

Team-Based Learning Approach for the Delivery of Over-the-counter Module in the Faculty of Pharmacy in Jordan

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ABSTRACT

Team-based learning is an active learning strategy that focuses on student's engagement, development of critical thinking, and transferable skills needed in the workplace. While many pharmacy faculties around the world have applied team-based learning into their curriculums, the implementation of team-based learning into the Middle East is still in the experimental phase and poses its own challenges. This reflective statement elaborates on our experience and feedback of implementing team-based learning for the first time at the pharmacy faculty of Zarqa University in Jordan through the delivery of over-the-counter module.

Key words: Team based learning, Active learning, Pharmacy, OTC, Flipped classroom, Medical education.

INTRODUCTION

A Reflective account of switching from a traditional approach to a team-based learning one to deliver an over the counter module

Similar to the majority of universities around the world, pharmacy students in Jordan are usually taught OTC through traditional lecture-based sessions. In this teacher-centered approach, the student is conventionally a passive recipient of the information delivered by the academic staff. Although the traditional “spoon fed method” is well established, there are many limitations.¹ Firstly, the lecturer usually delivers the module content in the form of didactic slide presentations and explains factual fundamental concepts of the topic with little or no time for elaboration, team discussion, feedback or interaction.² This challenges the students to process information on their own without mentoring support. Likewise, students themselves have also adapted to this method of learning by focusing on literal note making, rote-learning

the content provided by the lecturer, and reproducing this for the assessment.

Accordingly, by taking these surface approaches to learning, students are less likely to retain information after the exam and less likely to be able to apply their knowledge in clinical situations.³ Furthermore, these conventional methods of teaching have no or very little impact on providing pharmacy graduates with the required critical thinking skills to assess and solve problems encountered in clinical settings. Alternatively, team discussions are proven to enhance deeper approaches to learning and understanding through the active process of debating and explaining to their peers.⁴

To tackle the previous limitations of traditional teaching methods, strategies such as Team-Based Learning (TBL), problem-based learning (PBL) and flipped classroom approaches have gained popularity among educators in many medical, science and

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pharmacy schools all over the world in the last few years.^{5,6}

In most of these learning and teaching strategies, class time is used more efficiently to discuss and apply the fundamental knowledge to solve real life problems through active learning that employs higher cognitive and critical thinking skills.^{7,8}

Why do we need clinical reasoning in the pharmacy curriculum?

The importance of community pharmacists' role in diagnosing and advising patients on minor ailments, guiding them to proper medication use and prescribing over the counter (OTC) medications has been recognized by health systems globally. This has encouraged the deregulation of more prescription drugs to OTC in many countries. Therefore, along with the easy access to community pharmacies, pharmacists are obliged not only to have the required knowledge of medicines but also the appropriate clinical reasoning skills to make optimal diagnosis and prescribing decisions.^{9,10}

Indeed, pharmacy students study OTC medications in several modules during their study for the bachelor of pharmacy degree, including dedicated OTC modules to provide the students with the clinical knowledge needed, without focusing on application of this knowledge in clinical situations.¹¹ The traditional way of teaching is successful in delivering content to students, however, it fails neither to promote deep learning nor to develop their problem-solving skills.^{12,13}

While other medical fields focus on developing clinical reasoning skills in their curriculum, a significant number of pharmacy schools are still dictating structured questioning techniques based on mnemonic acronyms and fundamental pathophysiology.¹⁴

PBL has been successfully used to develop clinical reasoning skills in pharmacy students.¹⁵ In PBL, students are supplied with or bring in their own assignments and cases to the class to allow for clinical reasoning to be applied through discussion and analytical thinking.¹¹ Despite that, PBL has a number of limitations: - (1) it is time and resource intensive, (2) it relies on the motivation and preparation level of each student to bring in real clinical problems, (3) it lacks robust evaluation tools and (4) it could result in inconsistency in knowledge acquisition.^{16,17}

On the other hand, TBL is an alternative and a more structured active and collaborative approach to learning that is less resource intensive, guarantees higher levels of cognitive learning as well as development of personal skills such as teamwork, leadership and communication.^{18,19} TBL was developed as an interactive

learning and teaching strategy in the late 1970s by Michaelsen, since then TBL has been implemented and developed in many educational institutions including medical and pharmacy faculties.^{20,21}

The TBL approach to learning can be divided into 3 main steps.²²: - (1) students individually prepare a pre-assigned topic before class, (2) assurance of students' readiness to apply their new knowledge through the use of individual and team assessments, (Readiness Assurance Process) and (3) application of this knowledge to solve real world problems in teams (Application Exercises). Members of each team are selected by the teacher to avoid friends forming intra-team groups. They are usually between 5-7 members in each team and are usually kept the same for an academic year or even longer. This allows team spirit to develop and for team members to learn to work together.²³

MATERIALS AND METHODS

Using TBL within the pharmacy faculty at Zarqa University

The traditional lecture-based teaching method has been used in the faculty of pharmacy at Zarqa University since it was established in 2010. Therefore, it was decided to investigate the feasibility of adapting a new approach for the delivery of the curriculum. After a comprehensive literature review on interactive methods, TBL was chosen for the delivery of the OTC module. It was decided to verify and identify the benefits and challenges of adopting this new learning strategy by implementing TBL in one of the two groups of students taking the OTC module in the academic year 2018-2019 and subsequently comparing data from the two groups. The modules in the Jordanian education system have a 'credit hours' weight based on the number of contact learning hours with academic staff. The system allows students to select their modules based mainly on having passed prerequisite modules and each student having no more than 18 credit hours per semester. Furthermore, class size is limited to 40 students; hence the need for multiple parallel timetabled sessions for students to select from. Although the delivery of those sessions sometimes requires more academic staff to deliver the session, they have the same learning outcomes, and the same teaching material is used. Furthermore, the assessments are the same and are scheduled for all students of the cohort at the same time.

In this study the OTC module was delivered in two separate groups taught by two different academics each delivering the material to one cohort of the students. It was agreed that one group will learn through TBL while

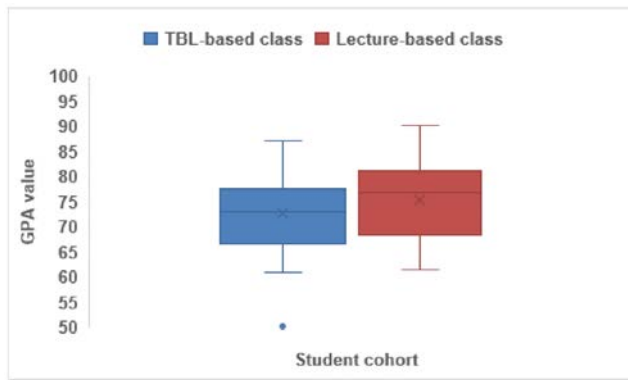


Figure 1: Box and Whisker plot of students' GPA in both TBL-based and lecture-based classes.

The middle line of the box represents the median. The x in the box represents the average. The bottom line of the box represents the 1st quartile. The top line of the box represents the 3rd quartile. The whiskers (vertical lines) extend to the minimum value and maximum value of the GPA for each class. There is an outlier low GPA for one student in the TBL class (50.1). The number of students is 27 in TBL-based class and 22 in lecture-based class.

the other group will continue to use traditional didactic lectures. This arrangement provided a control group to evaluate the relative performance of the students in the two groups to verify any advantage or disadvantage of TBL.

It should be noted that our students chose their OTC group at the beginning of the year without any prior knowledge of the method of delivery. Moreover, the Grade Point Average (GPA) from previous years shows no significant difference between the two groups in terms of student's profile of results hence confirming a random student distribution with comparable academic level (Figure 1).

RESULTS

TBL Implementation

In view of the fact that none of our academic staff had any previous experience of TBL, the decision was made to reach out to expert international colleagues to learn from their experience. The School of Pharmacy at University of Bradford (UoB) has pioneered the delivery of the pharmacy curriculum through TBL in the UK starting in 2012.²⁴ The pharmacy curriculum at UoB was designed to be delivered predominately via TBL in purpose-built learning spaces designed for optimum TBL delivery.²⁵

The decision to implement TBL at Zarqa University was made after visiting UoB to observe TBL in action. This was followed by a training workshop at Zarqa University in the faculty of pharmacy on TBL delivered by a visiting

member of staff from UoB with experience in delivering TBL. After that, it was clear that the experience of TBL in UoB could not be simply replicated at Zarqa University and a more gradual approach to adoption should be followed. After deliberation with UoB staff it was agreed to form a joint team between the two universities to conduct this study, design the methodology and evaluate the outcomes.

The delivery of TBL had to fit within the usual credit hour timetable constraints designed for the traditional style of delivery and ensure synchronization with the other lecture-based group. The OTC module is taught as two one-hour lectures per week. University regulation dictates that same material should be delivered to all students registered on the module; therefore, we were required to use the same set of presentation slides in PowerPoint format as our pre-reading notes for the TBL class. This is different to the comprehensive reading pack that is usually provided to students at UoB.

The notes were uploaded onto our virtual learning environment (Moodle), a week in advance and students were expected to come prepared before the sessions. The first session was dedicated to the individual and team readiness assurance "quiz". This test is referred to as the Readiness Assurance Process or RAP in TBL literature, but the team decided to keep the name "quiz" commonly used in Jordan to refer to short tests other than the main exams). The test was conducted using an online learning games platform; Kahoot.

Multiple Choice Questions (MSQs) were projected on the screen, one at a time, for 0.5-2 min (pre-determined by the staff according to the length and difficulty level of the question). The remaining time was displayed to the students, so they are aware of the timing for each question. Individual students used their mobile phone to choose their answer. Once the individual quiz was finished, the team was challenged with an immediate on-screen feedback using the same set of MCQs used in the individual quiz. Teams discussed the answers to each question as it is projected on the screen and decided on a team answer that is then selected using the mobile phone of the team leader. The question is displayed for 1-2 min followed by a quick facilitated discussion between the teams to explain the rationale for the correct answer (1-2 min). The team exercise serves to facilitate the peer learning and helps team members to explain the rationale to each other to reach a consensus. The benefits of peer learning are well known to enhance student's accuracy after peer discussion, improve information retention, build up new knowledge, encourage student's attendance and reduce failure rate.²⁶

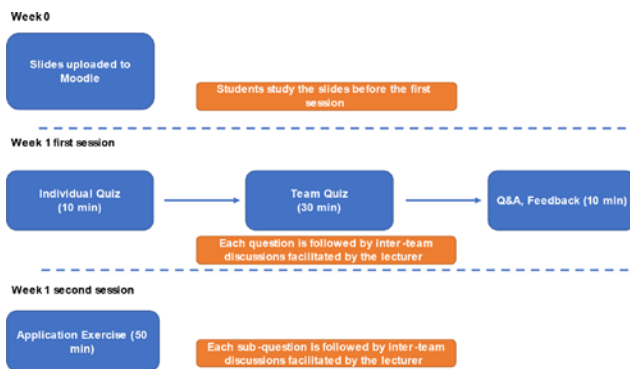


Figure 2: The weekly TBL cycle.
Pre-reading materials are released a week in advance (represented here by week 0).

The second session was reserved for the Application Exercise (AE). This session was designed with the 4S concepts of TBL; same and significant problem, specific defined choice and simultaneous reveal of teams' answers.²⁷ In each AE session a case is presented to the students with up to 10 subsections on differential diagnosis, treatment, referral, OTC options, counseling, and drug-drug interaction. The members of each team discuss each subsection of the patient case, make a collaborative decision on the outcome of each and simultaneously display their chosen answer by writing the letter that corresponds to their choice on a piece of paper. Teams are called upon to summarize the rationale for their decision and justify their answers during a lecturer facilitated discussion between the teams. The lecturer then reveals the preferred answers and summarizes the rationale (Figure 2).

DISCUSSION

The benefits of TBL in delivering clinical reasoning, critical thinking and enhancing student interaction was appreciated by the staff in our faculty of pharmacy following the introductory workshop delivered to us by UoB staff. Nonetheless, the response from faculty members was divided into those in favor and those against. The lecturers who did not support the implementation of TBL reasoned that our students are not used to being independent learners and TBL could be a step too far resulting in negative outcomes without delivering the main objectives of the module.

Nonetheless, I felt that TBL is worth experimenting with because of all the benefits that our students could gain using such an active and collaborative learning strategy. I was very excited to try something new and innovative but also unsure of students' response and outcomes. However, as I had some previous experience with group work through case studies in pharmacology modules,

I felt more confident about the TBL process and with the support I had from the qualified TBL teachers from UoB, I made the decision to deliver the OTC module using TBL.

On the first lecture, the module outline and TBL process was explained to the students. I was filled with dread seeing student resistance with many of them challenging the process. The students protested: "We will not have time to prepare the pre-reading material before every session", "if we are going to learn the topics by ourselves, what is the point of coming to the class?" "It is a waste of time". Expecting a push back, I managed to stay firm and emphasized the benefits of TBL and the reported student satisfaction from the experience of my colleagues at UoB. Finally, I asked the students to give TBL a go first before revisiting the discussion again after 3 weeks.

During the first couple of lectures, I could feel the anxiety and fear from most students. Nonetheless, a few students expressed excitement and positive body language especially while using the Kahoot software. During the first weeks, I had many students asking about the marking system and how these quizzes/ case studies will be evaluated. The concern was mostly about marks as I did not explain to the students that TBL will only have 10% of their final grade in the module because; (1) I want to see what effort they would put in regardless of the marking system, (2) To be able to conduct a comparison study between the TBL class and the traditional class of the OTC module, through interviews and through their final exam performance (worth 90% of the final grade). Typically, students are fixated on passing their modules and are, therefore, averse to change and new learning approaches if they are perceived to jeopardize their chances of success. It was essential therefore to emphasize that TBL implementation has always been linked with an increase in student's engagement and attainment. Moreover, I assured students that the effort they put into these quizzes will count towards their final grade without elaborating on the weighting to keep them motivated.

In addition, students were encouraged to ask questions prior to each topic each week if they needed any clarification on the assigned topic or needed help to understand the pre-reading material.

Some of the challenges encountered while observing the students in group discussions was that a small number of students were not participating in the team discussion, either out of shyness or lack of preparation before the class. To solve this, I told my students that a new student will be selected randomly from the fastest team to answer the question after the discussion time; this in fact increased the student's interaction with each

other because they wanted to be fully prepared as they felt accountable to their own team members. Another challenge was to encourage male students to interact with their teams; as team members were mostly female. Male students requested to work in a separate group but were told that the teams were set up randomly and they should attempt to interact with their fellow female colleagues. Consequently, I established a moderator for each team, based on individual quiz performance, to be responsible for intra-team discussion and to ensure each member contributed towards the final answer. The moderator was also responsible to display the team's chosen answer when called upon to do so by the facilitator. Moderators were changed each week during the module based on the previous week's individual quiz results. This increased students' performance in individual quizzes as they competed not only as teams but within the team itself during the individual quizzes. Observing the students working together to solve the quizzes and the case studies throughout the whole semester was really encouraging. As time passed by, I felt that students were enjoying the classes of this module more than other modules. This was clear from the positive atmosphere in the room and students' body language and verbal feedback; "*I'm having fun*", "*I like this method*", "*I do not need to study as much after the topic is completed*", "*I can retain a lot of the information*".

Overall, the average performance of the students was higher in the TBL class compared to the traditional class (students results will be published in detail in a follow up paper). In addition, clinical reasoning skills were improved with time as better explanation of differential diagnosis and therapeutic choices were given by the students.

A unique challenge for the students in this study stemmed from the structure of the exams in Jordan. Generally, each module has three major assessment (First, Second and Final). The First and Second exams are at weeks 5 and 9 of the semester and each contributes 20% to the final mark of the module. The attendance of students, therefore, was lower during the exams period as the student were not prepared for the topic and therefore did not attend the class. This has affected the team performance in general, as fewer members were present.

The overall TBL experience was positive for most of the aspects, including student performance, engagement, development of critical thinking and clinical reasoning as well as teamwork skills. The concern that our students would not be prepared to adapt to independent learning style was unfounded. Moreover, the traditional barrier to interaction between the genders was quickly

overcome as students were motivated to collaborate to score better grades. However, some technical issues should be addressed in the future to enhance and enrich the TBL experience. These can be summarized by the lack of suitable TBL classroom equipped with dedicated polling hardware and software as well as internet connected devices to allow students to conduct their own research during the application exercise sessions. In this regard by the time this reflective paper was written, a TBL classroom was developed in our faculty to support this teaching method. Furthermore, peer evaluation is an important aspect of TBL whereby students ask their peers to provide them with feedback on their performance as a team member (e.g., attendance, preparation, participation, collaborative skills, etc.) via an evaluation form. Due to time constraints this was not performed during this TBL experience. Therefore, in subsequent iterations peer evaluation should be included as part of the module design to improve their experiences of teamwork and ensure team members can develop these collaborative skills during the module.

CONCLUSION

TBL can enhance pharmacy student's engagement and critical thinking skills. Therefore, it should be incorporated into the pharmacy curriculum at Zarqa University to achieve the intended outcomes of development and application of clinical reasoning skills. However, the faculty's curriculum should be adjusted to allow such learning process to take place, as interaction and attendance was impacted during First and Second exam weeks.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

TBL: Team-Based Learning; **PBL:** Problem-based learning; **OTC:** Over the counter; **UoB:** University of Bradford; **AE:** Application Exercise; **GPA:** Grade Point Average.

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