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Developing an Innovative Team-Based Learning Protocol by Incorporating Stakeholder Feedback in a Dental School in the United Arab Emirates

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ABSTRACT

Introducing a new teaching method into the curriculum is challenging and requires stakeholder agreement, involvement and training. A concurrent, coordinated and innovative team-based learning (TBL) protocol was developed and applied to a cohort of 199 students. TBL sessions in restorative dentistry were conducted simultaneously in different rooms. More than 80% of the students who responded to the feedback questionnaires either agreed or strongly agreed that the TBL sessions helped improve their knowledge, information gathering and critical thinking skills. Open comments indicated that the TBL sessions were beneficial in the group discussion that ensued, as they embraced varying or differing opinions and enhanced critical thinking skills. A stepwise approach was used to integrate the innovative protocol into the curriculum. A cycle of faculty training, standardisation, implementation, student feedback, modification and closing the loop was established with favourable student feedback.

Keywords: Dental education; Team-based learning; E-learning

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INTRODUCTION

Dental education is shifting from a teacher-centred approach to student-centred learning (1, 2). Consequently, various student-centred learning approaches, including case-based, problem-based and enquiry-based, have found their way into teaching curricula worldwide (3–7). Small-group learning methods can be successfully used to facilitate conceptual learning from clinical case scenarios. There are significant advantages (8), despite the subtle differences among various forms of small-group learning methods [9–11]. However, the requirement for more facilitators and rooms creates obstacles to standardisation (12).

Team-based learning (TBL) may circumvent some challenges (13), as it is conventionally conducted by one facilitator catering to a larger group of students in one room. TBL is characterised by students learning in groups of 5–7 who complete an individual readiness assurance test (IRAT), a group readiness assurance test (GRAT), an application exercise and peer feedback (14). Studies investigating the effectiveness of TBLs in dentistry are scant (15–19). Moreover, TBL sessions may be challenging to use for a large class with more than 150 students. An increase in cohort size has previously been associated with lower acceptability for TBLs (20). Standardisation of the teaching content, instructor engagement and discussion may vary across sections when TBL teaching sessions are scheduled on different days for sections from the same larger cohort. A modified content creation, facilitation and communication approach may circumvent these limitations. The current manuscript describes the development of a modified protocol for TBL at Ajman University, United Arab Emirates, where student feedback is an integral part of the decision-making process.

METHODS

A concurrent, coordinated TBL protocol was developed and applied to a cohort of 199 students. TBL sessions in restorative dentistry were conducted simultaneously in different rooms. Ethical approval (D-F-H-19) was obtained from the Research Ethics Committee of Ajman University to obtain feedback from the students on how the concurrent, coordinated TBL sessions supported different learning domains. Suggestions for improving the protocol were also obtained. The course coordinator (TA) uploaded a TBL grouping list for the whole cohort on the MOODLE page for the course. Grouping was randomised and did not select students according to their grades or other parameters. All facilitators developed, discussed and agreed upon the pre-session reading material for each TBL session during a pre-session standardisation meeting. The reading material was shared with the students one week before each session. Two sessions were scheduled simultaneously for the male students on one day and for the female students on another day. The first session (TBL) and the second session (modified TBL) were conducted for the male and female students, as described below. Each room had 40–50 students (six students per TBL group) with one facilitator. The sessions started concurrently in two rooms. Two articles were provided as reading material for the first group of TBL sessions. In the first 10 minutes, the students in both rooms answered an IRAT. Subsequently, the students in both rooms answered a GRAT in the next 10 minutes. The IRAT and GRAT consisted of 10 questions each, which were responded to using Microsoft Forms. Two application exercises (treatment planning for a clinical case scenario) were conducted for the next 30 minutes, and 15 minutes were provided for each case scenario. Each exercise included the clinical case scenario, pictures and questions in a Microsoft Form. The students were required to submit written answers as a team. Once the answers were submitted, the facilitator generated a discussion among the teams in case they had different answers. The teams debated and came to a consensus about the case scenario's treatment plan. The links for the IRAT, GRAT and application exercises were sequentially revealed to the students in all the rooms concurrently on the MOODLE page for the course. The instructors in the two different rooms communicated in a joint WhatsApp group to ensure that all activities started and ended at the same time in all the rooms. Feedback was collected from the students through a questionnaire on improvement in knowledge, information gathering skills and critical reasoning. Open comments were invited, and specific questions were asked regarding the TBL session's perceived benefits and suggestions for improvement. A second group of modified TBL sessions was conducted for both the male and female students on two separate days, incorporating suggestions from the students regarding the first group of TBL sessions. The overall time of the modified TBL session was reduced to 40 minutes, and the time

for GRAT was increased to 15 minutes. Only one clinical case scenario was discussed as an application exercise. The time period for the application exercise was increased to 20 minutes. Feedback and open comments were collected again on the exact domains previously described. Figure 1 summarises the protocol for developing, implementing and gathering feedback for the TBL sessions.

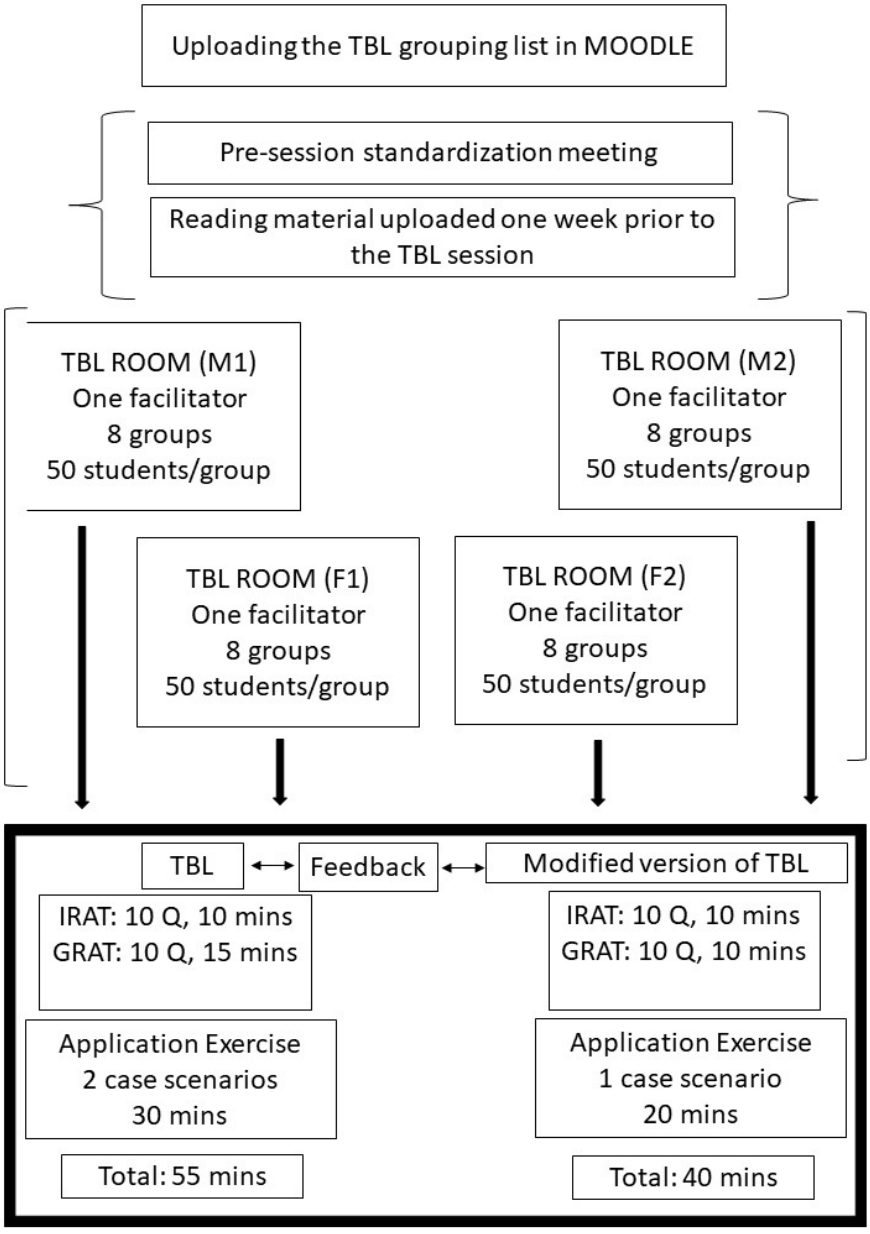

Figure 1: Protocol for developing, implementing and gathering feedback for the TBL sessions. Notes: TBL: Team-Based Learning; IRAT: Individual Readiness Assurance Test; GRAT: Group Readiness Assurance Test; Q: Questions

RESULTS

The response rates to the feedback questionnaires were 31% and 46%, respectively. The responses to the feedback questionnaires for each domain are presented in Table 1. More than 80% of the students either agreed or strongly agreed that the TBL and the modified TBL sessions helped improve their knowledge, information gathering and critical thinking skills. Responses to the open comments were summarised thematically. Open comments and the emerging themes are summarised in Table 2. The students reported that both TBL sessions were beneficial in the group discussion that ensued, as they embraced varying or differing opinions and enhanced their critical thinking skills. The students reported that the application exercise time was insufficient in the first group of TBL sessions, while the time provided for the application exercise was sufficient in the modified version of the TBL. The students preferred the one-article, one-application exercise approach in the modified version of the TBL compared with the two application exercises in the first group of TBLs.

Table 1: Responses to the questionnaire

Questions: The TBL session…….	Domain	TBL	Modified version of TBL
		Agree/Strongly Agree (%)	Agree/Strongly Agree (%)
helped me to apply my prior knowledge.	Knowledge	88	85
helped me to build upon my prior knowledge.		86	85
helped me to improve my listening skills (listening to my colleagues).	Information gathering	84	80
helped me to improve my information gathering skills.		80	80
helped me to improve my diagnostic skills.	Critical thinking	89	81
helped me to improve my clinical reasoning skills.		94	83

Table 2: Open comments from students

Question and responses for open comments What did you like or did not like?	Thematic summary	Question and responses for open comments What did you like or did not like?
TBL		Modified version of TBL

“the discussion was beneficial” “the group discussion” “Sharing knowledge and experience”	Discussion	“Discussing and sharing information with reasons” “discussion” “Group conversation”
“I like how everyone gave their opinion and everyone had different suggestions” “sharing different opinions and gaining knowledge” “I enjoy listening to different opinions and widening my view” “I liked the team learning and how we all listened to each other’s opinions and suggestions” “helped me improve my group team player skills” “it was nice to discuss with a team and see how our opinions deferred when it came to planning treatments.”	Difference in opinions	“Team work and having different options of treatment”
“team spirit” “that it is a team group discussion” take experience from the other and share the information as a team.	Teamwork	“The team work”
“i liked how it taught me how to gather information to properly reach a diagnosis and treatment plan with my colleauges” “It was useful and it helped me to increase my knowledge.” “refreshing our clinical information”	Knowledge and critical thinking	“It helped me to improve my knowledge and my diagnostic skills.” “Discussing possible treatment options” Expands our knowledge” “the best way to gain information” “increases and enhances my knowledge in topics and steps I was confused with and helps me think of many ways and possibilities of treatment planning
“More time to discuss the cases” “needs more time to discuss the case” “increase the time for discussion” “the clinical study discussion is short” “increase the time” “would like to have more time”	Time	“we had more time to actually discuss the case as compared to the last session” “One article_One case scenario” “Topics were interesting” I liked that it was focused on one case scenario only. Writing the answers on a word document was better since I was able to see everything I wrote and can add/remove information easily. I liked that there was more time

DISCUSSION

This study develops and implements a protocol for conducting TBL sessions at the College of Dentistry, Ajman University, where student feedback was collected to include modifications.

The TBL sessions were well-received by the students, as observed from the responses to the feedback questionnaire, which included questions related to knowledge, information gathering skills and critical thinking skills. This finding is in accordance with previous research on TBLs in medical education, in which TBLs have been found to increase the retention of facts and

academic performance, thus increasing satisfaction rates (21, 22). The same cohort of students was exposed to 'Think Aloud' videos for treatment planning in prosthodontics in the previous year and reported a similar increase in all three domains (23). Exposure to different teaching techniques over the clinical years, with a focus on critical skills for treatment planning, augmented the didactic and clinical learning of the cohort.

In agreement with previously conducted research on the effect of TBLs on medical education (24, 25), open comments from the students indicated that the TBL sessions enhanced team spirit, knowledge and critical thinking. Incorporating an individual and a group test in the same session is a unique advantage of TBLs compared with other forms of small-group learning (26). This allows the development of desirable skills and attitudes in a time-efficient format.

Previous evaluations of TBLs in medical education have been heavily inclined towards pre-clinical topics (27, 28). However, TBLs have been found to enhance clinical decision-making skills (29, 30), making the case for an increase in the development and integration of TBL-based clinical teaching in curricula.

The students in the current study reported exposure to different opinions during the case discussions as a beneficial aspect of TBLs. Discussions and consensus seeking are critical skills in clinical decision-making, and the TBL format provides a relatable and personalised environment in which to achieve these skills. The use of clinical cases from the student's institution provides much-needed authenticity. Thus, incorporating TBL sessions early in the curriculum is essential for students to develop familiarity with the teaching methodology (31). Moreover, faculty must be trained in conducting TBLs and creating application exercises (32) to ensure a favourable outcome concerning enhanced academic performance for students (33). The training workshop conducted for the faculty before implementing the TBL sessions was a critical step in ensuring faculty readiness.

The low response rate to the questionnaire is a limitation. Even though most students provided verbal feedback to the instructors regarding the acceptability of the sessions, fewer students preferred to take the time to provide written feedback and questionnaire responses. However, research based on student feedback must avoid coercing the vulnerable student population into providing written feedback to enhance response rates. The students were repeatedly reminded that giving written feedback was not mandatory, thus providing a safe environment. A yes/no response to the acceptability of TBLs could have generated more responses. However, this format may not provide sufficient depth to develop a new protocol. Consistently lower scores were observed for agreement with all the domains in the questionnaire for the modified TBL. However, the decrease was within 1%–4% for all domains except one. Considering the cohort size, this minor variation may not imply a significant variation. A more considerable variation was observed in the domain of assessing critical thinking. This may be because some students preferred the longer time provided in the initial TBL sessions and the higher number of cases dealt with. A few open-ended comments in the feedback emphasised this aspect. A few students noted the need for more time to discuss the cases, which could have also affected the percentage of agreement in the questionnaire feedback. Even though increased time is always beneficial for more enriched discussions, constraints in timetabling longer sessions and incorporating TBL sessions consistently across the semester require additional consideration. The modified TBL sessions also enable the inclusion of various case types and learning outcomes into the curriculum due to the shorter time required.

Dynamic feedback from the students was used to modify the timing of the TBL sessions to an acceptable level. This approach demonstrates responsiveness to the students' needs and ensures that the stakeholders perceive their importance in the decision-making process. Responsive teaching based on students' needs must be as important as teaching based on societal and community needs (34). Including dynamic stakeholder feedback in the decision-making process while developing teaching methods prepares students for their future roles as mentors and teachers (35). Introducing newer teaching methods may be challenging and require institutional, cultural and stakeholder acceptance. The process explained in the current study describes the implementation of TBL sessions in a traditionally lecture-based teaching environment, with timetabling restrictions based on gender and cohort size. The concurrent TBL sessions uniquely allow managing a cohort size of over 150 students to experience standardised, diverse and consistent delivery of learning sessions to enhance clinical reasoning skills and critical thinking. The method also provides a blueprint for effectively managing staff requirements for teaching large cohort sizes.

CONCLUSION

TBL sessions increased the perceived enhancement in knowledge, critical thinking and team work regarding treatment planning skills in 5th-year undergraduate dental students. A modified, shorter TBL session was designed by incorporating student feedback. The loop was closed by collecting student feedback yet again. Further studies are recommended in dentistry that compare TBLs with other small-group teaching methods for comparing academic performance and student feedback.

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