

**How to Cite:**

Fadelelmoula, T. E., & Abdalla, S. F. (2022). Team-based learning in an undergraduate health science program. *International Journal of Health Sciences*, 6(S3), 10734–10740. <https://doi.org/10.53730/ijhs.v6nS3.8936>

# Team-based learning in an undergraduate health science program

**Tarig Eltoum Fadelelmoula**

Department of Medicine, College of Medicine and Health Sciences, National University of Science and Technology, Sohar, Sultanate of Oman

\*Corresponding author email: [eltarig70@hotmail.com](mailto:eltarig70@hotmail.com)

**Sami Fathi Abdalla**

Department of Clinical Sciences, College of Medicine, Almaarefa University, Daraya, Riyadh, Kingdom of Saudi Arabia

Email: [sbillal@mcst.edu.sa](mailto:sbillal@mcst.edu.sa)

**Abstract**--This study aimed to determine students' learning experiences with team-based learning and the impact of gender and cumulative grade point average (CGPA) on this experience. The investigator observed the students during a team-based learning session, the, and after the session students completed a survey composed of biographical data and quantitative and qualitative questions focusing on the student learning experiences during the session. Before the session, the students agreed that they had no negative perception of team-based learning and observation during the session revealed high student interaction. The students enjoyed all the parts of the team-based learning session and they recommended using team-based learning in more courses. After the session, the students had a positive experience and found team-based learning is valuable and more useful than traditional lecture methods. The effectiveness of TBL as a teaching strategy that stimulates active learning and teamwork skills among students was revealed, but the impact of gender and CGPA on the student's learning experience was not evident.

**Keywords**---active learning, instructional, learning, respiratory care, team-based, earning.

**Introduction**

Traditional lecture methods are instructor-centered and discipline-oriented, resulting in students becoming passive learners who mostly recall some of the course content (Altintas et al., 2014). When we compare TBL with traditional

lectures, having a small group approach as the basic difference from other instructional methods used in higher education, TBL produces more interaction and student-centeredness (Birmingham & McCord, 2004). The purpose of team-based learning (TBL) is to deepen the higher cognitive skills and produce dynamic and interactive teams (Michaelsen & Sweet, 2012). Larry Michaelsen developed TBL in the 1970s when he, too, was facing the same problems many lecturers today are experiencing with traditional lecture methods: low class attendance, low student engagement in class, low value of lectures because they are perceived as boring, and small group work resulting in an opportunity for top-achieving students to dominate group activities (Michaelsen et al., 2007; Sibley & Ostafichuk, 2014). TBL is extensively described and detailed in publications by Michaelsen et al. in the field of health profession education (Michaelsen & Sweet, 2008). TBL ensures that students are more engaged with the course content than simply recalling facts before an assessment or examination (Hawkins, 2014). To apply TBL as an effective instructional method in any program, all targeted courses and the redesign should start enough time before the start of the academic year or term, and in a way that suits the new teaching and learning strategies. The teaching and learning activities will be modified on four different occasions during implementation: in the planning stage before launching the first session, when starting each major unit of instruction, and just before completing the course (Michaelsen et al., 2004).

The TBL methodology comprises three stages: (a) advanced preparation by the students, (b) the individual readiness assessment test (IRAT) and the group readiness assessment test (GRAT) and (c) application, which includes whole class discussion and reasoning (Koles, 2010). The primary goal of TBL is to support a high level of learning, improve the application of learning at both the quantitative and qualitative levels, and support the development of students' interpersonal and teamwork skills (Fink, 2004). In traditional instruction, the class is centered around the instructor, and this minimizes student interaction between students and compromises student-centeredness. On the other hand, during TBL sessions, students are held accountable to the session instructor and other team members for their performance. In addition to individual accountability, group members should have cumulative accountability as a team (Lerner & Tetlock, 1999). However, Kazory and Zaidi reported that first-year medical students who showed preference and satisfaction with TBL over traditional lectures noticed a mixed response to questions about accountability for team learning (Kazory & Zaidi, 2018). A study by Letassy and his colleagues, pharmacy students, perceived TBL to be more effective and engaging, and recommended expanding TBL use in other courses in an undergraduate pharmacy program (Letassy et al., 2008). Previous studies describe the preference of faculty for TBL due to increased student interaction despite requiring a longer design time (Kebodeaux et al., 2017). In our program setting, traditional lectures are the main teaching method and TBL is not an official teaching and learning strategy, but there are efforts to introduce many active learning strategies, including problem-based learning, (PBL), project-based learning and TBL. This study aims to determine learning experiences with team-based learning (TBL) and the impact of gender and cumulative grade point average (CGPA) on this experience.

## Materials and Methods

The study was carried out during the second semester of the academic year 2018-2019, in the Department of Respiratory Care of Almaarefa University in Saudi Arabia, and it is a qualitative descriptive cross-sectional study. All seven level students taking the Cardiology and Electrocardiography Course (RSTH330) participated in a one-day team-based learning activity on ischemic heart disease (IHD), during the activity, students were observed for interaction and group dynamics, then all participants completed a questionnaire to evaluate the TBL session. This questionnaire was reviewed by the Department of Medical Education regarding its validity of the content, clarity, differentiability of the questions, time needed to complete and any biased questions. The activity was conducted as described by Michaelsen & Sweet, comprising three stages: (a) advanced preparation by the students, (b) the individual readiness assessment test (IRAT), group readiness assessment test (GRAT), and (c) application, which includes whole class discussion and reasoning (Michaelsen & Sweet, 2012).

We observed students during group readiness assessment and application, to assess communication and interaction between team members and between different teams. After the session, all participants filled out a questionnaire to evaluate their learning experiences during the different phase of the TBL session. Students scored on a five-point Likert scale ranging from 1 to 5 (5: strongly agree; 4: agree; 3: neutral; 2: disagree; 1: strongly disagree). The main predictor variables were gender and cumulative grade point average (CGPA). The study was approved by Almaarefa University Research Center institutional review board (IRB). The objectives, steps, and the study questionnaire were explained to all participants prior to the session, and they were assured that their data would remain confidential. After the TBL session, the students completed the anonymous electronic questionnaires sent to them by electronic mail. In the end, data analysis was performed using the Statistical Package for the Social Sciences (SPSS) program. We applied descriptive statistics to all the responses of the five subscales to obtain the frequencies, percentages, mean scores, standard deviation, and the average response was calculated for each question.

## Results and Discussions

Thirty-two students participated in the session and responded to the questionnaire. Twenty of the study participants were women (62%), and 22 (69%) were low-achieving people with a CGPA of less than 2 (Table 1).

	N	(%)
Gender		
Males	12	37.5
Females	20	62.5
CGPA*		
Low achievers	22	69
High	10	31

Achievers		
* CGPA Cumulative Grade Point Average		
Low achiever = CGPA $\leq$ 2, high achiever = CGPA $>$ 2		

The investigators observed that the students were actively involved in the discussion, during both the group readiness assessment test and the group readiness assessment discussion, and the students agreed that they had no negative perception about TBL after the instructor had introduced them to it at the beginning of the session (Q1: Mean score=  $2.5 \pm 1.8$  ). The students were neutral in their response, regarding preparation in advance for classes (Q2: Mean score=  $2.9 \pm 1.2$ ); however, they agreed that knowing that they would discuss their opinions during the TBL session motivated them to prepare in advance (Q3: Mean score=  $3.7 \pm 1$ ). Regarding participation in discussions during sessions, students were neutral about feeling sleepy during traditional lectures more than during this TBL session (Q4: Mean score=  $3.2 \pm 1.1$ ), and that the TBL session may have increased their participation in class discussion (Q5: Mean score=  $3.4 \pm 1$ ). The students reported and agreed that they already work in a team with their peers (Q6: Mean score=  $3.9 \pm .8$ ), and they were fully engaged during the TBL session (Q7: Mean score=  $3.8 \pm .9$ ). Regarding enjoying the different stages of the TBL, student scores were neutral for the individual readiness assessment test (Q8: Mean score=  $3.1 \pm 1.4$ ), and the group readiness assessment test (Q9: Mean score=  $3.4 \pm 1.2$ ), however, they agreed that they enjoyed the group readiness discussion (Q10: Mean score=  $3.5 \pm 1.1$ ). Generally, 72.7% of the students agree that TBL should be adopted and used as a teaching method in more courses in the respiratory care curriculum (Q11: Mean score=  $3.6 \pm 1.3$ ).

Table 2  
Results of the Team-Based Learning (TBL) Survey on Student Learning Experiences

	Students' Responses N (%)					Mean Score	SD	Result interpretation
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree			
<b>Negative Perception of TBL</b>								
Q1: I used to have a negative perception of team-based learning before this session	2 (6)	6 (19)	3 (9)	16 (50)	5 (16)	2.5	1.2	Disagree
<b>Preparation in advance for classes</b>								
Q2: I usually prepare in advance for lectures in most of my courses	2 (6)	12 (38)	2 (6)	13 (41)	3 (9)	2.9	1.2	Neutral
Q3: Knowing that I would discuss my opinions during this TBL session motivated me to prepare in advance	7 (22)	15 (47)	5 (16)	4 (12)	1 (3)	3.7	1	Agree
<b>Engagement during sessions</b>								
Q4: I am more likely to feel sleepy during traditional lectures than during this session	2 (6)	15 (47)	4 (13)	10 (31)	1 (3)	3.2	1.1	Neutral
Q5: This session increased my participation in the class discussion.	3 (9)	16 (50)	6 (19)	6 (19)	1 (3)	3.4	1	Neutral
<b>Working in teams</b>								

This study aimed to evaluate a one-day team-based learning activity administered to a cohort of students enrolled in an undergraduate electrocardiography and cardiology course. In our program setting, traditional lectures, laboratory sessions, and bedside teaching are the main teaching and learning methods, but TBL is not an official strategy, currently there are efforts to introduce many active learning strategies, including problem-based learning (PBL), team-based learning (TBL), and flipped classroom. Student observation during this TBL session showed interaction and teamwork, which is among the most important benefits

and objectives of TBL implementation compared to traditional teaching methods (Altintas et al., 2014; Birmingham & McCord, 2004; Michaelsen & Sweet, 2007). Students knowing that they would discuss their opinions during the TBL session motivated them to prepare in advance; this indicates their increased commitment and accountability, and this reflects an important principle that in TBL sessions students are rendered accountable to the session instructor and other team members for their performance quantity and quality (Michaelsen & Sweet, 2008; Hawkins, 2014; Michaelsen et al., 2004). In this study, we conducted a typical TBL session as described in the literature, with the aim of supporting the development of students' interpersonal and teamwork skills (Koles, 2010; Fink, 2004; Lerner & Tetlock, 1999). The agreement (Mean score = 3.9 SD= .8) on their full contribution to their teams during the TBL session is promising and supports the results of Kazory and Zaidi about the first-year medical students who showed preference and satisfaction with TBL over traditional lectures (Kazory & Zaidi, 2018). It is rewarding that the students perceived TBL to be more effective and engaging and recommended using TBL in more curriculum courses, and these results support a previous study among pharmacy students by Letassy and his colleagues (Letassy et al., 2008). Although this study did not include teachers' perceptions about the use of TBL, many previous studies described faculty preference for TBL due to increased student interaction despite the requirement of more time for design (Kebodeaux et al., 2017). A larger study that includes the opinions of both students and teachers' opinions is required as a baseline before we officially implement TBL in our undergraduate respiratory care program.

## **Conclusions**

At the end of this study, the authors would like to state that team-based learning was an effective teaching strategy and stimulated active learning and teamwork skills among this cohort of students, but both gender and academic achievement had no effect on the learning experience. This study was limited by the small number of participants. A larger study is required to test the significance of these beneficial effects of team-based learning as a teaching strategy in undergraduate programs in different disciplines.

## **Acknowledgments**

The authors would like to thank Al-Maarefa University, Riyadh, Kingdom of Saudi Arabia, for providing the necessary facilities to carry out this study.

## **References**

- Altintas, L., Altintas, O., & Caglar, Y. (2014). Modified use of team-based learning in an ophthalmology course for fifth-year medical students. *Advances in physiology education*, 38(1), 46–48. <https://doi.org/10.1152/advan.00129.2013>
- Birmingham, C., & McCord, M. (2004). Group process research: Implications for using learning groups. In L. K. Michaelsen, A. B. Knight & L. D. Fink (Eds.), *Team-based learning: A transformative use of small groups in college teaching* (pp. 73-93). Sterling, VA: Stylus.

- Fink, L. D. (2002). Beyond Small Groups Harnessing the Extraordinary Power. Team-based learning: A transformative use of small groups, 1.
- Hawkins, D. (2014). Rationale and method for developing team-based learning education. *A Team-Based Learning Guide for Faculty in the Health Professions*. Bloomington, IN: AuthorHouse, 1-10.
- Kazory, A., & Zaidi, Z. (2018). Team-Based Learning Activities for First-Year Medical Students: Perception of the Learners. *Southern medical journal*, 111(9), 525–529.  
<https://doi.org/10.14423/SMJ.0000000000000865>
- Kebodeaux, C. D., Peters, G. L., Stranges, P. M., Woodyard, J. L., & Vouri, S. M. (2017). Faculty perception of team-based learning over multiple semesters. *Currents in pharmacy teaching & learning*, 9(6), 1010–1015.  
<https://doi.org/10.1016/j.cptl.2017.07.004>
- Koles, P. G., Stolfi, A., Borges, N. J., Nelson, S., & Parmelee, D. X. (2010). The impact of team-based learning on medical students' academic performance. *Academic medicine : journal of the Association of American Medical Colleges*, 85(11), 1739–1745.  
<https://doi.org/10.1097/ACM.0b013e3181f52bed>
- Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological bulletin*, 125(2), 255–275.  
<https://doi.org/10.1037/0033-2909.125.2.255>
- Letassy, N. A., Fugate, S. E., Medina, M. S., Stroup, J. S., & Britton, M. L. (2008). Using team-based learning in an endocrine module taught across two campuses. *American Journal of pharmaceutical education*, 72(5), 103.  
<https://doi.org/10.5688/aj7205103>
- Michaelsen, L. K., Knight, A. B. & Fink, L. D. (2004). *Team-based learning: A transformative use of small groups in college teaching*. Sterling, VA: Stylus: vii-xi.
- Michaelsen, L. K., & Sweet, M. (2008). The essential elements of team-based learning. *New directions for teaching and learning*, 2008(116), 7-27.  
<https://doi.org/10.1002/tl.330>
- Michaelsen, L. K., & Sweet, M. (2012). Fundamental principles and practices of team-based learning. *Team-based learning for health professions education: A guide to using small groups to improve learning*, 9-34.
- Michaelsen, L. K., Parmelee, D. X., McMahon, K. K., & Levine, R. E. (2007). *Team-based learning for health professions education: a guide to using small groups*. Stylus Publishing LLC, Sterling, USA.
- Sibley, J., & Ostafichuk, P. (2014). Introduction to team-based learning. Sibley J, Ostafichuk P. *Getting Started With Team-Based Learning*. Sterling, VA: Stylus Publishing, 3-15.  
<https://doi.org/10.7771/1541-5015.1701>
- Suwija, N., Suarta, M., Suparsa, N., Alit Geria, A.A.G., Suryasa, W. (2019). Balinese speech system towards speaker social behavior. *Humanities & Social Sciences Reviews*, 7(5), 32-40. <https://doi.org/10.18510/hssr.2019.754>
- Widana, I.K., Dewi, G.A.O.C., Suryasa, W. (2020). Ergonomics approach to improve student concentration on learning process of professional ethics. *Journal of Advanced Research in Dynamical and Control Systems*, 12(7), 429-445.