



ORIGINAL ARTICLE

Effectiveness of online peer assisted learning as a teaching methodology for dental undergraduate students



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Abstract

Introduction: Peer-assisted learning (PAL) has been extensively used in professional courses. However, its effectiveness as an adjunct to teacher-assisted learning (TAL) has not been evaluated. The objective of this study was to evaluate the effectiveness of Online PAL as an independent teaching methodology and as an adjunct to TAL, for dental students.

Methods: Forty BDS year 3 students were divided into 2 groups of 20 each. Four year 5 students were chosen as tutors to teach 4 different topics using the Microsoft teams platform. The study was conducted in two parts. At first, two topics were taught to one group by the tutor (peer-led group) and the other group, by a teacher (teacher-led group). Next, the remaining two topics were taught to both groups by the teacher initially. This was followed by repeated teaching of the topics to peer-led group by tutors, while other group did self-study. Students' perception and performance scores were compared using an independent sample *t*-test for all the topics. **Results:** The mean performance scores in the teacher-led group for topics 1 and 2 were 86.15 and 90.22, whereas scores in the peer-led group were 75.38 and 79.21 which was statistically significant ($p < 0.05$). The mean scores in the teacher-led group for topics 3 and 4 were 71.82 and 65.42, whereas in the peer-led group as an adjunct to TAL were 84.55 and 82.50. This was statistically significant ($p < 0.01$).

Discussion: Online PAL as an adjunct to teacher-assisted learning can be useful for teaching dental undergraduate students.

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PALABRAS CLAVE

Odontología;
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Aprendizaje;
Enseñanza

Eficacia del aprendizaje asistido por pares en línea como metodología de enseñanza para estudiantes universitarios de Odontología**Resumen**

Introducción: El aprendizaje asistido por pares (PAL) se ha utilizado ampliamente en cursos profesionales. Sin embargo, no se ha evaluado su eficacia como complemento del aprendizaje asistido por el maestro (TAL). El objetivo de este estudio fue evaluar la efectividad del PAL en línea como metodología de enseñanza independiente y como complemento del TAL, para estudiantes de Odontología.

Métodos: Cuarenta estudiantes de tercero de BDS se dividieron en 2 grupos de 20 cada uno. Se eligieron 4 estudiantes de quinto año como tutores para enseñar 4 temas diferentes utilizando la plataforma de equipos de Microsoft. El estudio se llevó a cabo en 2 partes. Al principio, 2 temas fueron enseñados a un grupo por el tutor (grupo dirigido por pares) y al otro grupo, por un maestro (grupo dirigido por el maestro). A continuación, el profesor enseñó inicialmente los 2 temas restantes a ambos grupos. A esto le siguió la enseñanza repetida de los temas a un grupo dirigido por pares por parte de los tutores, mientras que el otro grupo hizo el autoaprendizaje. Las puntuaciones de percepción y rendimiento de los estudiantes se compararon mediante una prueba t de muestra independiente para todos los temas.

Resultados: Las puntuaciones medias de desempeño en el grupo dirigido por el maestro para los temas 1 y 2 fueron 86,15 y 90,22, mientras que las puntuaciones en el grupo dirigido por compañeros fueron 75,38 y 79,21, lo cual fue estadísticamente significativo ($p < 0,05$). Las puntuaciones medias en el grupo dirigido por el maestro para los temas 3 y 4 fueron 71,82 y 65,42, mientras que en el grupo dirigido por compañeros como complemento del TAL fueron 84,55 y 82,50. Esto fue estadísticamente significativo ($p < 0,01$).

Discusión: El PAL en línea como complemento del TAL puede ser útil para enseñar a los estudiantes universitarios de Odontología.

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Introduction

Teaching and learning has undergone advancements from conventional blackboard to smartboard online teaching. The conventional didactic teaching and learning are being replaced by newer alternative teaching methods.¹ Peer-assisted learning (PAL) is one such underutilized alternative teaching method, based on the social discourse principle, adopted by the teachers to achieve desired learning outcomes in both preclinical and clinical settings.¹ PAL allows the students to receive help and support from their peers for learning without the immediate intervention of a teacher.² Students are either taught by their seniors or students of the same level, by conventional classroom teaching or through other means such as collaborative work, projects, seminars, clinical demonstrations, etc.^{2,3} It is believed that social and cultural interaction among the peers facilitates learning better than students learning on their own.⁴ Furthermore, it provides a friendly engagement and enhances their interest in topics as they feel more comfortable asking questions to their peers in comparison to professional teachers.^{5–7}

The current COVID-19 pandemic resulted in an indefinite deferral of face-to-face teaching and clinical training, consequently leading to online theoretical teaching. Although PAL has been adopted by many educators in different ways in traditional face-to-face teaching, however, there is a lack of literature on the effectiveness of PAL on students' learning and assessment through online platforms.

Methods**Study design**

The present study was conducted on BDS year 3 cohorts (2018/23 batch) at the Faculty of Dentistry, SEGi University, Malaysia. The study was conducted from September 2020 to December 2020 through Microsoft teams. Ethical approval was obtained from the institutional ethical committee and informed consent was obtained from the participants. Students were divided into two groups of 20 each, based on their attendance order. One group was termed as the Peer-Led Group (PLG) and the other was termed as Teacher-Led Group (TLG).

The study was conducted in two parts. In the first part, the effectiveness of PAL was compared against Teacher assisted learning (TAL). For the PLG, the two topics were taught by two year 5 dental students and for TLG, the same topics were taught by two faculty members. In the second part of the study, the effectiveness of PAL as an adjunct to TAL, as compared to TAL alone, was tested. Two topics different from the earlier ones were taught to all the 40 year 3 students by the faculty member. After 2 weeks, the same topics were repeated to the PLG by tutors and the TLG was asked to undertake a self-study.

All the four topics were taught through PowerPoint presentations to both groups at the same time, but in different Microsoft teams link. The allotted time for each session was

Table 1 Comparison of student's performance in teacher-led group and PAL group.

Topic	Groups	N	Mean	Std. Deviation	p
1. Examination of temporomandibular joint and lymph nodes. (Tutor 1)	PLG	20	75.38	16.189	0.052
	TLG	20	86.15	9.985	
2. Intraoral radiographic technique. (Tutor 2)	PLG	20	79.21	10.772	0.005
	TLG	20	90.22	9.383	

Table 2 Comparison of students' performance between teacher-led group and PAL as an adjunct to teacher assisted group.

Topic	Groups	N	Mean	Std. Deviation	p
3. Intraoral radiographic anatomy and interpretation of radiograph (tutor 3)	Teacher assisted learning	20	71.82	18.340	<0.01
	Peer-led group	20	84.55	8.202	
4. Basic periodontal instrumentation (Tutor 4)	Teacher assisted learning	20	65.41	19.202	<0.01
	Peer-led group	20	82.50	6.832	

one hour. At the end of each session, students' performance was evaluated through structured assessment through the online learning platform 'Blackboard'. Students' perception and experience was assessed through validated online questionnaires. Two separate sets of questionnaires were designed and validated for the first and second part of the study to collect data from the student participants in PLG.

Training of peer tutors: Training in generic teaching skills was provided to the tutors by the faculty member. Calibration exercises were carried out to ensure the similarity of the content between teachers and tutors.

Assessment of student's performance: A 20-min test was administered after each topic was taught to assess the knowledge gained by the students. The assessment pattern and marking method employed was uniform for all the groups. One Short Answer Question and 10 Multiple Choice Questions were given, which measured four levels of the cognitive domain.

Statistical analysis

Data was analyzed using SPSS version 22. The mean scores between the groups were compared using an independent *t*-test. $p < 0.05$ was considered statistically significant.

Results

Student's performance in teacher-led group and peer-led group

The tutor and the students were within the age group of 20–24 years. The mean scores of the students in the TLG for topics 1 and 2 were 86.15 and 90.22, whereas for PLG were 75.38 and 79.2 respectively. Students in the TLG performed better in both topics however, a statistically significant difference was seen in relation to the second topic ($p = 0.05$). (Table 1).

Student's performance in PAL as an adjunct to teacher-assisted teaching

The mean scores for students in the TLG for topics 3 and 4 were 71.82 and 65.42, whereas the mean scores in the PLG as an adjunct to TAL were 84.55 and 82.50 respectively. Students in the PLG where PAL was used as an adjunct to the TAL had performed better than the TLG and these results were statistically significant ($p < 0.01$) (Table 2).

Students' perception to PAL as independent teaching and as an adjunct to TAL

The questionnaire responses were on a 5-point Likert scale from strongly disagree to strongly agree. For ease of interpreting the results, "strongly disagree" and "disagree" were combined. Similarly, "strongly agree" and "agree" were combined. Students' perceptions and experiences to PAL are described in Table 3.

Discussion

Despite the various advantages offered by the PAL in traditional face-to-face teaching, its implementation in online has not been explored. The previous studies were not available to discuss the results of online PAL, hence our results were compared to the studies conducted on the traditional face-to-face PAL method.

In our study, when PAL was used as an independent teaching method, the students in the TLG had performed better than the PLG. Congruent findings were reported by Ehsan AA et al. for the topics taught in orthodontics. Similarly, Iwata et al.,⁸ Cameron et al.,⁹ and Saeed et al.,¹⁰ reported weak academic performance by PAL groups. Despite the weaker performance in the PAL group, authors argue that assessment scores should not be correlated with the other benefits it offers to learners,¹¹ and they asserted that PAL could be utilized as an important teaching supplement in dental institutes, as it provides a stress-free environment

Table 3 Students' perceptions on PAL alone as an independent teaching methodology and as an adjunct to TAL.

Questionnaires	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
<i>3a. Students' perceptions on PAL alone as an independent teaching methodology</i>					
I like this idea of learning.	5%		25%		70%
This teaching method can be modified in future.	11.7%		31.7%		55%
I can apply what has been taught.	8.3%		16.7%		75%
If questions from this topic are given, I am confident to tackle them.	6.7%		38.3%		55%
I need to recall this topic a few more times to understand.	11.7%		31.7%		55%
I have understood what has been taught by the tutor.	5%		20%		75%
I was able to clarify my doubts with the tutor.	8.3%		31.7%		60%
The tutor seemed well informed.	5%		13.3%		81.7%
The tutor has clearly understood the topic and explained it to us.	3.3%		18.4%		78.3%
I have benefited from this class and find it useful.	5%		15%		80%
<i>3b. Peer assisted learning as an adjunct to TAL</i>					
I like this idea of PAL as an adjunct to teacher assisted learning.	3.4%		23.3%		73.3%
This teaching method is better than PAL alone as an independent learning method.	6.8%		26.6%		66.6%
A similar teaching method can be implemented in the future for other topics.	10%		30%		60%
I can apply what has been taught.	0%		13.4%		86.6%
If questions from this topic are given, I am confident to tackle them.	3.4%		26.6%		70%
I don't need to recall this topic a few more times to understand.	10%		26.6%		63.4%
I have clearly understood what has been taught by the tutor.	0%		30%		70%
I was able to clarify my doubts with the tutor.	6.6%		30%		64.4%
The tutor has clearly understood the topic and explained to us.	0%		10%		90%
I have benefited from this class and find it useful.	3.4%		16.6%		80%

and contributes to the mutual development of tutors and tutees.

In this study, the mean assessment scores for PAL as an adjunct to TAL were higher than the TLG suggesting that PAL as an adjunct to TAL can be more useful for teaching dental undergraduates. Similar findings were reported by Nallaswamy et al.,⁶ and Sammariaee et al.,¹² for teaching preclinical topics. Abdel Salam recommended that implementation of PAL in academic institutions may not only reduce the burden of teacher load but also prepare dental graduates for their future role as educators.¹³ The growing need of dental educators and lack of time to provide remedial or supplementary classes can be partially addressed by using PAL as an adjunct to TAL. The feedback questionnaires in our study found that the students favored PAL as an alternate teaching methodology and as an adjunct to TAL. These findings were congruent with the study results of Sausan Al Kawas et al.³

The majority of the (86.6%) students felt that they can apply from what had been taught by tutors when PAL sessions were conducted as an adjunct to TAL. Students were more confident to tackle the questions from the topic taught by the tutors and many of them felt that there was no need to revise those topics again to understand the topic. This suggests that PAL as an adjunct to TAL had more impact on the students. Most students felt that the tutor had understood the topic well and explained it to juniors and 80% of the students found that PAL sessions were useful, and they had benefitted. Similar findings were reported by Silbert et al.,¹⁴

The results of our study suggest that PAL as an adjunct to TAL can be an effective teaching method in dental undergraduate training. However, the success of the PAL to a great extent depends on the involvement of academic staff, proper planning, training, and support provided to the tutors involved in teaching.⁹ Therefore, PAL may not be used as a substitute to teaching activities delivered by faculty but

as an attractive and valuable supplement in teaching and learning.^{4,15} The limitations of our study are that the topics taught were from preclinical subjects, and the cognitive skills were not assessed in detail. Hence, the results cannot be generalized. More studies in this direction will be useful to affirm the findings of our study.

Contribution

SKV and PHR designed the study and drafted the manuscript. DR, EYSJ, FSL, and DV were involved in data collection. ATBZ and SY was involved in the proof reading and final revision of the manuscript.

Conflict of interest

The authors of this article declare no conflict of interest.

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