the two batches. Significance level was kept at $p<0.05$.

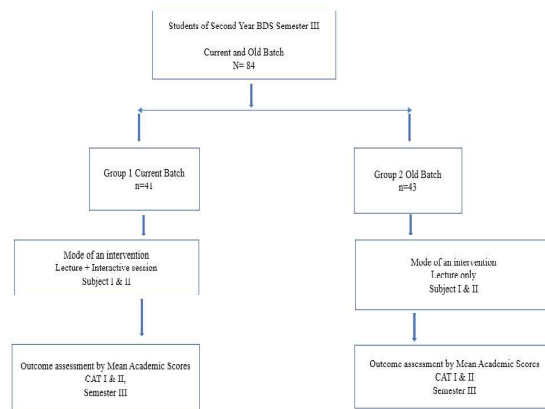


Fig 1. Showing flow chart of the study methods

Results

The data was analyzed on a total of (n=84) students for subjects I & II. The mean age of the students was 20.5 ± 0.93 . Out of the total 85% were girls and 15% were boys.

There were (n= 41) students from the current and (n=43) students from previous batch respectively.

In comparison to group 2, group 1 performed relatively better at a mean academic score of 65.1 ± 11.01 with a $p < 0.001$ on the Continuous Assessment Test.

The semester means academic scores were statistically significant among group 1 and group 2; 68.3 ± 9.04 and 72.0 ± 8.08 respectively with the $p < 0.04$. (Table 1)

No significant difference was observed in the mean academic scores between group 1 and group 2 on the continuous assessment test.

However, the mean academic score was increased from 64.3 ± 10.04 in group 1 to 66.9 ± 9.08 in group 2 with no statistical significance difference i.e., $p=0.285$. (Table 1)

Table 1. Performance of students in a subject I & II

Subjects	Mode of Assessment	Group 01 n=41	Group 02 n=43	Level of Significance p-Value
Subject I	CAT 1	61.5 ± 12.22	62.2 ± 11.61	0.783
	CAT 2	65.1 ± 11.01	55.3 ± 11.80	<0.001*
SEMESTER III		68.3 ± 09.04	72.0 ± 8.08	0.04*
	CAT 1	64.3 ± 12.77	64.95 ± 11.28	0.822
Subject II	CAT 2	68.3 ± 9.51	66.9 ± 10.1	0.602
	SEMESTER III	64.3 ± 10.04	66.9 ± 9.08	0.285

Group 1: Current batch which received an interactive session with conventional lectures

Group 2: Old Batch with conventional teaching

Subject I: Community Dentistry

Subject II: Science of Dental Materials

*Statistically significant

Discussion

The current study has evaluated the impact of an interactive session by comparing it with the traditional mode of teaching among student in of two consecutive batches with in one semester i.e., semester III. Students who attended

the interactive session had performed relatively better in their CAT and semester scores as compared to their counterparts from the previous batch where teaching activity was limited to the didactic lecture only.

Traditional mode of lecturing has been appraised critically as they are failed to grasp students' attention during the classroom sessions resulting in relatively low grades and reduced attendance rates¹¹.

On the other hand, across the globe in dental curricula implementation of interactive learning sessions are well documented. Due to the reasons of multiple benefits that a student can gained from an interactive type of learning strategy such as the development of problem solving skills by active participation in the class sessions that enhances the promotion of lifelong, and self-directed learning with problem solving skills based learning that has an impact over deep learning process of the students¹².

- Lecturing or large group teaching is found to be one of the oldest forms of teaching strategies/methods. Therefore, among the students of health sciences, lectures are observed to be the least preferred teaching method for learning medical terminologies and cases. However, during the lecture session, a large group of individuals gets to transfer the knowledge and concepts thus stimulating the interest of the learner by providing the core knowledge. But lectures also tend to encourage passive learning among the learners with a minimal opportunity of critically appraising the new knowledge offered¹³.

Begum et al. had conducted a study in which they compared the effectiveness among interactive and traditional teaching mode of activities in medical students from India. In their study they also determined the faculty and students' perception towards the interactive session. They reported an increased in classroom performance of the students who attended the interactive sessions with better scores significantly than the students in the group of traditional teaching. Further they reported that students and faculty found interactive teaching better than traditional lecturing method¹⁴.

Similarly, in the current study, the student's academic performance was reported to be improved after participating in an interactive session in agreement with the results of Hameed et al. and Begum et al. However, in the current study a larger cohort of students was selected in form of an entire class instead of a small group of students. In addition, the facilitators were subject experts who were delivering the content as well as they followed the same strategy in the conduct of sessions to bring homogeneity and to reduce potential biases due to heterogeneity of content and the teacher¹⁵.

The content delivered via an interactive session is tested for concept retention by different assessment tools where scenarios or problem-solving questions are given to test the application of the concepts^{16,17}.

In our study, the interactive session was structured based on two components i.e., recall to develop long-term retention of concept delivered and scenario-based assessment to develop problem-solving skills within the student. Students are further evaluated throughout the semester and the comparison made between previous and current batches for similar semesters to make uniform comparisons and remove selection bias. Furthermore, in the current study assessment of the impact of an interactive session was performed by evaluating student academic performance through Continuous Assessment Tests (I & II) which were held after modules within the semester followed by the semester examination held at the end of the semester. This was a reliable indicator in comparison to perception-based uncertain outcomes used by other researchers^{18,19}.

Although the scores difference was observed in the case of subject I unlike subject II which could be because a smaller number of students were attending the interactive session for subject II. It is also likely that scheduling of the written exam of subject II and structured practical exam of all subjects altogether on the same day due to administrative problems might have given students less opportunity to study just before exam time. It could

be that students might have incorrectly attempted questions in a state of anxiety due to sudden changes in the exam schedule.

Roopa et al. performed an evaluation of the types preferred on lectures among dental students in a college. The students were exposed to 12 lecture series of traditional and interactive sessions. Of the total 12 lectures, the content delivered at every second lecture was via an interactive session. At the completion of the total lecture series, students' feedback was obtained. Among the total sample, about ninety-two percent of the dental students reported that they found the interactive sessions more useful than the traditional mode of teaching i.e. didactic lectures. The majority of the students further stated that they were more attentive and feels motivated during an interactive session. Students also claimed that interactive teaching to be a non-monotonous and well-defined learning method. From all the techniques, the most liked one was the use of video clippings (58.1%)²⁰.

The study reported by Cheema and Arora among n= 150 students of a medical college in Jalandhar, Punjab to evaluate the effectiveness of interactive lectures as a teaching method in Obstetrics and Gynecology, reported that interactive methods stimulate self-directed learning among learners in agreement with the results of current study²¹.

An interactive session's teaching strategy may face challenges because in this mode of education method, the teacher plays a vital role and there is a transformation of her duty from the knowledge-keeper to the coordinator of the learning which is found to be a challenge for teachers as they have to dramatically change the strategy of teaching the student's learning process i.e., from the transition of passive teachings to the active mode of teaching and critical thinking simultaneously. However, in developing countries, like Pakistan restricted resources may pose additional challenges in the implementation of interactive teaching. Many teachers have the view that the basic science subjects cannot be taught via an interactive mode of teaching because they are covering the basic human body concepts as compared to the clinical

science subjects that can be interactive because of the addition of clinical relevance and scenarios as well as case-based leanings. Few teachers believe that in interactive teaching methods higher order thinking is required but at undergraduate students' level because of their limited knowledge they are unable to participate in an interactive mode of teaching²².

However, the current study focused on basic science subjects to clear the ambiguity. Even though there are some other barriers and challenges involved in the implementation of an interactive mode of learning in the health science curriculum which can be controlled by proper training and planning or preparing the stakeholders for the new mode of teaching and implementation of the teaching strategy by the council across the board. The limitation of current study was that researcher evaluated improvement in academic performance of students in two subjects with in one semester it should be better if it could be done in all subjects prospectively for one academic year. As in current study the interactive session was performed in large group however, it is ideal to conduct interactive session in small group to increase active participation of students.

It is further suggested to investigate in the future among different modes of an active learning process which one is most effective in terms of deep learning and understanding of students belonging to various disciplines of health sciences.

Conclusion

In the current study, the conclusion drawn suggested that a single teaching strategy was not found to be suitable for all subjects. Tutors need to identify techniques to deliver concepts and to maintain the interest of students in class. Thus, interactive sessions, when supplemented with traditional lecturing mode will improve the academic performance of learners.

Conflict of Interest

Authors have no conflict of interest and no grant/funding from any organization.

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