

ORIGINAL ARTICLE

Students' Perception of Virtual Team-based Learning (vTBL) in Clinical Emergency Medicine Virtual Module

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ABSTRACT

Introduction: The COVID-19 pandemic has been inflicting an extraordinary disruption in medical education, in particular within the clinical setting. Therefore, the emergency clinical module was created by modifying virtual team-based learning (vTBL) and this method had been implemented for the first time at the Faculty of Medicine, UIN Syarif Hidayatullah Jakarta. This study explores medical students' perception of the effectiveness of vTBL after completing their clinical emergency medicine virtual module. **Methods:** This research was mixed with sequential, quantitative data elicitation and qualitative data collection. In the quantitative study, students anonymously completed a pre-module survey about TBL and a 24-items Likert Questionnaire after they had finished the module. Data were analysed by statistical software known as JASP Version 0.15. A phenomenological approach was used to collect qualitative data by filling out a questionnaire with open-ended questions. Qualitative data were explored by the subject content analysis method. **Results:** There were 30 students enrolled on the module. The pre-module survey indicated that 70% of students had never heard the term TBL and did not understand the meaning. After the module was ended, quantitative data showed that most students gave positive feedback and recommend this vTBL method to the next module (83.3%). Qualitative data were in line with quantitative data. Several themes emerged related to the implementation, the learning process, and the obstacles faced during the implementation of vTBL. **Conclusion:** Most students had good satisfaction. The constraints faced by students need to be considered for the next better vTBL implementation.

Keywords: Team-based learning, Medical education, Online learning, Clinical phase

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INTRODUCTION

During the Covid -19 pandemic, the learning process in almost all medical schools must undergo several adjustments. Social distancing measures regarding the Covid-19 pandemic had caused all educational institutions to suspend classroom teaching. Restrictions on personal interaction forced the learning process to be done online. This caused the implementation of the subjects learned to be very limited, especially in the clinical clerkship phase. Students cannot come to the hospital because they are at high risk of contracting Covid-19. The clinical clerkship phase must continue to run even though it could only be done online so that the student's learning process will not be hampered.

Online teaching has made it possible to continue medical education in these uncommon times (1). Online learning must also ensure that students are exposed to clinical cases. Therefore, the module management team made modifications to the implementation of the emergency clinical module and implemented a new online classroom platform to continue the learning process in medical school. One of them is maintaining interactive learning technologies, such as team-based learning (TBL). TBL is both learner and teacher-centred interactive teaching method. TBL is emerging as a strategy to enhance learning as it facilitates individual learning and team learning. TBL is usually done by combining activities in large classes and dividing the students into small groups (2,3). TBL is done virtually online using the Zoom® platform in this pandemic condition. The first virtual team-based learning (vTBL) method was applied to our institution. Therefore, we conducted this study as an evaluation study for TBL implementation by looking at the perspective of students' perceptions.

MATERIALS AND METHODS

Design and Data collection

The mixed-methods sequential design was conducted in this study. Quantitative data were collected first, followed by qualitative data. The quantitative design was a cross-sectional survey. Students anonymously completed the survey. All respondents (n=30) completed a structured self-administered pre and post-module questionnaire. The pre-module survey asked students about their understanding of TBL. The post-module survey consisted of 24 multiple-choice questions, including possible answers on the Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). The questionnaire includes five main ideas: (1) TBL content, (2) Opinions on the TBL process, (3) Opinions on the materials taken up during the TBL session, (4) Opinions on the TBL evaluation, and (5) The effect of TBL on communication and interpersonal skills. A phenomenological approach was used to collect qualitative data by filling out a questionnaire with open-ended questions.

Subject

Thirty students enrolled on the virtual clinical emergency module. The students were organised into three groups, consisting of ten students per group.

Virtual Team-Based Learning (vTBL) implementation

Virtual Team-Based Learning (vTBL) was done online using the Zoom® application. There were 20 emergency topics discussed in TBL. There were around eight to ten vTBL sessions during the study period per week, each of which lasted for at least two hours and was conducted by five faculty members. One was a resource person and four others as assistance. The three phases of the vTBL process were (1) Preparation, (2) Readiness Assurance, and (3) Application of course concepts (2). Students outside the classroom carried out the pre-class preparation steps. In this step, students were given learning assignments by content sources. The learning assignments can be done by reading textbooks or other references such as journal articles (maximum two references), watching recorded lecture videos or YouTube®, or studying in the laboratory. Students also learned to prepare for vTBL sessions. They learned the vTBL topics that will be carried out beforehand. Students were allowed to study individually in a small or large group during this phase.

In the second phase, an Individual Readiness Assurance Test (iRAT) was followed by students in a virtual class. Students worked on 5-10 multiple choice questions (MCQ) without vignette with learning achievement levels of remembering and understanding according to Bloom's taxonomy (lower ordered thinking skills). The content tested was integration between fundamental and applied medical science. The students were not allowed to open any references (closed book). The test took

about 5-10 minutes. The students were not allowed to work together during the test either. Afterwards, students underwent a Team Readiness Assurance Test (tRAT) where they were finally allowed to discuss multiple-choice questions (MCQ) that were the same as iRAT with their peers. This phase took about 15-25 minutes. The whole team reported the answers at the same time. Both of the tests were done using Quizizz®. After iRAT and tRAT were managed, resource person provided feedback on each group's MCQ. When there was disagreement between the groups, they were encouraged to defend their answers in reasoning and discussion. At least 25-40 minutes were used to discuss and explain MCQs.

Application practice is the most crucial step in a vTBL session. The "four Ss" principle guides the content (significant problem), structure (same problem and specific choice), and process (simultaneous reporting) of this vTBL session (2). In this last step, tutors can present real, complex clinical case scenarios (vignette) that students will face during clinical practice, accompanied by questions in the form of multiple-choice questions (MCQ) or short essays. Multiple-choice questions consist of four answer options, with one most appropriate key answer and three distracting answers. The content tested can integrate fundamental medical science and applied medical science. Vignettes can be text; clinical, radiological or histopathological images; videos, and audio files. The questions made by the tutor were questions to assess the level of learning achievement of applying, analysing, or evaluating according to Bloom's taxonomy (higher-ordered thinking skills).

In teams, the students were trained to interpret data, make predictions, analyse, synthesise the information provided, and make specific choices regarding diagnosis and treatment. Students were allowed to browse references in this step. Teams reported their answers together with other teams, discussed them, and presented arguments for different choices or decisions. According to the tutor, the teacher provided feedback in the form of the best choice or decision after discussing a question between them. The time required was 1-2 hours. If there was disagreement in this step, then proceed with the step of requesting an appeal.

Statistical analysis

The data of the quantitative research study was analysed with the help of statistical software, known as JASP Version 0.15. Qualitative data were analysed by the subject content analysis method. Illustrative quote selected based on the quality and brevity of student expression each point and the representativeness associated with the offer overall theme.

Ethical consideration

Oral direct explanations describe the purpose of the study and assure students that their responses are confidential.

Institutional ethical clearance was granted for the study from Ethics Committee Faculty of Medicine, UIN Syarif Hidayatullah, Jakarta.

RESULTS

There were 30 students enrolled on the module, consisting of 8 males and 22 females. The pre-module survey indicates that 70% of students have never heard the term TBL and did not understand the meaning of TBL. After the module was ended, quantitative data showed that most students gave positive feedback. Overall the implementation of vTBL was quite good (average score was 3.7). Assessment of resource persons and feedback from both resource persons or students were good (average score was 4). Learning outcomes and mastery of the material were good (average score was 3,9). The proportion of each item is shown in Table I. The majority of the questions were answered agreeably by the students. Almost no one answered disagree or even strongly disagree. The majority of students recommend this vTBL method to the next module (83.3%).

Several themes emerged from the qualitative data elaborated on open-ended questions. The three main themes were implementation, learning, and obstacles.

Implementation

1. Interesting

Students mainly reported enjoying the vTBL intervention. The vTBL makes the learning process more exciting and stimulates competition positively. It stimulates the students to think quickly with sharp analysis to determine treatment priorities in emergency cases. Study sessions that are very varied and involve teamwork make vTBL not monotonous.

The learning method is fascinating in solving a disease case, so the treatment determined by the team makes my thoughts and knowledge broader and better (QL7).

This is the first time I have experienced the vTBL method.

This learning system is exciting and quite honing the analysis process, especially in discussing application exercises with groups (QL8).

2. Collaboration

Collaboration in a cohesive team supports implementing an effective learning process in vTBL. Collaboration skills have been trained to prepare students for later in the actual work environment as doctors, where they must work together in teams to deal with patient problems. The atmosphere of collaboration was powerful in the TBL method, especially in the tRAT session and case

Table I: Students' response at post-module survey

No	Questions	Strongly agree n (%)	Agree n (%)	Neither agree nor disagree n (%)	Not Agree n (%)	Strongly not agree n (%)
1.	Clear learning goals	7 (23.3)	23 (76.7)	0	0	0
2.	Clear learning activities	6 (20)	24 (80)	0	0	0
3.	The learning method used is interesting	6 (20)	23 (76.7)	1 (3.3)	0	0
4.	The learning method in this module is a waste of time	0	8 (28.7)	2 (6.7)	16 (53.3)	2 (13.3)
5.	The supporting facilities in this module are good	2 (6.7)	22 (73.3)	6 (20)	0	0
6.	There are too many tasks in this module	0	9 (30)	9 (30)	12 (40)	0
7.	Less time to achieve learning goals	4 (13.3)	8 (26.7)	13 (43.3)	5 (16.7)	0
8.	Well planned virtual team-based learning (vTBL) sessions	0	27 (90)	3 (10)	0	0
9.	The material for reading assignments is simple and easy to understand	0	15 (50)	12 (40)	3 (10)	0
10.	Individual and team readiness test questions according to the material	0	16 (53.3)	13 (43.3)	1 (3.4)	0
11.	vTBL session runs interactive	0	29 (96.7)	1 (3.3)	0	0
12.	vTBL session is effective	0	27 (90)	3 (10)	0	0
13.	I enjoy learning to use the vTBL method	0	28 (93.3)	2 (6.7)	0	0
14.	Application exercises help me understand the material	0	29 (96.7)	1 (3.3)	0	0
15.	Colleagues in the module are actively involved in vTBL activities	0	29 (96.7)	1 (3.3)	0	0
16.	The resource persons in vTBL are already qualified regarding the material	0	30 (100)	0	0	0
17.	Resource persons in vTBL helped me in understanding the material	0	30 (100)	0	0	0
18.	Resource person feedback in accordance with the material	0	29 (96.7)	1 (3.3)	0	0
19.	The resource person's feedback makes me excited to learn more	0	28 (93.3)	2 (6.7)	0	0
20.	Feedback from fellow discussion partners at the end of vTBL made me improve myself	0	30 (100)	0	0	0
21.	The appeal request makes me more confident, in my opinion	0	28 (93.3)	2 (6.7)	0	0
22.	I get benefit from this module	12 (40)	18 (60)	0	0	0
23.	My ability to study independently is facilitated in this module	6 (20)	22 (73.3)	2 (6.7)	0	0
24.	I recommend vTBL for future modules	0	25 (83.3)	5 (16.7)	0	0

application sessions. Each student could freely express their opinions and get feedback from other colleagues and the teacher.

At vTBL, we can discuss and learn from each other with our friends (QL4).

Discussion with groups about the case and discussion with groups during tRAT (QL22).

vTBL provides an opportunity to exchange ideas with fellow teammates to measure our abilities and encourage ourselves to study harder, and hone teamwork in making decisions (QL26).

3. Interaction

The interactions that occur during the implementation of vTBL are between teachers, students, module managers, and daily module implementers. Students must be active on both interactions related to the content of the module material and the implementation of the module itself. They must communicate with lecturers, module managers, and daily implementers. There were more flexible interactions, no gaps in position, acting as partners, and supporting each other.

vTBL is interactive learning, sharing knowledge learned between friends/groups (QL17).

4. Applicability

The cases discussed were cases that a general practitioner would often face. The level of competence of cases was adjusted to the abilities expected of a general practitioner. The goal was that students could learn properly, like dealing with patients face-to-face, even though the implementation of TBL was online. Students felt the benefit from this diversity of cases, and they can understand what to do when handling the cases.

The cases covered were diverse, from various branches of specialisation. We could repeat the lessons that have been learned at the previous modules, and for the modules that have not been passed, we get an overview of the cases that would be faced later (QL13).

Learning Process

1. Freedom of thought

Students can express their opinions freely about the cases they face. When discussing with colleagues, they can also practice being generous in accepting input and suggestions. Of course, they also need to learn about good ways of expressing opinions and giving constructive feedback.

I could freely express my opinion (QL24).

2. Triggering students to learn actively

Students must prepare before the vTBL session takes place. They should read the references related to the cases given previously. During the discussion, they must be actively involved, applying their knowledge.

This method triggers to learn every day (QL10).

vTBL triggers students to learn more to maximise in discussions (QL 12).

3. Practicing systematic and critical thinking patterns

The case given to the student is a case that must be analysed to solve the problem. It starts from identifying the problem to finally determining treatment. This process will undoubtedly trigger students to think systematically and use clinical reasoning rules as an approach. Thorough and critical thinking is certainly needed in solving patient cases.

Through vTBL, I am trained to analyse a case thoroughly and get a lot of additional insight through team discussions (QL20).

4. Fostering independent learning

The process in vTBL allows students to be able to study independently. They can evaluate their abilities and finally plan their learning process in the future so that the ability of self-directed learning is honed through this TBL.

Through vTBL, we can exchange ideas with fellow teammates to measure our abilities and spur ourselves to study harder (QL26).

The obstacles

1. Internet networks

An unstable internet network will certainly hinder the learning process. Internet quota limitations will, of course, also have an impact.

Unstable network and data package quota runs out (QL1).

Sometimes the signal breaks. I have to move to the next place when I rejoin, so I miss the consultant's explanation (QL10).

2. Module components

Activities in the module certainly impact students, for example, busy module schedules or too much material without understanding the emphasis on priority topics to be mastered. Students also find difficulties in setting personal schedules.

There's a lot of material to learn (QL17).

Pre-learning preparation is only one day in advance, so there is not much time to explore the material. I found it difficult to arrange the study schedule (QL27).

3. Software application

vTBL used an existing online application by making modifications. This application sometimes cannot cover the things that are the real purpose of vTBL.

The implementation of iRAT uses the Quizizz@ application, so you can't skip difficult questions and move on to the next question (QL26).

DISCUSSION

This vTBL was implemented according to the existing TBL principles (2,4). The division of groups are usually in small classes, but during online implementation, we used the breakout room feature on Zoom®. We know

that students need to be accompanied more intensely, so the resource persons need to go around the breakout room to ensure the discussion went well. vTBL may be accompanied by an increase in teacher resources. It is possible to use 1-2 teachers for one large class in offline conditions, while it takes about five teachers in online conditions.

Students have also stated that signals and internet quotas constrain them sometimes, the time used becomes longer. In addition, the platform used was not fully able to support the implementation of vTBL. For example, the Quizizz® used to carry out iRAT and tRAT certainly have limitations. These limitations include not repeating the questions, so students cannot confirm their answers. In the future, hopefully, an application can be developed as part of a learning management system that is genuinely designed and intended to facilitate vTBL learning methods so that the learning process becomes more effective. Teachers and students are inevitably faced with digital conditions. The adaptation process is vital as well. The ability to operate various platforms, be familiar with the existing features, and control students online are undoubtedly different from face-to-face. Successful implementation of online learning approaches in health education requires appropriate institutional functions such as: supporting culture, educational skills, and organizational preparation (5).

The survey results showed a positive response to students. They are mostly satisfied with the implementation of this vTBL. This condition and the themes that emerged in the open-ended questions were almost the same as in previous studies (6-9). Students enjoy the implementation of vTBL because it is not monotonous and exciting. Interest is the result of learning. It is not the beginning. The degree to which the team works well determines the students' interest in the subject. Content experts positively influence interest in the subject with their knowledge (10). Students can be actively involved and can express their opinions freely. There is a noticeable improvement in TBL in communication and teamwork (9,11,12). Cooperation in the team was honed, and they also had to prepare themselves to master the case material being discussed (13,14). Independent learning that emerges from the TBL process is in line with research conducted by Whittaker (15) that TBL groups have significantly higher self-regulated TBL groups have significantly higher self-adjusting learning activities than groups that learn traditionally. learning activities than groups that learn traditionally. In this study, students only went through virtual TBL activities (vTBL), so their opinions could not be compared with conventional TBL implementation in the classroom. But from research conducted by Silva (16), online TBL provided students with dynamic sessions and the opportunity to have meaningful discussions with their classmates in situations where close contact within the class was suddenly lost.

The role of the teacher in vTBL is as a scientific resource, course manager, course designer, and assessor. This can be done by the group of teams that organise the course. Students need direction to form a systematic and critical mindset in handling and solving cases in handling and solving cases. Constructive feedback from resource persons and peers can trigger the student learning process following students' conveyed based on the survey results. Feedback should be given as soon as students show their performance. It should be done during iRAT, tRAT, and applications exercises. While rapid response fosters competition between individuals and teams, gaining and retaining knowledge can impact team development (17,18).

Students feel the case discussion was very applicable. The cases presented are cases they will face later when they become a doctor. They find it easier to understand cases through this TBL. The use of cases emphasises that there are multiple possibilities to identify existing problems in practice. Students must work together to determine the best answer or solution (2).

The limitation of this study is that it is based on questionnaire data only. The ability to measure some variables less explicitly can improve results interpretation. The limited number of samples and only taking perceptions from students is also a limitation. In the future, further research needs to be done with a more significant number of samples and varied respondents, such as from teachers and education administrators.

CONCLUSION

vTBL implementation is a valuable alternative. It provides students with a positive learning experience. An implementation that requires extra preparation will have a positive impact on students. Students' ability in terms of hard skills such as mastery of the material and soft skills such as independent study collaboration will be honed well. Implementation support, such as using the right platform, the ability of teachers and students to operate digitally, and the internet network, still need more attention.

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