

Comparison of medical students' learning approaches between electronic and hard copy team-based learning

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ABSTRACT

Aim: To compare the students' perception of team-based learning (TBL): The paper (hard copy) compared with the e-copy (electronic copy) in the family medicine course of the fifth year medical students, Qassim University College of Medicine.

Methods: A cross-sectional study was conducted during the family medicine course in 2015-2016 to compare the hard copy and the e-copy TBL sessions. We used Google drive to distribute, collect and analyze the questionnaire. The results of the e-copy TBL are shown and displayed directly with each session to the students, which was not the same as practiced with hard copy. We used also SPSS (version 17 for Windows) for more statistical analysis.

Results: The total number of respondents of students in each was 96; a phase of TBL phase 1 (hard copy) and phase 2 (e-copy). Male were 64 (66.7%) and females 32 (33.3%). The first three knowledge questions showed no difference between the mean score between paper and e-copy TBL, but of the perception questions showed a significant difference between the paper and e-copy TBL.

Conclusions: The results of the survey showed that the students prefer e-copy TBL as a course format, as it was an attraction for most of the students and making them even more successful in the key exam and e-copy TBL develop the skills needed to work productively in task-groups.

Keywords: E-copy, family medicine, Qassim, team-based learning

Introduction

Qassim University, College of Medicine (QUCOM) established in 2004, it is the first medical college to adopt the program of problem-based learning (PBL) and community-oriented medical education approach in KSA, because of these innovative educational strategies, QUCOM in a relatively in a short period has earned the status of a leader in medical education in the kingdom. The number of students in different educational activities is highly variable; in small group teaching activities such as PBL, the number of enrolled students ranges from 6 to 10 students. The actual number of admitted medical students has grown in the last five years; more for boys than that for girls. Always QUCOM seek to be leading nationally and internationally recognized college in innovative medical education by improving the educational strategies and improving the health of the society by preparing competent health professionals.^{1,2}

The team-based learning (TBL) strategy had been introduced internationally in medical education in 2001, a study was conducted to determine whether student performance on examinations is affected by participation in TBL that study showed that the performance of students is higher in the first years of medical study.³

In 2013, QUCOM introduced TBL in some departments; the Radiology Department presented a poster in SIMC - Qassim 2014.⁴ The Family Medicine Department QUCOM, introduced the traditional paper TBL in 2014 and the e-copy TBL in 2015.

There is clear evidence that TBL is an effective way to integrate interactive peer small group education and enthusiasm for learning, now there is an increase courses in the Qassim College of Medicine using TBL medical education.⁵

The TBL activities are:

Phase 1: Individual preclass preparation; self-learning

Phase 2: Readiness assurance in-class for the selected topic

Phase 3: Application in-class. The students were divided into groups according to their GPA; each group contains at least one of each rate.^{6,7}

Methods

We conducted a cross-sectional study during the three family medicine rotations in 2015-2016, the students were invited to participate (72 males and 38 females) to compare a traditional paper TBL session using the paper and a-copy TBL sessions. We used the Google drive to inter and help to analyze the

data, and then, the results of the work are shown directly to the students during the TBL session.

Study setting

5th-year medical student's during the family medicine course, using a well-constructed validated questionnaires (Table 1), the questions were grouped into categories; knowledge and perception TBL questions, the questions used help to assess; present knowledge, reduces the time for self-study, helps to get to a higher level of knowledge, focus on core information, reduces the amount self-study, understanding of the course material, prepare for course examinations, useful learning activities, facilitated the learning process, were attentive during TBL sessions, contribute meaningfully to the TBL discussions and overall preference e-copy TBL or the paper sessions. The opinion of a focus group of expert faculty was taken.

Sample size

We assumed that the sample size was calculated based on the assumption that participants selection of e-copy ($P = 0.5$), then $(1-p = 0.5)$, assuming $d = 0.1$ (confidence limit is $P \pm 10\%$), then desired sample size ($n = 95$), we increased the number to 10% to account for the design effect.⁸

Groups: Steps of instructional strategy in TBL, preclass self-learning followed by in-class team-focused active learning:

- Step 1: Individual study of assigned objectives
- Step 2: Individual readiness assurance test
- Step 3: Group readiness assurance test
- Step 4: Faculty feedback and clarification (mini-lecture)
- Step 5: Group case studies with faculty facilitation.

The hard copy TBL activities as described by Michaelsen 30-40 students should be divided into groups, each group could be about 6-7 students.⁹ We used the same the same approach of grouping (about 6-7 students) in TBL e-copy sessions.

Distributing and collecting of data

The questionnaire was distributed among fifth year medical students to: Phase I (paper) TBL session and Phase II (e-copy) TBL session, the questionnaire was distributed to the students and collected through a link designed on Google drive. We have used also SPSS (version 17 for Windows) for descriptive statistics as expressed in: Frequencies, percentages and as mean \pm standard deviation (SD), Chi-square test to compare between categorical variables, and Student's *t*-test was used to compare means between the two groups, and also the help of Google drive to do some analysis of the collected data.

Results

The total number of respondents of students in each is 96; a phase of TBL phase 1 (hard copy) and phase 2 (e-copy). Male are 64 (66.7%) and females 32 (33.3%).

Table 2 shows the total score of the mean knowledge TBL questions, the two phases (paper and e-copy) showed no significant difference in; assess present knowledge ($P = 0.9$), reduces time needed for self-study ($P = 0.4$), and helps to a higher level of knowledge ($P = 0.8$).

The total score of the mean of the perception question showed a significant difference between the two TBL phases as it is higher in e-copy than paper, and TBL helps to focus on core information (3.8 ± 0.8 and 3.4 ± 0.9 , respectively) $P < 0.001$, helps to increase understanding of the course material (3.9 ± 0.8 and 3.4 ± 0.7 , respectively) $P < 0.001$, and helps me prepare for course examinations (3.6 ± 0.9 and 3.3 ± 0.8 , respectively) $P = 0.04$. Discussions of the TBL learning issues were useful learning activities (4 ± 0.8 and 3.7 ± 0.7 , respectively) $P = 0.02$, TBL the instructor highly facilitated the learning process (4.2 ± 0.93 and 3.6 ± 0.8 , respectively) $P < 0.001$, and I contributed meaningfully to the TBL discussions (4.2 ± 0.95 and 3.5 ± 0.9 , respectively) $P < 0.001$) and the students prefer the e-copy more than paper copy TBL; $n = 57$ (60%).

Table 1: Rating of items according of Likert scale

| Questionnaire items/score | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|--|-------------------|----------|---------|-------|----------------|
| | 1 | 2 | 3 | 4 | 5 |
| TBL helps to assess present knowledge | 1 | 2 | 3 | 4 | 5 |
| TBL reduces the amount of time needed for self-study | 1 | 2 | 3 | 4 | 5 |
| TBL helps to get me to a higher level of knowledge | 1 | 2 | 3 | 4 | 5 |
| Learning issues helped me to focus on core information | 1 | 2 | 3 | 4 | 5 |
| Helped me increase my understanding of the course material | 1 | 2 | 3 | 4 | 5 |
| TBL helped me prepare for course examinations | 1 | 2 | 3 | 4 | 5 |
| Discussions of the TBL learning issues were useful learning activities | 1 | 2 | 3 | 4 | 5 |
| The instructor highly facilitated the learning process | 1 | 2 | 3 | 4 | 5 |
| Most students were attentive during TBL sessions | 1 | 2 | 3 | 4 | 5 |
| I contributed meaningfully to the TBL discussions | 1 | 2 | 3 | 4 | 5 |

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly agree

Table 2: Family medicine rotations questionnaire responses to TBL

| Questionnaire items/score | Responses | | | Mean score±standard deviation | | | P* |
|--|-----------|----|-----|-------------------------------|---------|----------|-------|
| | (n=192) | | | Total sample | Paper | e-copy | |
| | 1-2 | 3 | 4-5 | (n=192) | (n=96) | (n=96) | |
| TBL helps to assess present knowledge | 34 | 51 | 107 | 3.2±1.1 | 3.2±1.1 | 3.2±1.1 | 0.9 |
| TBL reduces the amount of time needed for self-study | 32 | 59 | 101 | 3.4±0.9 | 3.4±1 | 3.5±0.9 | 0.4 |
| TBL helps to get me to a higher level of knowledge | 16 | 73 | 103 | 3.5±0.8 | 3.3±0.8 | 3.5±0.8 | 0.8 |
| Learning issues helped me to focus on core information | 19 | 61 | 112 | 3.6±0.9 | 3.4±0.9 | 3.8±0.8 | 0.001 |
| Helped me increase my understanding of the course material | 14 | 64 | 216 | 3.7±0.8 | 3.4±0.7 | 3.9±0.8 | 0.001 |
| TBL helped me prepare for course examinations | 20 | 77 | 95 | 3.5±0.9 | 3.3±0.8 | 3.6±0.9 | 0.04 |
| Discussions of the TBL learning issues were useful learning activities | 10 | 43 | 139 | 3.6±0.8 | 3.7±0.7 | 4±0.8 | 0.02 |
| The instructor highly facilitated the learning process | 11 | 46 | 135 | 3.9±0.9 | 3.6±0.8 | 4.2±0.93 | 0.001 |
| Most students were attentive during TBL sessions | 65 | 72 | 147 | 3.9±0.9 | 3.7±0.7 | 4.2±0.9 | 0.001 |
| I contributed meaningfully to the TBL discussions | 9 | 51 | 132 | 3.9±0.9 | 3.5±0.7 | 4.2±0.95 | 0.001 |

*P-values indicate the statistical significance of differences between the paper and e-copy TBL calculated by Chi-squared test. 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.
TBL: Team-based learning

Discussion

The family medicine is with wide a variety of volumes and health problems, this lets the medical student in a predicament and contact hours the books.¹⁰ Our study suggests that improving the TBL using e-copy sessions will help the student to improve in; the team work, the discussions, the focus of the information, understanding of the course material, and help in the examination.

Researchers have shown that medical students enrolled in a PBL curriculum are similar to academic students in the traditional lecture-based approach, based on the medical licensing exams in the United States during the period of 7-year.¹¹

QUMED started PBL as an active learning method, this proved to be useful in undergraduate medical education. Our approach in using e-copy TBL allowed us to replace paper (hard copy) TBL and also replace some lectures with learning issues that enabled students to work individually and as a team in learning family medicine. In comparison TBL with passive learning and traditional lectures, the team interactions are strongest, allow more participation of students and strengthen, and activate the knowledge construction.¹² A study showed that TBL works to increase the participation of students, preparedness, and to improve problem-solving, and improve teamwork skills, knowledge and outcomes.¹³

Our study, when compared with a different study, showed no significant difference between these studies in the first three questions of knowledge of TBL.¹⁴ While our study showed a significant difference in the questions related to perceptions of TBL; get higher knowledge, focus core information, understanding the course material, help for exams, useful learning activity, proper facilitated by instructors, and more attentive of students. Overall the study revealed that the students prefer e-copy TBL (Figure 1).

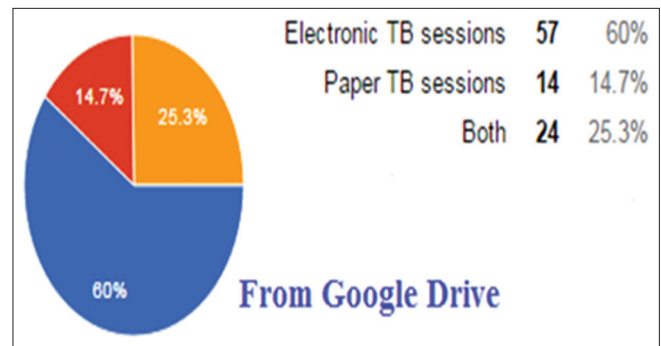


Figure 1: The responses to the type of preference of team-based learning, family medicine rotations

The TBL followed in our study during the family medicine rotations - QUMED is a new way of medical education, titled by the authors (e-copy); it is not used in other schools of medicine before, no similar TBL study did ever emphasize to it, as the students receive feedback about the quiz performances is just after the instructor distributes the quiz and solved by them, the answers collected, analyzed by Google drive and then at once displayed to the students, this helps the students to be in a constant cycle of identifying knowledge gaps, addressing these deficits and thereby fostering abilities for self-assessment (Figure 2).

Questionnaire adopted and modified from Office of Education, New Jersey Medical School, Newark, New Jersey.

Directions: Please circle the number for each that best describes the extent to which you agree with the following statements about TBL.

This is a significant finding that leads us to the conclusion; as all medical students in QUMED - Saudi Arabia, as the students have an easy access to electronic and to the internet, our students; e-copy TBL sessions were highly appreciated

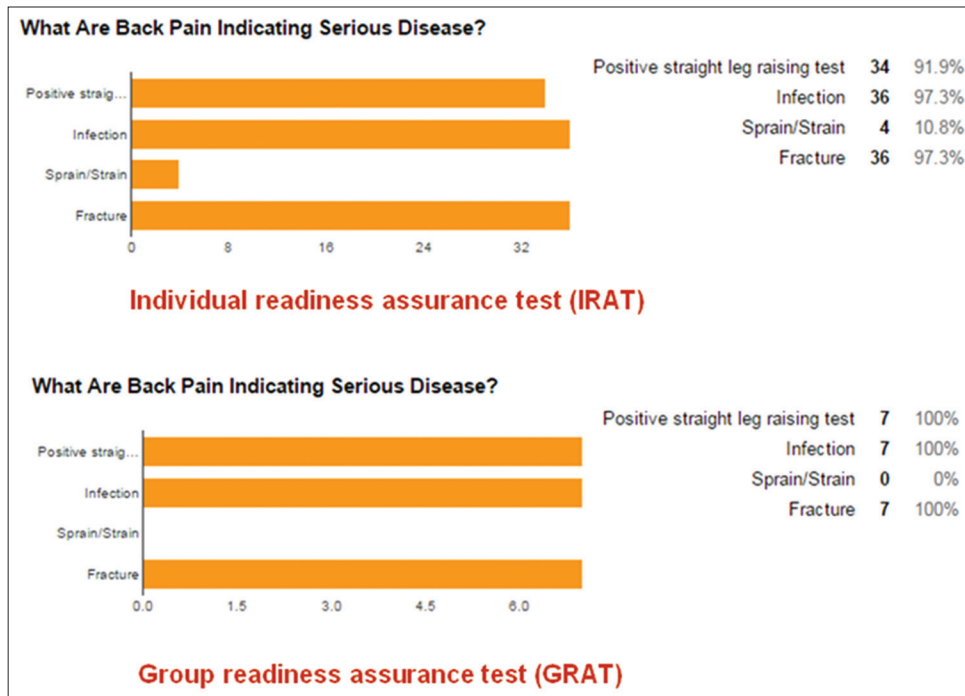


Figure 2: The responses of identifying the knowledge gaps between individual readiness assurance test and group readiness assurance test

by students and will have a better impact on the student’s academic performance. Hence, I recommend an e-copy TBL session during their medical study.

Limitations of study

First; e-copy TBL is applied in the clinical fifth year family medicine rotations only, second; TBL is more beneficial in the basic years.

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