Original Article

Medical Students' Perception and Satisfaction towards Team-Based Learning at Alfajr College for Science and Technology, Sudan, 2022

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Abstract

Background: Team-based learning (TBL) is an active learning strategy that provides learners with opportunities to apply conceptual information through a series of activities that include individual work, group work and instant feedback. It is defined as an evidence-based cooperative learning educational strategy designed around modules that are taught in three stages; learners preparation; individual and group readiness assessment test; and finally, team application.
Aim: The study aimed to assess the perception and satisfaction of medical students towards TBL at Alfajr Collage for Science and Technology.
Methodology: The study was a cross-sectional study, conducted at Alfajr College for Science and Technology in the year 2022. The targeted group was students from the fourth and fifth levels; the data was collected through a self-administered online interview using a pretested structured questionnaire. The data were entered, cleaned, and analyzed using SPSS version 25. The chi-square test was used for categorical variables.
Results: Of 131 interviewed medical students, females were the majority constituting 61%. More than half (53%) of the students found that their performance on the examination is affected positively by their participation in TBL; and the fifth-year students stated that they benefited much from TBL specifically in the surgery course. Nearly 90% of students were satisfied with the TBL approach and they felt that they would recommend the TBL program to other universities in Sudan. There was a significant correlation between the female gender and the perception of the usefulness of TBL (p value = 0.009).

Conclusion: Medical students at Alfajr College had positive perception towards TBL and the majority of students were satisfied with the TBL approach. The number of TBL activities during the course was crucial to reinforce the students' benefit from this type of activity. This was reflected in the students' opinion of the benefits of TBL in the surgery course, which happened to have the largest number of activities compared to other courses.

Keywords: *Team-Based Learning, Medical Students, Perception, Satisfaction, Sudan*

Introduction:

Team-based learning (TBL), introduced by Larry Michaelsen in 1979, is defined as an evidence-based, active, cooperative learning educational strategy that provides learners with opportunities to apply conceptual information through a series of activities that include individual work, group work and instant feedback (1). TBL is designed around modules that are taught in three stages.

First Step: the learners are prepared for TBL study out of class and individually. The tutors prepare learning objectives and indicate reading materials from textbook chapters, articles, videos, or PowerPoint slides.(2)

Second Step: the learner's knowledge of the subjects studied in the first stage is assessed by individual Readiness Assessment Test (iRAT) in classthrough completing a 15-20 multiple-choice question (MCQ)test.This is followed bycreating small groups for discussions between the classmates in-class; and repeating the same MCQin a group Readiness Assessment Test (gRAT).(3)

For immediate feedback, a special type of scoring card known as an “Immediate Feedback Assessment Technique" is used; in which the answers are covered by opaque covering films. The teams must negotiate which answer to choose; the learners scratch off the chosen answer, and the correct answer is indicated by a star. If the learners do not find a star, they continue to discuss the question and pick other options sequentially. The gRAT is a high-energy learning event. To conclude the Readiness Assurance Process, the instructor clarifies for the students -in a mini-lecture- the concepts that they debated during the gRAT; and encourages teams to consider creating written appeals for questions they got incorrect(4). This forces students back into the reading materials where they

having difficulties. Then the team searches for the right answer and may decide to complete the appeal forms with their rationale and defense for their answer. The appeal must consist of (a) a clear statement of the argument, and (b) evidence cited from the preparation materials. The instructor collects these forms and considers them after class.

Third Step: in this stage which is called "Team Application", in-class/team, the learner goes through the presented scenario and applies deep knowledge and understanding by making interpretations, calculations, analysis, and synthesis of the given information; and makes a specific choice from a range of options. This is posted and explained to the class (5). The primary learning objective in TBL is to go beyond simply "covering" content and focus on ensuring that students can apply the course concepts to solve the problem (6). Moreover, TBL changes the classroom experience from acquiring knowledge in a lecture-based format to applying knowledge in a team format (7). Most of the class time is used for team assignments that focus on using course content to solve problems that students are likely to face in the future. Thus, TBL is designed to provide students with both conceptual and procedural knowledge (6,8). TBL is a student-centered and teacher-directed teaching strategy(9).It promotes self-directed learning(10) and improves student participation, motivation and engagement during class(11).

The four essential elements for TBL are shown in table (1):

Table (1) The four essential elements for TBL
1. The groups must be properly formed and managed
2. Students must be accountable for the quality of their individual and group work
3. Students must receive frequent and timely feedback
4. Group assignments must enhance learning and the development of the team

When these four essential elements are implemented in a course, the stage is set for student groups to evolve into cohesive learning teams (8,12–14).

Worldwide, a large number of institutions adopted TBL as a learning strategy, and Alfajr College for Science and Technology (ACST) in Sudan is one of them. Since TBL was introduced in 2001, no study was conducted in Sudan to explore the perception and satisfaction of medical students towards TBL. The present study aimed to assess the perception of Alfajr medical students regarding the effects of TBL on their academic performance. We hope that, it will be an added value to the global literature on the issue.

Methods:

This was a descriptive cross-sectional institution-based study, conducted at the program of medicine, ACST. Students start the TBL program in the first year, however, the bulk of TBL activities are covered in the clerkship courses in the fourth and fifth levels.

Sample Size and Sampling:

Sample size was calculated using the formula: $n=N/(1+Ne^2)$

Where n is the sample size; N is the total number of the medical students, (e) is the margin of error at 95th confidence interval = 0.05.

The total number of students was 197, distributed between the fourth level (93 students) and the fifth level (104 students). The calculated sample size was 131 students distributed proportional to the size of the fourth and fifth levels as 62 and 79 respectively. From each level the students were enrolled by convenient sampling technique. Regarding clerkship courses and the number of TBL sessions, the fifth level courses covered were: Paediatrics (6 sessions), Obstetrics and Gynaecology (7 sessions), Medicine (7 sessions) and Surgery (9 sessions). Whereas for the fourth level, only one course was included; Medicine (7 sessions). The data was collected through a self-administered interview using an online Google questionnaire. The questionnaire was adapted from previous

studies (15) and validated by an expert. Then the questionnaire was distributed through the students' group leaders using WhatsApp. Courses covered were in semesters seven, eight, nine and ten; in which 17, 15, 13 and 13 TBL sessions were carried out respectively.

Data Analysis:

The data were entered, cleaned, and analyzed using SPSS version 25. The chi-square test was used for categorical variables. A *p*-value of 0.05 or less was considered statistically significant. The data was summarized and presented in tables and diagrams.

Ethical considerations:

Ethical approval was obtained from ACST Research Ethical Committee. Informed written consent was sent to the participants and attached to the Google form. Filling and sending back the questionnaire was considered as acceptance to participate in the study. Anonymous questionnaires were used and confidentiality was ascertained.

Results:

This study involved 131 medical students from ACST with 100% response rate. The age range was 20 – 30 (mean 23 years). Females represented the majority (61%). Table 2 shows that female gender correlated best with positive perception about the usefulness of TBL (p= 0.009).

Table (2) shows the Statistical correlation between the perception of the students about the usefulness of TBL with other variables, including Age, Gender, Academic years, and Academic grade.

Table (2) Correlation between the Perception of the Students about the Usefulness of TBL with other Variables.

(*Significant correlation)

		TBL is Very Useful					**Total**	**p value**
		Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**		
Gender	Female	33	42	3	0	1	79	0.009*
	Male	16	23	4	6	3	52	
Age	20_23 years	11	28	2	1	1	43	0.347
	24_26 years	18	20	1	2	1	42	
	more than 26 years	20	17	4	3	2	46	
Academic year	4th year	24	28	5	5	0	62	0.064
	5th year	25	37	2	1	4	69	
Academic grade	Excellent	18	8	1	0	0	27	0.062
	Good	15	34	2	5	3	59	
	Pass	3	8	1	0	0	12	
	Very good	13	15	3	1	1	33	

Most of the participants were residents of Khartoum State.

Students' opinion on the effect of TBL on their personal educational achievements are shown in Table 3. Thus all the nine attributes of educational gain were reported positively by the vast majority of the students.

Table (3) Students' opinion about the usefulness of TBL at personal educational achievements level.

STATEMNT	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
1. TBL is useful as a medical educational tool	49 (37.4)	65 (49.6)	7 (5.3)	6 (4.6)	3.1 (4)
2. TBL had a positive impact on my learning attitude	37 (28.2)	65 (49.6)	13 (9.9)	2 (1.5)	10.7 (14)
3. TBL is an effective, motivating learning process.	43 (32.8)	61 (46.6)	11 (8.4)	3 (2.3)	9.9 (13)
4. TBL helped me to obtain a higher level of knowledge	31 (23.7)	65 (49.6)	18 (13.7)	3 (2.3)	10.7 (14)
5. TBL promoted increased reading of textbooks by students.	29 (22.1)	60 (45.8)	24 (18.3)	9 (6.9)	6.9 (9)
6. TBL challenged me to give my best.	21.4(28)	66 (50.4)	21 (16.0)	7 (5.3)	6.9 (9)
7. TBL helped me to assess present knowledge.	26.0(34)	75 (57.3)	10 (7.6)	4 (3.1)	6.1 (8)
8. Student-to-student discussion helped me to learn concepts covered during TBL exercise better than if studied independently.	26.0 (34)	63 (48.1)	19 (14.5)	7 (5.3)	6.1 (8)
9. TBL facilitated long-term retention of information covered in the TBL exercise.	14.5 (19)	77 (58.8)	26 (19.8)	4 (3.1)	3.8 (5)

The overall positive opinion of students on *personal gains from TBL* is shown in Figure 1, where the scores of 'strongly agree and agree' were amalgamated together; and those of 'disagree and strongly disagree' were similarly added together. The two groups of scores were separated by "neutral' score. As shown, the positive score was above 70% for most attributes.

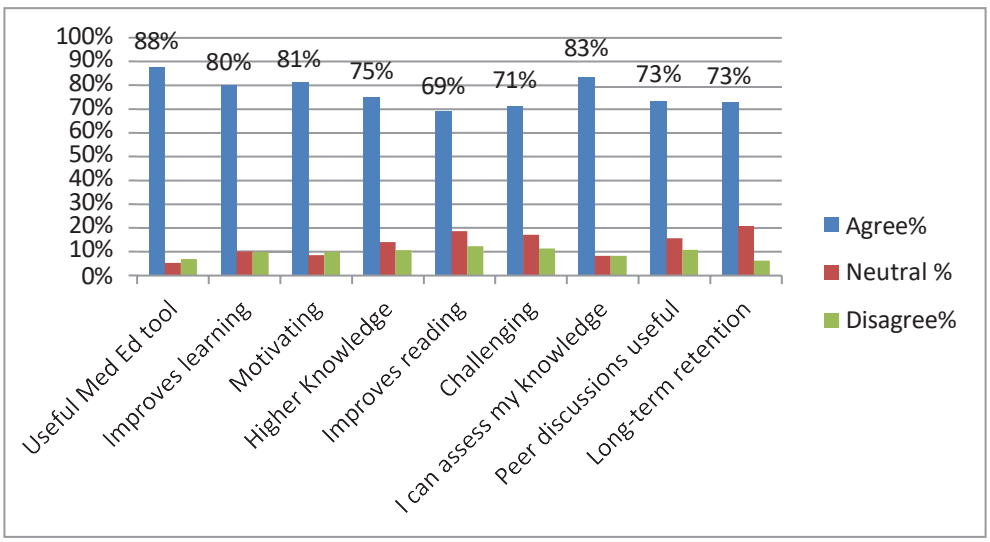

Figure 1: Students' opinion on the impact of TBL on their educational process

Table (4) Students' opinion about the usefulness of Team Based Learning at gains in time-management, cognitive achievements and team collaboration, Alfajr College for Science and Technology.

STATEMNT	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
1. The amount of material learned while preparing for TBL is worth the time of investment.	17 (13.0)	64 (48.9)	22 (16.8)	21 (16.0)	5.3 (7)
2. TBL sessions foster the use of critical reasoning and clinical problem-solving skills.	22 (16.8)	73 (55.7)	25 (19.1)	4 (3.1)	4.6 (6)
3. All team members made an effort to participate in the discussion.	17(13.0)	67 (51.1)	23 (17.6)	17 (13)	5.3 (7)
4. The tutor helped me to focus on discussions and learning.	22 (16.8)	71 (54.2)	22 (16.8)	8 (6.1)	6.1 (8)
5. l received useful and timely feedback from the tutor.	18 (13.7)	59 (45.0)	29 (22.1)	17 (13)	6.1 (8)
6. Student's performance on the examination is affected by participation in the TBL program.	18 (13.7)	69 (52.7)	26 (19.8)	12 (9.2)	4.6 (6)
7. Overall, I am very satisfied with the TBL approach.	42 (32.1)	71 (54.2)	13 (9.9)	3 (2.3)	2 (1.5)
8. l will recommend the TBL program to other universities in Sudan.	59 (45.0)	58 (44.3)	10 (7.6)	2 (1.5)	2 (1.5)

The overall positive opinion of students on *general attributes of TBL* is better shown in Figure 2, where the scores of 'strongly agree and agree' were amalgamated together; and those of 'disagree and strongly disagree' were similarly added together. The two groups of scores were separated by "neutral' score. As shown, the positive score was 60% or above for all attributes,

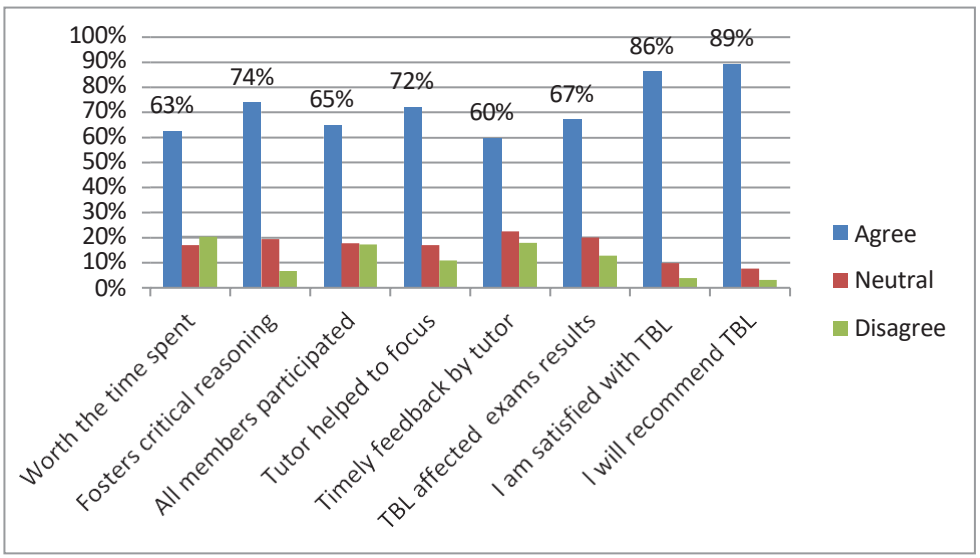

Figure 2 Students' opinion about general attributes of TBL, Alfajr College for Science and Technology

The most positive perception (strongly agree plus agree) was about recommending the TBL program to other universities in Sudan and satisfaction with the TBL approach (89.3% and 86.3% respectively).

Table (5) shows the distribution of the students' positive opinion about effectiveness of TBL according to different courses in the fifth level.
Note that the highest score was achieved by the surgery course, because they had the highest number of TBL activities.

Table 5: The Students' opinion about the effectiveness of TBL courses in the fifth year level, Alfajr College for Science and Technology

Specialties	No of sessions of TBL carried out	Percent of Students' who approved of TBL usefulness
Surgery	9	44%
Medicine	7	14%
Pediatrics	6	8%
Obse and Gynae	7	3%

Regarding the frequency of the TBLs to be conducted each month, half of the fifth-year students recommended that TBL should be conducted every two weeks, (40%) recommended one per week, and (8.7%) preferred it to be once each month.

Figure (3) represents that (86%) of the fifth-year students agreed on advising the next batch to pay more attention to TBL.

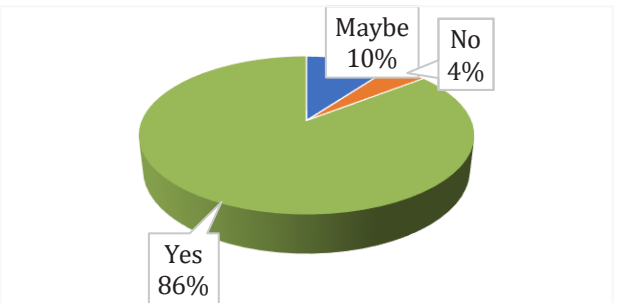

Figure (3) Distribution of the fifth-year students' opinions "that they will advise the next batch to exert efforts and attention to TBL", Alfajr College for Science and Technology, Sudan, 2022

Discussion:

Medical education in many countries increasingly focuses on developing teaching strategies that help students achieve higher levels of learning. The present study aimed to explore the perception and satisfaction of fourth and fifth-level medical students toward Team-based learning. The study revealed that the most strongly agreed statement of perception that they will recommend the TBL program to other universities in Sudan, followed by, they are very satisfied with the TBL approach, Santana et al., 2019; Vasan et al., 2009(16,17) reported such findings. About 53% of students found that performance on the examination is affected by participation in TBL, and several studies reported that TBL participation strongly correlated with final examination score (18). Approximately 49% felt that student-to-student discussion helped them to learn concepts covered during TBL exercise better than if studied independently and

this is comparable to the study done by Jabbar et al., 2018 and Parthasarathy et al., 2019(13,19). In contrast to Vasan et al., 2009(17), there was a positive correlation between the agreements of the statement "TBL is an effective, motivating learning process" and gender, while no significant correlation with the academic score. Fifty six percent of students agreed that TBL sessions foster the use of critical reasoning and clinical problem-solving skills, and this result is consistent with Ahmed et al., 2022(20), and likewise Inuwa, 2012. About 64% of fifth-year students revealed they benefited much from TBL in surgery, and 64% of fourth level students were satisfied with internal medicine clerkship TBL. This is probably due to frequency of TBL conducted for those courses. The least student satisfaction (less than 60%) was related to the usefulness of feedback they receive from the tutors. Medical school is a very hard and tough period for the doctor, a student could benefit from the help of his peers as much as from his teacher. Also, the TBL creates a social environment between the students and helps to make the learning process much simpler. Team-Based learning enhances the academic performance of students with a deeper knowledge of course concepts, higher cognitive skills, and retention of academically weaker students (21).

Conclusion:

In this study, medical students at ACST had a positive perception of Team-Based Learning and the majority were satisfied with the Team-Based Learning approach.

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Conflict of Interest: None

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