ORIGINAL ARTICLE

IMPACT OF DIGITAL TECHNOLOGY ON THE TEACHING AND LEARNING IN DENTAL EDUCATION

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Background: Incorporation of Digital tools for acquisition of high quality knowledge and skills is dire need of dental education which is quite challenging. **Methods:** Study was conducted at School of Dentistry Shaheed Zulfiqar Ali Bhutto Medical University Islamabad for one month from 2nd October to 2nd November 2025 under the Ethical Approval No. SOD/ERB/2025/95. Qualitative research was conducted where 50 undergraduate 2nd year BDS students participated. Large group interactive session was used as initial mode of knowledge transfer through PowerPoint presentation pertaining to Dental Material Sciences. The learning process of students was investigated through a digital tool 'Kahoot'. Five open ended questions were used for students' interviews to collect generic feedback regarding fun and ease while handling digital technology. This qualitative data was displayed in word codes recorded from software R Studio-24. **Results:** Out of 50 participants, 44 were female. Students depicted that Kahoot was more lesson-understanding, entertaining, beneficial, enjoyable, valuable, helpful, competitive showing effective permanent learning with more grasp on the topic. Digital tool promoted learning with ease and fun. Kahoot enhanced platform for collaborative learning with sense of high scoring achievement thus, confirming that Kahoot is best option for learning purposes in BDS teaching at undergraduate level. **Conclusion:** Digital tool like Kahoot enhanced the learning process of undergraduate 2nd year BDS students pertaining to subject of Dental Material Sciences with ease and fun thus promoting collaborative learning in a friendly environment.

Keywords: Dental Education, Digital tool, Fun, Kahoot, Teaching

Pak J Physiol 2026;22(2):95–8, **DOI:** https://doi.org/10.69656/pjp.v22i2.1914

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INTRODUCTION

There is dire need of incorporating digital tools in the dental education for acquisition of high quality knowledge and skills which is quite challenging.[1] Digital technology based systems are required for better retention of this subject in order to improve the academic performance. The digitally applicable web based blended learning inducing online Kahoot can be used not only for improving the learning process but also amplifying the understanding and engagement level of students with ease and fun.[2,3]

According to recent studies, Kahoot has been used in the medical profession attributed to various subjects including pathology, pharmacology, immunology, microbiology, and histology since 2017.[4] This online learning has become popular among medical professionals during COVID-19 epidemic where physical in-person training was impossible as a result of lockdown worldwide.[5] The lack of on-campus instruction during this COVID shift has been linked to lower levels of involvement, attention, collaboration, loneliness altogether with mental and general health deterioration. Thus, Kahoot has proven to be a useful and an efficient e-learning platform that has the capacity of increasing enthusiasm and engagement of students with ease and fun.[3]

Currently, health professional educators are facing the genuine challenge of keeping students engaged during teaching and learning sessions pertaining dental speciality that could be useful in the development of metacognitive skills. Retention of Dental Material Sciences subject matter attributed to dental education is difficult because its curriculum is a true combination of physics, chemistry and biology that needs attention. There is scarcity of data available regarding learning of students with fun and ease at undergraduate level in dentistry. This study aims to gauge the better learning of undergraduate 2nd year BDS students attributed to Dental Material Sciences subject.

METHODOLOGY

This study was conducted at School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University for a period of one month (2nd October to 2nd November 2025) with the Institutional Ethical Approval No. SOD/ERB/2025/95. Sample size calculated for the current study was 50 which was supported by Central limit theorem of normal approximation for samples >30.[6] Purposive sampling technique was used where 50 undergraduate second year BDS students volunteered to participate in this study and informed consent was obtained from them. The study aimed to investigate the

effect of Digital online Kahoot quiz on learning subject of Dental Material Sciences. The initial mode for transfer of knowledge was long group interactive session after which learning of students was gauged through validated open ended questionnaire available in the literature.[4,5] The digital quiz involved creation of a Kahoot teacher account following free registration on 'https://kahoot.com/'. A Kahoot quiz was generated on 'https://create.kahoot.it', comprising of 20 multiple-choice questions supplemented with images, each question had a time limit of 30 seconds (Figure-1).[6,7]

The feed back of 2nd year undergraduate BDS students was recorded via interviews for finding the effect of Kahoot on learning of Dental Material Sciences subject. The open ended questionnaire used for the Kahoot led learning feedback pertaining Dental Material Sciences subject is illustrated in Table-1.

R Studio-24 was used for the word codes obtained from the open ended questionnaire responses of the participants. Qualitative data was displayed as frequencies and percentages from SPSS-26.

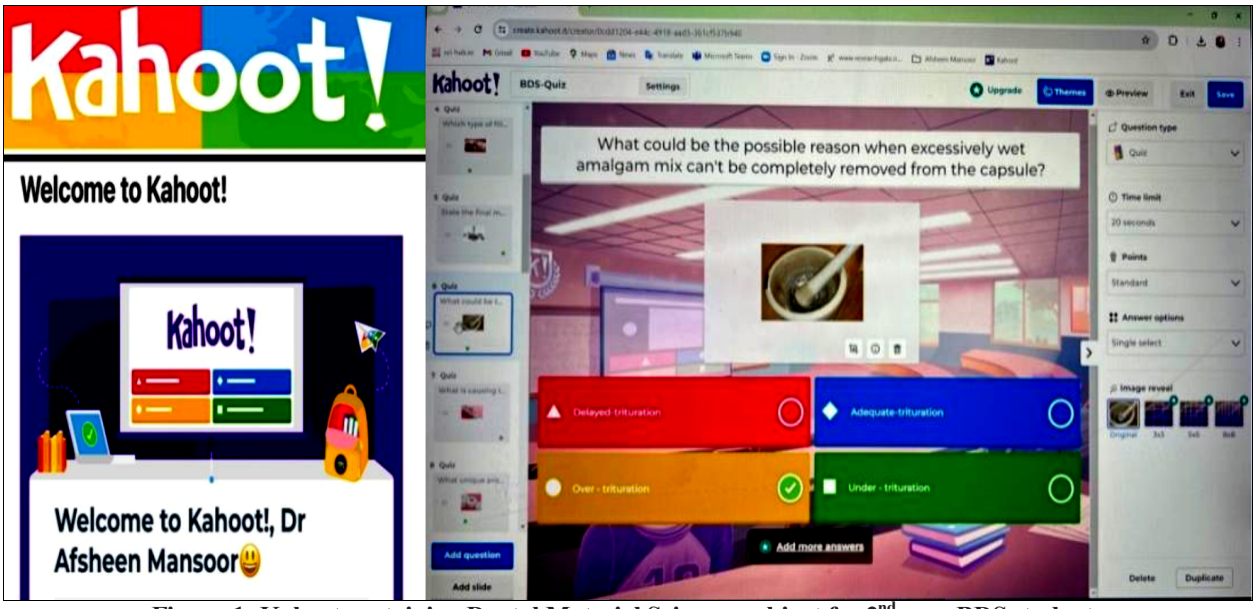


Figure-1: Kahoot pertaining Dental Material Sciences subject for 2nd year BDS students

Table-1: Open-ended questionnaire regarding feedback of students attributed to Kahoot led learning

No.	Questions attributed to Kahoot led learning in Dental Material Sciences subject
1.	What do you think about the game Kahoot! as an in-class activity that you have participated in?
2.	How did you feel while you were playing Kahoot!?
3.	Should the game Kahoot! be used for Dental Material Sciences lessons? Why?
4.	What do you think about learning Dental Material Sciences subject via Kahoot?
5.	Has Kahoot! changed your opinions towards learning Dental Material Sciences subject?

RESULTS

The pictorial version of R Studio displayed verbal responses of students regarding Kahoot is illustrated in the Figure-2.

A total 44 (88.0%) female students and 6 (12.0%) male students participated in this study. The Kahoot Quiz was fully equipped with a mark score sheet tool that checked the grasp of students pertaining Dental Material Sciences subject. The 2nd Year BDS students were actively interacting with their peers and were taking part in the quiz more enthusiastically. The response of the students regarding 5 qualitative questions was recorded through R Studio-24 where frequency and percentage of the highly repeated words from the open-ended questionnaire data was extracted to figure out the opinion of undergraduate 2nd Year BDS students regarding utilization of Kahoot for learning purposes. The code word responses used excessively by 2nd Year BDS students regarding Kahoot in Q-1 to Q-5 are given in Figure-3.

This study revealed that Kahoot quiz is more lesson-understanding, entertaining, beneficial, enjoyable, valuable, helpful, competitive showing effective learning, more grasp on topic, permanent learning, more effective learning, easy learning with fun. Kahoot enhanced platform for collaborative learning, improving knowledge, proper educational practice, interesting revision tool with broader perspectives, confirming that Kahoot is good option for learning of 2nd Year BDS students at the undergraduate level (Figure-3).

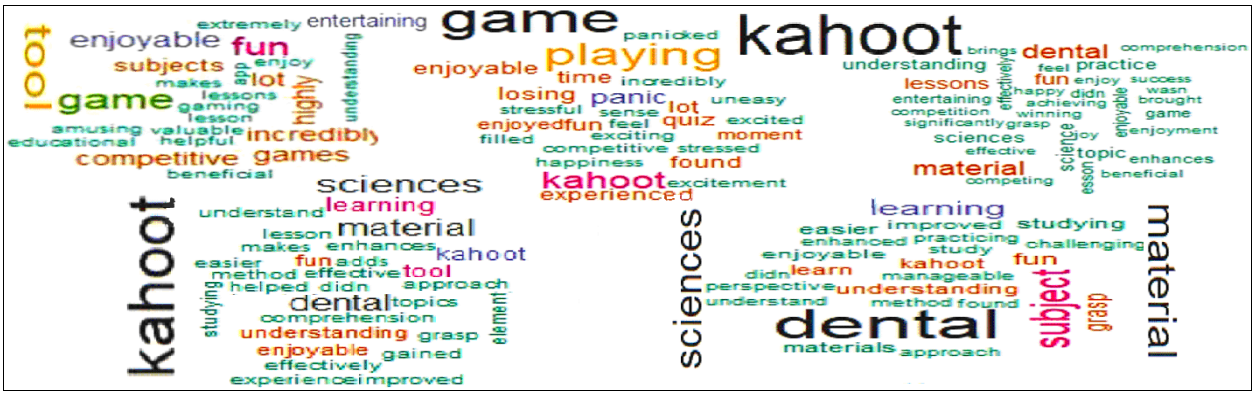


Figure-2: Code word pictorial depiction by R Studio-24 showing various responses of 2nd Year BDS students regarding Kahoot led learning

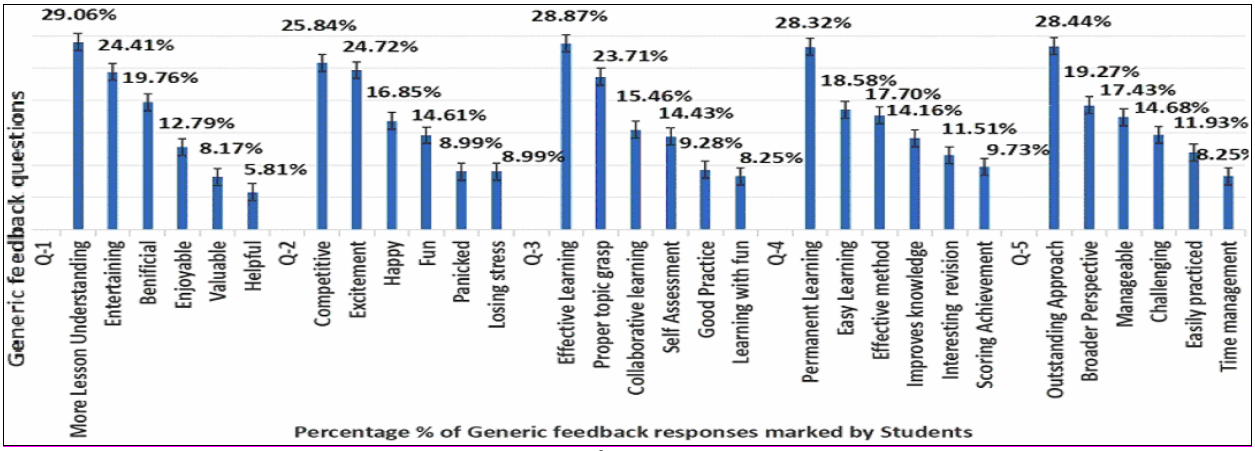


Figure-3: Generic feedback percentages of 2nd year BDS students regarding Kahoot led learning

DISCUSSION

Kahoot is the best tool for learning purposes in BDS teaching at undergraduate level pertaining Dental Material Sciences with sense of high scoring achievement in broader perspectives. Kahoot is more lesson-understanding, entertaining, beneficial, enjoyable, valuable, helpful, competitive promoting effective permanent learning. Kahoot enhanced the grasp on Dental Material Sciences topic in an easy way with fun, thus providing a platform for collaborative learning. The usage of Digital tool in learning is quite challenging but if appropriately managed it could be beneficial for the knowledge retention purposes in the BDS teaching at the undergraduate level.

Learning with Kahoot is appreciated because of its friendly user capabilities, attractive features, and its healthy competition arising properties. Game-based learning is commonly considered as unique follow-up system that truly facilitates the student-centred learning where teachers are facilitators. Kahoot has capacity of delivering high concentration of knowledge through media into brains of the students.[8] Delivery of academic content through this technology has become a promising avenue for students because of its versatility.

In recent years, combination of digital tools have played a major role in multiple fields such as robotics, and artificial intelligence (AI) machines.[8] Various studies demonstrated that digital technology based learning engages the matter content more effectively in comparison to the traditional textbooks, written assignments and schooling. These studies have proven the positive effects of blended Kahoot based learning not only on the academic performances of the students but also their brain growth.[9,10] Kahoot is more competitive, challenging and manageable in the learning process.[11,12] The 2nd year BDS students in this study were familiar with the content matter that was already taught to them, therefore the Kahoot used in the review process was potent enough for imparting the deeper and permanent learning.

Collaborative learning in Kahoot magnified the competition level of these students for high scoring and they learnt time management in short duration as well. This instrumental tool is quite beneficial for students in overcoming the learning deficiencies in case if the subject matter is quite difficult to understand further, magnifying the smart features of this friendly human user digital technology and its usage in healthcare

systems at larger scale to benefit the general wellbeing, dental issues and mental health of individuals in a community. Future studies are required to employ this innovative digital technology for dental education among healthcare professionals at different levels.

LIMITATION

The limitation of the current study is its small sample size that might pose an impact on the results.

CONCLUSION

Digital tool like Kahoot amplified the learning process of undergraduate BDS students pertaining to Dental Material Sciences with ease and fun thus promoting collaborative learning in a friendly environment. It is difficult to develop such digital technology-based quizzes. Workshops should be carried out to train the teachers for creating proper questionnaires, assignments, discussions, exams and MCQs.

ACKNOWLEDGEMENT

The authors acknowledge the role of AI tool in improving the vocabulary of the manuscript.

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Received: 19 Nov 2025 **Reviewed:** 4 Dec 2025 **Accepted:** 23 Dec 2025

Contribution of Authors:

Authors approved the draft and are accountable in ensuring that questions related to accuracy or integrity of the work are duly investigated and resolved.

AM: Concept, data collection and interpretation **FS:** Critical review and final approval **SA:** Study design, Critical review
EM: Data collection, Manuscript writing **EM:** Data analysis **EM:** Bibliography and referencing

Conflict of Interest: No conflict of interest is declared, **Funding:** No funds have been received from any agency