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Iwata, Kentaro

Doi, Asako

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Can Hybrid Educational Activities of Team and Problem Based Learning Program be Effective for Japanese Medical Students?

KENTARO IWATA^{1,*}, and ASAKO DOI²

¹*Division of Infectious Disease, Kobe University Hospital, 7-5-2 Kusunokicho, Chuo-ku, Kobe, Hyogo, 650-0017, Japan*

²*Division of Infectious Diseases, Kobe City Medical Center General Hospital, 2-2-1, Minatojiminamimachi, Chuo-ku, Kobe, Hyogo, 650-0047, Japan*

**Corresponding author*

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Background: The purpose of this study is to investigate the medical students' perceptions of the Hybrid Educational Activities between team based learning (TBL) and problem based learning (PBL) Program (HEATAPP), a novel educational program that combines characteristics of PBL and TBL. **Methods:** A five-day HEATAPP on infectious diseases was provided to 4th year medical students at Kobe University School of Medicine, Kobe, Japan. After the program, a focus group discussion was held among 6 medical students who participated in HEATAPP. We qualitatively analyzed the recorded data to delineate the effectiveness of, and the perceptions on, HEATAPP. **Results:** Some students considered HEATAPP being effective as an active learning, and in developing questions. However, some students found active learning difficult to execute, since they were so familiar with passive learning such as lectures and examinations. They also found it difficult to identify important points by reading authentic textbooks on given issues, particularly English textbooks. **Conclusions:** Even though active learning and group discussion are underscored as important in medicine, some Japanese medical students may be reluctant to shift towards these since they are so used to passive learning since childhood. English language is another barrier to active learning. The introduction of active learning in the earlier stages of education might be an effective solution. Teachers at medical schools in Japan should be mindful of the students' potentially negative attitudes towards active learning, which is claimed to be successful in western countries.

INTRODUCTION

Active learning, such as problem based learning (PBL) and team based learning (TBL), has become increasingly popular in medical education in Asian countries such as Japan (1)(2). We developed a novel learning method named HEATAPP, which is a hybrid version of TBL and PBL. An overview of HEATAPP was previously reported (3-5), and it had been used for 5 consecutive years at Kobe University School of Medicine (6). However, HEATAPP is rather a new concept and few studies were conducted on it. Therefore, we conducted a qualitative study to delineate the effectiveness, limitations, or challenges of the program in order to improve it.

SUBJECTS AND METHODS

1. This qualitative study was conducted using semi-structured interviews and focus group discussion with 4th year medical students who participated in HEATAPP for 5 days. Six medical students volunteered to participate in an interview the day after completing HEATAPP. The participants commented on, and discussed, various aspects of HEATAPP, using, but not limited to, the questionnaire (Appendix). The focus group interview/discussion lasted for about 3 hours. It was facilitated by one of the authors, who did not provide HEATAPP (AD).
2. A Grounded Theory approach was adopted and we modified its original version (7)(8). We extracted data through interviews, coded the data, categorized them into theory, as a variation of grounded theory approach. The recorded data were transcribed verbatim. Based on multiple readings of transcripts, themes relevant to our research questions were repeatedly sought by the analysis team (KI and DA). We extracted comments from interviewees as data, and the comments were coded based on generated hypotheses and concepts, and grouped into a mind map (9), which we elaborated on after reading participant responses. The developed categories were reviewed by both authors repeatedly in-depth to ensure rigor, to the point where all categories were well developed, and further data collection and analysis added little novel information to the

conceptualization (theoretical saturation). Finally, remarks by the participants included in the manuscript were translated into English. We used NVivo for Mac 11.3.2 (QRS International Pty Ltd) for data coding and analyses.

3. We obtained written informed consent from all participants. To respect ethical considerations, the participants were assured that all the information would remain confidential, and that, after transcription, all the audio files would be destroyed. An author (KI) who actually provided HEATAPP did not attend the focus group discussion/interview and did not have access to the recorded data. The author was provided the transcribed version without disclosing the identity of each participant, to ensure that the comments made by each participant would not affect the evaluation at the medical school. The Kobe University Graduate School of Medicine Ethics Committee reviewed and approved this study (No. 1121).
4. A HEATAPP course has been held annually at Kobe University School of Medicine since 2012. It was initially referred to as TBL (5)(6); however, the overall structure of the program has been modified by KI and it is now different from the original version of TBL (10)(11). To avoid confusion, we re-named the course Hybrid Educational Activities between TBL and PBL Program, or HEATAPP. HEATAPP used to be included within the PBL activity after the clinical medicine lecture series; however, it was incorporated into clinical education of Infectious Diseases *before* the PBL course. This was because PBL at Kobe University School of Medicine had a structural reform to a symptom-oriented schedule, instead of the old-fashioned division- (Ikyoku) based schedule.

HEATAPP was provided to all 4th year medical students (108 students). Japan's medical school consists of a 6-year course after graduating from high school. By the time HEATAPP was held, the students had gone through all basic medicine curricula, including pathology, microbiology, and clinical pharmacology. These courses were taught either through lectures or PBL. The students also completed a medical English course, went through some of the clinical medicine courses such as cardiology, rheumatology, and hematology/oncology before the HEATAPP.

The participants were divided into groups of about 6 people, like in conventional PBL. However, they did not gather at small rooms. Instead, all students gathered together in a large hall and one tutor took care of everything, and they did the same case task in each team at one same place. There was no specific maneuver for group member assignment for HEATAPP; we merely utilized groups assigned for other exercises for our activity.

HEATAPP does not require readiness assurance activities as in conventional TBL, to lessen both teachers' and students' workload, and emphasize more on clinical reasoning. To train their clinical reasoning, students are not provided the diagnosis or subject of the day, and preview and pre-test could disturb our plan. We preferred to discuss the case without pre-notifying what the case was about, similar to the PBL of John A. Burns School of Medicine at Hawaii University, from which we adapted our HEATAPP substantially (12).

After listening to a few sentences of present illness of a case (patient's age, sex, and chief complaint), a group discussion on clinical reasoning, hypothesis generation and verification of the developed hypotheses was encouraged. The tutor (KI) provided further clinical information one by one (working forward), without revealing all information, including laboratory and imaging results, to avoid thinking "backward" (13). The participants continued to discuss the case by alternating the short lectures from the tutor and small group discussions until they reached final assessment of the case. Unlike conventional PBL, the tutor actively joined the discussion and taught knowledge, skills, or principles of management of each case; this necessitated the tutor to be a clinician with expertise in the field (as opposed to conventional tutors who do not have special knowledge or skills). Following these activities, the participants were requested to develop a Your Specific Question (YSQ) per group. The aim of YSQ was to investigate a topic regarding the case, mostly on diagnosis, treatment, epidemiology, or pathogenesis, which students would like to answer. It is basically the same as learning issue (LI) in PBL at Hawaii; however, we altered the term since LI sounded unfamiliar to most of the participants.

After deciding YSQ, the session was adjourned and the students were requested to solve the YSQ in their groups. Each group was asked to present what they had learnt the following morning, and the next new case was discussed afterwards.

Students dealt with one case a day, and a total of 5 cases were presented. On the 4th and 5th days, the cases were presented in English deliberately, to encourage the use of English among the students.

RESULTS

Some students considered that HEATAPP to be effective in active learning, group discussion, and developing questions.

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(Student A) I could actively participate in HEATAPP than usual lectures, and I also noticed that asking questions is quite important.

(Student B) I realized that many people could be committed to learning if we were given such opportunity.

(Student C) I needed to explain things logically during group discussion. I also had to have output by explaining things in a way of learning, rather than just having input. This output was useful in sorting out my knowledge.

However, the students also perceived this type of active learning difficult to execute.

1. Difficulty in active, participatory learning

There were contradictory remarks on active, participatory learning. Although some were of the view that the form of HEATAPP made students more active, other participants expressed difficulty in active, participatory learning. For example, some preferred classical didactic lectures and memorization of things to extracting problems from the cases by themselves.

(Student C) I do not like HEATAPP to be applied to every subject, by abandoning didactic lectures, because we will have no input from them. I like having HEATAPP very much along with conventional lectures, but I do not recommend replacing lectures with HEATAPP.

(Student B) HEATAPP will not allow us to learn knowledge in a structured way.

Some complained of not having much teaching about treatment, which we actually expected them to learn through YSQ. They implied that didactic lectures through which teachers provided knowledge would have aided in understanding antibiotic treatment, rather than attempting to find it by themselves.

(Student D) I think the course had too much importance on diagnosis, and there was not much talk about which antibiotics we should use for treatment.

(Student A) I did not study about antibiotics. I know nothing about it.

(Student D) Some studied about antibiotics on YSQ, but in the end, I know nothing about antibiotics, only vaguely know about their classification. I wish I could study about antibiotics systematically.

(Student A) I think we could have far more meaningful discussion if we had knowledge of antibiotics.

2. Difficulty in asking questions

Many were of the view that asking questions is a very important skill for clinical reasoning; however, some students found asking questions to be difficult. In some instances, they just elicited questions from answers they already knew or ones they were likely to get easily.

(Student D) My group brought up a question, the answer for which could likely to be found in "Harrison," and Professor Iwata would not complain about it.

(Student C) We were wondering about the diagnosis of pyelonephritis, but could not find good references, so we changed it to an easier question to answer.

3. Difficulty in English

Working in English is another task some students found difficult; although HEATAPP was held after they had completed the medical English course.

(Student E) Reading articles were tough.

(Student D) Some are good at English and others were not. Guys who are not good at English found searching PubMed painful, and they used only Ichushi (Japanese database).

(Student B) The case was discussed in English from the 4th day. I felt it was too fast. Professor Iwata translated it in Japanese later, but managing information was still tough. I wish he could speak slower.

4. Less motivated students

There were discussions on less motivated students.

(Student E) Everybody can participate in groups, but a charismatic guy might do all.

(Student A) Some people around did not have any motivation at all. No study at all for whole 5 days. One guy was appointed to present, then grabbed a paper from the next guy and just read, getting back on safe ground, well, I think professor Iwata had noticed it anyway for sure.

(Student B) I guess one in a group made up his mind that “I am not going to any of YSQ!”

5. Juken burnout

Some found a difference between the Japanese system and systems in other countries. The implication is that Japanese medical students are burnt out by the entrance exams (Juken) and need time to recover after being admitted to medical schools. The argument that college students in the United States do not study hard is probably untrue; the view of “we did study too hard until Juken, and we need some rest” is shared by participants.

(Student E) Well, my guess is that students in the US do not study until they get medical school, then they study a lot. On the other hand, Japanese students study a lot until they get to medical school, then we relax there.

(Student E) In the US, they graduate colleges, and get into medical schools. They had nice time at colleges already. I think we have to have both fun and study at medical school. This is systematic error, I think.

A summarized conceptual diagram (mind map) is shown in Figure (Figure 1).

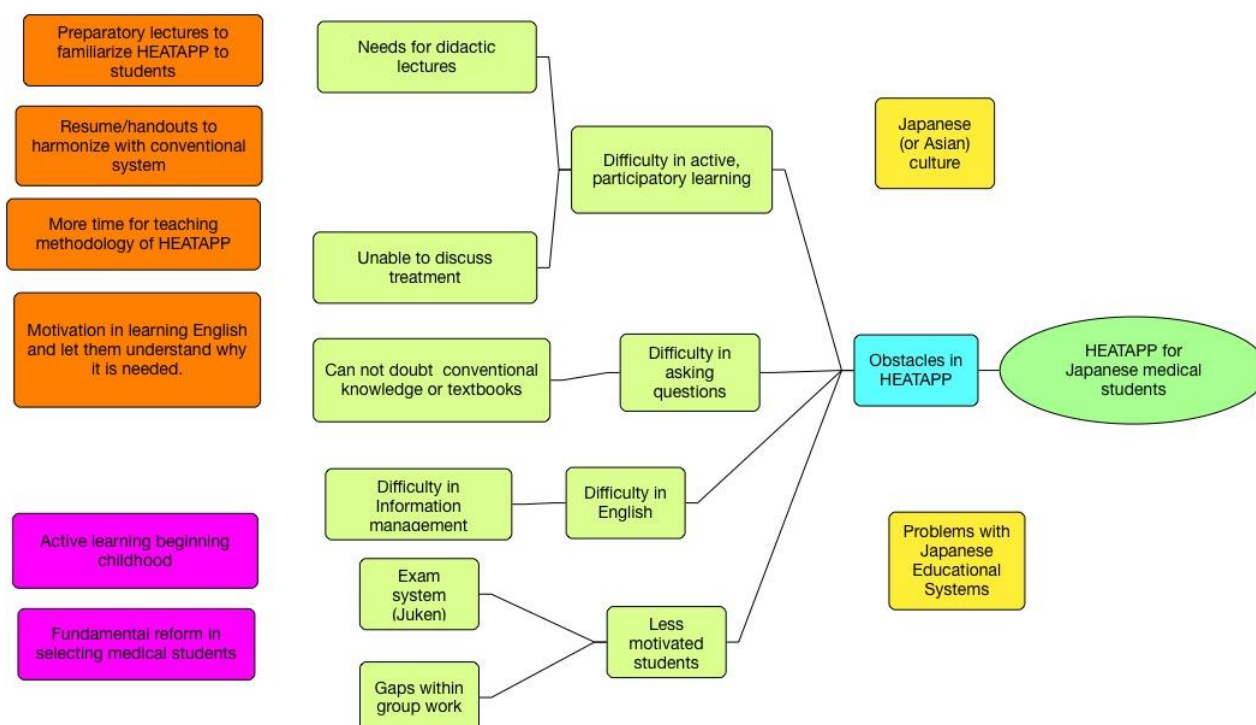


Figure 1. Conceptual Diagram of our qualitative study (mind map). Issues raised in data were conceptualized into green areas, with larger concepts were denoted in yellow. Potential solutions to each issues were shown on the left, the short term solutions in orange and the long term solutions in magenta.

DISCUSSION

Active learning has gained popularity at medical schools based on adult learning theory (14). However, it is difficult to execute, particularly among students who were used to gaining knowledge passively. This seems particularly true of many Asian countries with the influence of Confucianism, where people are used to learning through didactic lectures, being spoon-fed and memorizing knowledge without criticizing it, and Japan is not an exception (1)(15). Students may not have had exposure to learning through open discussion, debating, or group work. They are also not familiar with constructive criticism. Passive learning can be useful in memorizing information and answering questions accurately, but a student may not be good at “asking questions,” which is considered the foundation of problem-based learning. Asian cultural attitudes are not compatible with active learning such as PBL, and this was discussed by Khoo. The article pointed out the characteristics of Asian students, such as fear of a confrontation with authority, distaste for open criticism of authority, Confucian socialization requiring a person not to be outspoken, lack of passion for studies, lack of ability/motivation to ask questions, and low participation in class discussion (1). Another article rebutted that the passive attitudes of Asian students are not inherent in them. They argue that the attitude of Asian students are a result of situation-specific factors of teaching methodologies, learning requirements, learning habits and language proficiency, rather than cultural factors (15). Whether this view holds true or not, the learning habits of passive learning are in fact preventing students from learning actively. Whether these habits are culturally inherited or not, we need to alter the way we approach teaching and learning.

Many medical students in Japan misunderstand PBL as “problem *solving*,” and wrongly interpreted it as “Mondai Kaiketsu Gata” in Japanese, or problem solving, rather than problem-*based* learning (16). Students attempt to “hit the right answer,” the approach that many Japanese medical students are very good at (“Shindan Ate Quiz,” or guessing diagnosis right game). However, they struggle at bedside learning (BSL) to find the problems that their real patients have. Furthermore, they cannot develop clinical questions and hypotheses. This may be because PBL in Japan is often “thinking backward” (13), provides all clinical information at once, and astute students search the internet using keywords to find the “answer.”

In a real clinical scenario, there is no such complete information at the beginning, and medical personnel have to think “forward” about what to do by gathering information continually. To think “forward,” one needs to ask questions to patients, develop hypotheses, and verify them by further gathering data.

To make things worse, some medical students are already burnt out after rigorous entrance examinations (Juken in Japanese). After years of training at school and knowledge-cramming schools (Juku and Yobikou), medical students seek happiness in extra-class activities and they float through their school years (17). They simply cease to study in the way they used to.

Since medicine is an ever-progressing field and its progress is becoming more rapid, life-long active learning by physicians is a *must* (18). Therefore, the tendency of burning out and not studying after entering medical school needs significant reform.

The gap between those who are motivated and those who are less motivated is wide. Furthermore, there are significant shortcomings in group works; this problem is evident in both PBL and TBL. Assigning homework or an examination might improve the attitude of those who are less motivated; however, these strategies will not enhance their motivation (this may even be the other way round).

To overcome the problems experienced at Japan’s medical schools, we probably need tactics to encourage students to learn actively and promote life-long learning. This means that merely imitating the way western countries do things is not the answer (and *imitation* is ironically a kind of passive learning). For short-term improvement, one needs a gradual transition from passive learning such as lectures to active learning. Teaching why active learning is important and making students understand is another way to reconcile these two forms of learning. For the long term, Japanese students need to understand how to learn actively from their childhood. This means we need fundamental reform both in the educational system and in the way we view education.

Lack of English skills, despite the rigorous “Juken” study and the medical English curriculum, is another issue to overcome (19). Inability to search and read literature is a drawback in active learning and information management. Physicians in the 21st century will not survive without these skills. In HEATAPP, we discuss cases in English with the aid of some Japanese by the tutor on days 4 and 5; however, 2 days of training are not adequate to make students familiar with English. Long-term practical use of English and making students read and write in English easily are extremely important tasks.

Our study has inherent limitations. First, we were not able to randomly assign interviewees to the focus group discussion; we had to rely on those who volunteered to take part in the study. This is likely to have resulted in bias towards choosing more serious and active students, although their observations covered the mentality of those who were less motivated. Even though we endeavored to reach “theoretical saturation,” employing more volunteers could have helped us gain new insight we did not obtain. Second, even though confidentiality of the participants were assured and the tutor remained blinded to their identity, some still might

be hesitant to disclose their thoughts honestly. Third, although we tried our best to analyze data thoroughly to reach theoretical saturation, there might still be insights we were not able to find. Obviously, our study is qualitative, not quantitative. Although we were able to raise several important theories using grounded theory approach, these need to be verified by future quantitative analyses.

In conclusion, we evaluated the novel educational activity called HEATAPP, and found room for improvement, which is inherent in other active learning methods such as PBL and TBL. We will continue to improve our activity to make it more useful for Japanese medical students.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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APPENDIX

Questionnaire used for the semi-structured interviews

1. Did you enjoy HEATAPP? Could you focus on it? Could you participate in it positively? If yes, why? If not, why?
2. In what way was HEATAPP useful? Do you think you improved yourself through the activity?
3. Where did you find HEATAPP useless?
4. What can improve the activity?
5. What do you think of the current training system?
6. Can HEATAPP be applicable to other fields? Should we apply it in different fields?
7. How was the group discussion? How should it be?