



Comparison of Class Room Lectures with Fishbowl-Snowball Activity for Dental Undergraduate Students: An Observational Study

Amitha M. Hegde¹ Shreema Shetty² Deepshikha Mehrotra¹

¹Department of Pediatric and Preventive Dentistry, A B Shetty Memorial Institute of Dental Sciences, Nitte (Deemed to be University), Mangalore, Karnataka, India

²Department of Conservative Dentistry and Endodontics, A J Institute of Dental Sciences, Mangalore, Karnataka, India

Address for correspondence Amitha M. Hegde, BDS, MDS, Department of Pediatric and Preventive Dentistry, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Deralakatte, Mangalore 575018, Karnataka, India (e-mail: amipedo9@gmail.com).

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Abstract

Background Traditional classroom lectures have been the backbone of the education system for a long time although this method is most effective but it may not always permit active engagement with the matter and learn it. In contrast, active teaching formats such as fishbowl and snowball techniques allow students to participate in the task of attaining knowledge by shifting the target from preceptor to student, thereby allowing a better understanding of the concepts.

Methodology A total of 80 final-year undergraduate dental students were included in this study. Each student was informed regarding study design and protocol. A lecture on the principles of Pediatric Endodontics was delivered to the students in small groups using the routine virtual method, following which a pre-test activity questionnaire and formal thinking questionnaire were given to the students for scoring. Following this, the class of 80 was divided into smaller groups of four each and the Fishbowl–snowball activity was performed. A post-test activity questionnaire and formal thinking questionnaire were given once again to the students for scoring. The mean pre and post-test scores were statistically analyzed using paired *t*-test by statistical software SPSS version 20. A *p*-value of < 0.05 was considered significant.

Results The overall mean difference between pre and post-test activity and formal thinking scores was seen to be statistically significant ($p < 0.001$).

Conclusion It was seen that a combination of fishbowl and snowball method of teaching led to more satisfactory results as compared with the routine classroom teaching method.

Keywords

- ▶ fishbowl
- ▶ snowball throwing technique
- ▶ active teaching
- ▶ dental education

Introduction

For generations, huge classroom lectures that are employed to convey knowledge to pupils have formed

the backbone of education.¹ Although this method is arguably the most efficient for delivering extensive amounts of complex content to big groups and for introducing new and difficult topics,² the classic lecture pattern

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may not always encourage active engagement with the matter and learn it.³

Not only the health care sector but also teaching institutions around the world are significantly affected by the novel Coronavirus (COVID-19) pandemic. Owing to the current pandemic situation, the teaching method has been shifted from the routine large class room lectures to virtual classes in smaller groups for better understanding for students.

Active teaching allows pupils to participate in the task of attaining knowledge, shifts the target from preceptor to pupil, thereby allowing trainees to grasp the concepts better by completing substantial tasks and improve their comprehension on what they are doing, which is one alternative to traditional lecturing.⁴⁻⁷

For healthcare education, a variety of activity-based educational approaches have been put forward. The Fishbowl approach, popularly called the cluster method of teaching, is one such method.

The basic structure is made up of two concentric circles (groups), which interchange working (conversation) and observing responsibilities.^{8,9} While surrounded by an outer circle, pupils belonging to the internal circle review a particular task or piece of work. Students in the outside circle listen calmly to the conversation, noting the themes and evaluating the legitimacy and credentials of the inner group's ideas.¹⁰ When the inner cluster of pupils' assigned time is completed, pupils in the outside circle may put forward their doubts, offer commentary, and critique the performance of the members of the internal circle.¹¹

To ensure that both groups are equally involved in the interaction, their roles maybe swapped. A faculty member usually overlooks this activity and has a passive role in this teaching method by providing inputs at the end of the session.¹⁰

The fishbowl training style can be used for a variety of purposes; however, its main objective is to acquaint the students with the framework and quality of a more detailed interactive discourse.¹²

Snowball throwing technique is a learning strategy that permits pupils to collaborate in groups and exchange vital information in relation to a selected topic. This technique requires that each member of the group listen to one another attentively. This is followed by scrutinization of the information by the other groups. Once the discussion between the said group is completed, a pupil from the group tosses a ball of paper without warning to any other member in the group.¹³

As a result, this strategy is used to teach students how to respond more quickly to messages delivered in the form of paper snowballs by their group member, as well as to communicate with other students in their group.

There have been a few studies in the literature, which assess the effectiveness of these active teaching formats; however, there are no studies where a combination of Fishbowl-Snowball format has been used in dental education. The purpose of this research was to compare a standard virtual approach with a Fishbowl-Snowball activity for dental undergraduate students.

Materials and Methods

Two questionnaires were designed for this study. The formal thinking questionnaire consisted of nine questions designed on the basics of pediatric endodontics and the second questionnaire was an activity survey questionnaire consisting of three questions. Several rounds of discussion were performed among the research team members before achieving consensus regarding the questions. When a consensus was achieved, the two questionnaires were presented to a panel of five faculty members who are experts in the field of pediatric dentistry, for validation and applicability of the questionnaire using the Content Validity Index (CVI).¹⁴ The questionnaires used in this study are as follows:

Formal thinking questionnaire	Scores
1. Indication of pulp therapy in children	
2. Contraindication of pulp therapy in children	
3. Principles of protective base/indirect pulp capping	
4. Principles of direct pulp capping	
5. Principles of pulpotomy	
6. Principles of pulpectomy	
7. Principles of extraction and space maintainers	
8. Principles of apexification	
9. Principles of apexogenesis	
Scores: 1/2/3/4/5 Scoring Scale: 1 = Not confident/not sure 5 = very confident	
Activity survey questionnaire	Scores
1. This activity helped me in learning better	
2. This activity helped me to prepare for exam better	
3. This activity helped me to practice pulp therapy better	
Scores: 1/2/3/4/5 Scoring Scale: 1 = Not confident/not sure 5 = very confident	

The observational study was performed with the final year undergraduate students ($n = 80$) in the Department of Pediatric and Preventive Dentistry of the institute. Ethical approval was obtained from the review board of the institution. Students ready to participate, present on the day the study and gave informed consent were included. Final-year undergraduate students were recruited. The total sample size was 80. Each student was informed regarding study design and protocol. A lecture on the principles of Pediatric Endodontics was delivered to the students in small groups using the routine virtual method.

A pre-test activity questionnaire and formal thinking questionnaire were given to the students and they were asked to give a single score between 1 being the 'Not confident/not sure' to 5 being 'Very confident.' The class of 80 was divided into smaller groups of 4 each and the

Table 1 Mean differences between pre-test and post-test questionnaire scores

		Mean	95% CI		t-Value	p-Value
			Lower	Upper		
Pair 1	Question 1	-2.792	-2.968	-2.616	-31.609	< 0.001
Pair 2	Question 2	-3.181	-3.354	-3.007	-36.577	< 0.001
Pair 3	Question 3	-2.806	-2.980	-2.631	-32.007	< 0.001
Pair 4	Question 4	-2.958	-3.118	-2.798	-36.890	< 0.001
Pair 5	Question 5	-2.986	-3.167	-2.805	-32.880	< 0.001
Pair 6	Question 6	-3.125	-3.301	-2.949	-35.383	< 0.001
Pair 7	Question 7	-3.014	-3.188	-2.840	-34.512	< 0.001
Pair 8	Question 8	-2.986	-3.193	-2.779	-28.792	< 0.001
Pair 9	Question 9	-3.236	-3.419	-3.053	-35.290	< 0.001

Abbreviation: CI, confidence interval.

Table 2 Paired sample test showing the overall mean difference

	Mean	95% CI		t-Value	p-Value
		Lower	Upper		
Overall pre-test and post-test scores	-3.0015	-3.0731	-2.9300	-83.661	< 0.001

Abbreviation: CI, confidence interval.

participants were explained about the Fishbowl–Snowball activity.

Students in each group were divided into an inner circle (the fishbowl), which consisted of 10 participants who were instructed to hold a discussion on the allotted topic on the Principles of Pediatric Endodontics with the representative member among them in time limit of 5 to 7 minutes. The inner circle was enclosed by an external circle and participants were expected to quietly pay attention to the discussion, noting and evaluating the legitimacy and merits of the inner group’s ideas.

The members of the outside circle asked questions and offered essential input after the inner group’s time allocated had expired.

A post-test activity questionnaire and formal thinking questionnaire were given to the students and they were asked to give a single score between 1 being the 'Not confident/not sure' to 5 being 'Very confident.' The pre-test and post-test questionnaire scores were statistically analyzed using paired *t*-test by statistical software SPSS version 20. A *p*-value of < 0.05 was considered significant.

Results

Formal Thinking Questionnaire

A significant change in the mean values (*p* < 0.001) for all nine questions was present between pre and post activity scores for formal thinking [► **Table 1**].

The overall pre-test mean was 1.6034 and the post-test mean was 4.6049 with a standard deviation of 0.1936 and 0.2229, respectively. The overall mean difference between pre and post paired *t*-test formal thinking was -3.00 and was seen to be statistically significant (*p* < 0.001) [► **Table 2**].

Activity Survey Questionnaire

A significant change in the mean values (*p* < 0.001) for all three questions between pre and post activity scores was seen [► **Tables 3 and 4**].

The overall pre-test mean was 1.8122 and the post-test mean was 4.3521 with standard deviations of 0.3768 and 0.4397, respectively.

The overall mean difference between pre-test and post-test paired *t*-test for activity scores was -2.53 and was statistically significant (*p* < 0.001) [► **Table 5**].

Discussion

One of the biggest hurdles faced by an educator in a professional college is the lack of attentiveness and participation of their pupils/trainees the class.⁹

Table 3 Mean values of pre and post-test activity questionnaire for all three questions

Paired samples statistics				
		Mean	S.D.	Std. error mean
Pair 1	q1 pre	1.73	.506	.060
	q1 post	4.30	.619	.073
Pair 2	q2 pre	1.92	.579	.069
	q2 post	4.46	.530	.063
Pair 3	q3 pre	1.79	.505	.060
	q3 post	4.30	.619	.073

Abbreviation: SD, standard deviation.

Table 4 Mean differences between the pre-test and post-test scores for three questions

		Mean	95% CI		t-Value	p-Value
			Lower	Upper		
Pair 1	Question 1	-2.563	-2.766	-2.360	-25.190	< 0.001
Pair 2	Question 2	-2.549	-2.756	-2.342	-24.553	< 0.001
Pair 3	Question 3	-2.507	-2.681	-2.333	-28.767	< 0.001

Abbreviation: CI, confidence interval.

Table 5 Showing overall pre-test and post-test scores

	Mean	95% CI		t-Value	p-Value
		Lower	Upper		
Overall pre-test and post-test scores	-2.5399061	-2.6862	-2.3936	-34.622	< 0.001

Abbreviation: CI, confidence interval.

The fishbowl training style can be used for a variety of purposes; however, its main objective is to acquaint the students with the framework and quality of a more detailed interactive discourse.¹²

Snowball throwing technique is a learning strategy that permits pupils to collaborate in groups and exchange vital information in relation to a selected topic.¹³

Although these two active teaching methods have been used on their own for teaching students, there has been no study that uses a combination of the two techniques especially in dental education.

In this study, 80 final-year undergraduate students were recruited to evaluate the effectiveness of the combination of Fishbowl-Snowball technique. The students were first given a routine lecture on a specific topic of principles in endodontics. The students were then explained about the study design and protocol. The fishbowl-snowball activity was then performed in smaller groups, which was followed by distribution of two questionnaires to each student, the first questionnaire evaluated the pre and post formal thinking scores of the students based on nine questions related to the Principles of Pediatric Endodontics. The second questionnaire evaluated the pre and post activity scores of each student based on three questions. The students were asked to give a single score between 1 being 'Not confident/not sure' to 5 being 'Very confident' for each question in both questionnaires. The results of our study showed that overall pre-test and post-test mean for the formal thinking were 1.60 and 4.60 respectively and the overall mean difference was -3.00, which was statistically significant ($p < 0.001$) and which indicated higher scores given by students to the Fishbowl-Snowball method of teaching as compared with the routine method.

The results of the activity scores demonstrated that the overall pre-test and post-test mean was 1.81 and 4.35, respectively, and the overall mean difference was -2.53 and was statistically significant ($p < 0.001$) which indicates higher scores given by the students to the Fishbowl-Snowball method of teaching as opposed to routine method.

The findings of this study are in accordance with Pearson et al,¹⁵ who showed that Fishbowl activity may be a valuable educational tool for the development of postformal thinking skills. Setiyowati et al¹⁶ reported the positive influence of STT on brushing mannerism of school children.

From our study it was therefore seen that there is a statistically significant difference in routine virtual teaching method and Fishbowl-Snowball activity method and that the combination of Fishbowl-Snowball method was significantly better. The feedback from the students was taken and majority of the students felt that this method of teaching was innovative and allowed easy learning, there was active participation by all students, concepts were better cleared, and it helped in developing free thinking. Hence a hybrid technique of virtual classes with small group discussions by various methods should be used regularly in teaching class rooms.

Conclusion

The present study concluded that the use of Fishbowl-Snowball method was an effective method in improving the comprehension and retention of concepts in most participants. An amalgamation of Fishbowl-Snowball method can be employed to achieve a satisfactory teaching technique as the students show active participation and the shortcomings of one approach could be overcome by the other.

Conflict of Interest

None declared.

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