

RESEARCH ARTICLE

Implementing online team-based learning in an interuniversity setting: A case study of a traditional medicine course

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Keywords

Online learning
Pharmacy
Team-based learning
Traditional medicine

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Abstract

Background: Online team-based learning is a crucial teaching method to successfully increase students' engagement during the pandemic. This study provides a report on online team-based learning during a traditional medicine course attended by undergraduate students from different higher education institutions in Indonesia and overseas. **Methods:** A questionnaire was administered to determine the active participation of team members and to carry out a course evaluation. **Results:** The learning outcome was successfully achieved as 96% of the groups scored above the passing grade for the team-based projects. Students from various institutions had generally positive opinions on the course, especially on the course design, course material and the speakers, and the collaborative working with students from diverse backgrounds. **Conclusion:** Language barriers and technical difficulties were some factors that hindered the students from gaining full benefit from the course, and thus should be mitigated in the implementation of online team-based learning. Additionally, a well-designed pre-test and post-test survey should be conducted to aid the assessment of students' comprehension of the course.

Introduction

The Ministry of Education, Culture, Research and Technology of Indonesia launched a programme called "Merdeka Belajar – Kampus Merdeka" (which translates to Independent Campus – Freedom to Learn), at the beginning of 2020. This programme provides students with opportunities to experience learning in other higher institutions, workplaces, communities, and other relevant settings. This "beyond campus wall" learning experience aims to increase students' competence and readiness for the job market by synchronizing their hard and soft skills with the current workplace needs. One of the activities promoted by the programme is student exchange between higher education institutions both in

Indonesia and overseas (Dirjen Dikti Kemdikbud RI, 2020). This activity allows students to take courses in other institutions and transfer the credits to their home institutions. While this is relatively new in Indonesia, this practice has been well implemented in many countries, such as the Chevening Scholarship Programme in the UK, the Erasmus Programme in Europe, and the Fulbright Programme in the US (Grinbergs & Jones, 2013). On-campus and/or distant (online) learning can be facilitated. The latter is especially of interest during the coronavirus (COVID-19) pandemic, as online learning can facilitate students' learning outside their university in a more cost-effective and safer way.

Online learning has been encouraged by the Indonesian government since 2014 to increase learning

accessibility for higher education students (Dirjen Dikti Kemdikbud RI, 2014). Online learning is a broad term for education which involves using the internet to facilitate teaching and learning activities so that instructors and students are not restricted by their not being physically present in the same location. Online learning may encompass synchronous and asynchronous activities (Singh & Thurman, 2019). In Indonesia, online learning gives a huge advantage due to the inequality of infrastructure development between regions which prompts disparity in the quality of higher education. It has been a long-standing problem that the development of higher education institutions has been concentrated in Java island and better education is usually available in big cities only (Dirjen Dikti Kemdikbud RI, 2019). Thus, online learning may bridge this discrepancy in education quality. Online learning has never been as critical as in the time of the COVID-19 pandemic. Online learning allows social distancing between participants and reduces the necessity of commuting to the study location (Nguyen *et al.*, 2020). Online learning can be utilised to reach students from various places which have restricted mobility during the pandemic. Moreover, online learning removes the accessibility barrier that typically exists due to the geographic condition of Indonesia, which comprises many islands and makes mobility among them often expensive. Online learning via courses delivered in English further removes this geographic barrier, allowing students from different countries to engage in the learning activities and obtain international exposure at the same time. This exposure is beneficial for the language development of the students, and this could increase their competence in intercultural communication and improve self-confidence (Nanda, 2019). On top of that, course materials and lecture recordings are often available on-demand as well, so that the participants can review the materials as needed (Nguyen *et al.*, 2020).

Unfortunately, remote learning is not without disadvantages. Lack of direct interaction of students with their instructors and students with students, is known to reduce students' engagement during online learning. Limited to no hands-on activities during online courses is especially undesired in pharmacy education (Nguyen *et al.*, 2020). Technical aspects of conducting online learning, such as software, internet, and related costs, may induce problems during online courses. In addition, students are often given too many study materials and assignments which require a lot of time to finish (Dalipi *et al.*, 2018). These result in high rates of student dropout from online courses, even up to 90 to 95% in massive open online course (MOOC) (Jacobsen, 2019). Therefore, the negative aspects of

online learning should be mitigated to reduce student dropout and increase learning achievement.

One of the techniques to effectively improve the learning experience in a cross-cultural setting is by implementing team-based learning. Team-based learning helps the students to achieve the course learning outcomes through active learning and problem solving. It is especially important in a big class or an online course in which lecturers do not have enough opportunity to engage with all students (Chen *et al.*, 2018). Students are able to learn from a different perspective during the problem solving of given tasks, especially in a diverse team. Students could suggest different approaches depending on the existing knowledge that they gain from their previous experience, education, and cultural background, thus, enriching the experience of each of their team members. The cultural diversity within the team has a positive impact on building trust, leading to cognitive and behavioural engagement of the team members (Poort *et al.*, 2020).

To facilitate the intercultural learning experience and support the "Merdeka Belajar – Kampus Merdeka" programme, an online summer course (OSC) on traditional medicine was developed and conducted with the theme "Embracing Traditional Medicine: Adopt and Adapt Toward Society 5.0". The OSC highlighted the modern development of traditional medicine in line with society 5.0, thus balancing technological advancement for the human-centred spirit. Traditional medicine has been historically practiced in Indonesia and other Asian countries, but modernisation is necessary to increase acceptance among the current generation. The OSC was designed to suit an international audience and covered knowledge and experience on traditional medicine from different Asian countries. Thus, students can learn and compare technology, application, and regulation regarding the traditional medicine practice in different regions. The OSC was structured as online team-based learning in which participants were grouped into a small team (6-7 students) with their peers from other universities. Smaller study groups with participants from diverse backgrounds have been proven to increase personal and social development of students (McLean *et al.*, 2006). This study evaluates the implementation of online team-based learning in an interuniversity setting and identifies the challenges that arose in the implementation. This study provides suggestions to avoid those problems, for future implementation.

Methods

Recruitment of the course participants and formation of the groups

The OSC was primarily designed for undergraduate students taking pharmacy or related majors and open for students from all countries. The OSC was announced through the faculty website (Faculty of Pharmacy UGM, 2021), social media, and personal communication to lecturers in other universities. The prospective participants were expected to fill out a registration checklist which included a registration form, motivation letter, endorsement from their home institution, and a short questionnaire on the demography of the participants. 300 participants were targeted to join the course. The motivation and endorsement letters were highly considered in selecting the admitted participants. The course was free to attend for all the participants. The admitted participants were divided into 50 groups. The groups were assigned by the instructors to ensure diversity. Each group consisted of students from 4-6 different universities with at least 1 non-Indonesian student. The students were assigned into groups such that all groups had a well-balanced mix of junior and senior students.

Course design

The OSC was organized during the university summer break for ten subsequent working days consisting of three hours of synchronous activity and six hours of asynchronous activity each day. The course started at 8-9 AM Western Indonesian Time (GMT+7). The course was equivalent to 2-course credits or 3.6 ECTS (European Credit Transfer and Accumulation System).

Pre-test and post-test surveys were conducted before the start of the course and at the end of the course, respectively, with the same set of multiple-choice questions. The learning activities were assisted by a MOODLE- Modular Object-Oriented Dynamic Learning Environment based platform called "eLOK" developed by Universitas Gadjah Mada, Indonesia. The synchronous activities were delivered via lectures (through Zoom), pre-recorded videos with question and answer sessions, and interactive lab tutorials using annotated images/videos (via *Thinglink*). The speakers were lecturers, guest lecturers, or expert practitioners from several countries. Short discussion sections (30-50 minutes) within the team also took place during the synchronous activities. The asynchronous activities were given as group projects. Minor projects that involved discussion with team members were given at the beginning of the week for team building. Two major team-based projects were given at the end of the first and second week. The full course structure and the weight of each assignment are given in Table I. Students indicated their presence in each of the activities manually in *eLOK*. The course was fully conducted in English.

The assessment of asynchronous assignments was conducted through peer review. The best major team-based projects were then selected by the instructors based on the assessment results and instructors' evaluations. The group dynamic during the project completion was assessed using a questionnaire delivered with *Teammates* version 7.17.3 (NUS, Singapore). In the questionnaire, the students were asked to rate the active participation and contribution of each team member and the overall quality of the teamwork.

Table I: The structure of the online summer course and the weight of each activity

Day	Synchronous activity	Asynchronous activity
1	Lecture	Pre-test (2.5%)
2	Lecture	Individual assignment (5%)
3	Pre-recorded video	Minor group project (10%)
4	Lecture	Minor group project (10%)
5	Lecture Synchronous discussion within the group	Minor group project (5%)
6	Lecture Pre-recorded video Interactive lab activity with annotated videos and images	Major team-based project (continued for the weekend) (15%)
7	Lecture	Evaluation of team dynamic
8	Lecture	Minor group project (10%)
9	Lecture Synchronous discussion within the group (for video annotation) (5%)	Major team-based project
10	Lecture Synchronous discussion within the group (5%) Evaluation of the major team-based project (synchronous and asynchronous evaluation – 30%)	Major team-based project (continuation)
		Major team-based project (continuation)
		Evaluation of team dynamic
		Post-test (2.5%)

Note: Percentage indicates the weight of the assignment

Evaluation of the course

A questionnaire for the evaluation of the OSC was developed and subsequently validated by experts, course instructors, and students (N=6). The questionnaire was administered during the closing session on the last day and remained active for the following nine days for the participants to fill in voluntarily. The questionnaire was not sent to students who did not participate in any of the OSC activities. Each student received a personal link via e-mail, to complete the survey. Thus, each student was only able to complete the survey once. The anonymous questionnaire was administered using *SoSci Survey* Version 3.1.06 (LMU Munich, Munich, Germany). Pseudonym mode was chosen for survey administration. Participants who had not filled the questionnaire were reminded in the middle and at the end of the administration period.

Statistical analysis

The comparisons between two related variables were conducted using paired t-test. The correlation between the two variables were analysed using Pearson χ^2 . The relationship between two ordinal variables was evaluated using Kendal τ_b . A *p*-value of ≤ 0.05 was considered significant. Statistical analysis was conducted using SPSS Statistics version 27 (IBM Analytics, Armonk, United States). The answers to the open-ended questions were analysed and summarized manually.

Results

Participants demographic and questionnaire completion

In total, 357 applications for the OSC were received. After the selection process and reconfirmation, 319 students committed to participating in the online course. Most of the participants (78.4%) in the OSC were Indonesians. Students from the host university (i.e. Universitas Gadjah Mada, Indonesia) comprised 12.5% of the total participants. Students from 16 other higher education institutions in Indonesia comprised 65.83% of the total participants. Foreign participants (21.6%) were from 15 different institutions outside Indonesia. As expected, the students were mainly Asians as the topic was of regional focus. The level of study was quite balanced between first year, second year, and third year of undergraduate. Almost all the participants were pharmacy students (94.7%). The demography of the participants is presented in Table II.

Table II: Demographic characteristics of the online summer course participants (N=319)

Demographics	n (%)
Nationality	
Southeast Asia	
Indonesian	250 (78.37)
Vietnamese	31 (9.72)
Filipino	3 (0.94)
Malaysian	2 (0.63)
Cambodian	1 (0.31)
East Asia	
Taiwanese	3 (0.94)
Japanese	1 (0.31)
South Asia	
Nepali	6 (1.88)
Pakistani	1 (0.31)
Others	
Iraqi	19 (5.96)
Ugandan	1 (0.31)
Saint Kitts and Nevis	1 (0.31)
Institution	
Host university [†]	40 (12.54)
Institutions in Indonesia other than host university	210 (65.83)
Institutions outside Indonesia	69 (21.63)
Level of study	
1st year of undergraduate	88 (27.59)
2nd year of undergraduate	116 (36.36)
3rd year of undergraduate	104 (32.60)
4th year of undergraduate	1 (0.31)
Postgraduate	8 (2.51)
Apothecary	1 (0.31)
Recently graduated	1 (0.31)
Study programme	
Pharmacy	302 (94.67)
Traditional medicine	12 (3.76)
General medicine	2 (0.63)
Medical laboratory technology	1 (0.31)
Chemistry	1 (0.31)
Veterinary medicine	1 (0.31)

[†]Host university is Universitas Gadjah Mada, Indonesia

During the OSC, forty-one students did not participate in any of the OSC activities as some of them withdrew their participation (due to academic activity in their home university or personal issues) while others did not give any explanation. Therefore, the questionnaire for the evaluation of the OSC was sent to 278 participants. A total of 153 responses were received (55.0% of the total participants), 150 of which gave full responses. The proportion of the respondents were 18.42% from the host university, 57.24% from other institutions in Indonesia, and 24.34% from non-Indonesian institutions. This respondent proportion is similar to that of the OSC participants and thus could reflect the whole population of OSC participants.

Most students were very satisfied (41.1%) or satisfied (51.0%) with the course overall. Only 12% of the respondents gave neutral responses. Regarding the expectation of the course, the respondents answered that the course much exceeded their expectation (27.8%), exceeded their expectation (45.7%), or was same as their expectation (24.5%).

Course completion

A minimum of 75% attendance was required to pass the course. The criteria for grading are available in Table III, while the weight of each activity on the grade is available in Table I. 252 participants passed this course, with an average grade of 88.68±5.25. The average of the pre-test was 47.19±13.53 (N=250), while the average of the post-test was 52.57±12.59 (N=244). The small increase in the average between pre-test and post-test was not significant based on paired t-test ($p < 0.001$, N=219). The difference between pre-test and post-test did not significantly correlate to the percentage of attendance (Pearson χ^2 , $p=0.09$).

The statistical analysis are compiled in Table IV.

Table III: Criteria for course grading with the number of participants receiving the corresponding grade

Criteria	Grade
Less than 75% attendance	F
75-85% attendance	C
More than 85% attendance and point from activities of less than 60%	B
More than 85% attendance and point from activities $60 \leq x < 70\%$	B* (N=5)
More than 85% attendance and point from activities $70 \leq x < 80\%$	A or B (N=9)
More than 85% attendance and point from activities $80 \leq x < 90\%$	A (N=125)
More than 85% attendance and point from activities $90 \leq x < 100\%$	A (N=113)

Note: A is the highest grade. F is the lowest grade (not pass). The number of participants who achieved each grade was indicated (N). The total number of participants who passed this course is N=252.

Table IV: Statistical analysis of the variables in the online summer course

Variable 1	Variable 2	Statistical analysis	p-value†
Pre-test score	Post-test score	Paired t-test	$p < 0.001$
Difference between pre-test and post-test score	Percentage of attendance	Pearson's correlation	$p = 0.09$
Comprehensible aspect of the course	Level of study or home university	Pearson's correlation	$p > 0.05$
Level of study	Student had enough background knowledge	Pearson's correlation	$p < 0.05$
Level of study	Student had received similar topic before	Pearson's correlation	$p < 0.05$
Home university	Student had enough background knowledge or had received similar topic before	Pearson's correlation	$p > 0.05$
Active participation in project 1	Active participation in project 2	Paired t-test	$p = 0.143$
Teamwork quality of project 1	Teamwork quality of project 2	Paired t-test	$p = 0.593$
Self-perceived English proficiency	Difficulty in performing team discussion	Pearson's correlation	$p < 0.01$
Other team members' English proficiency	Hindrance in the team discussion	Kendall's tau correlation	$p = 0.098$
Comfort about the schedule of the course	Difference in time zone	Kendall's tau correlation	$p = 0.001$

†A p-value of ≤ 0.05 was considered significant

Course comprehension

Regardless of the pre-test and post-test results, most of the participants gave positive reviews on the comprehensible aspect of the course (Table V). The course was easy to understand regardless of the level of study or the home university of the participants (Pearson χ^2 , $p > 0.05$). The level of study determined

whether the student had enough background knowledge or had received a similar topic before (Pearson χ^2 , $p < 0.05$; $\tau b = -0.202$ and -0.168 , $p = 0.006$ and $p = 0.025$, respectively). In contrast, the home university was not a discriminative factor on whether the student had enough background knowledge or had received a similar topic before (Pearson χ^2 , $p > 0.05$) (Table IV).

Table V: Students' perception of comprehensible aspects of the course (n=150)

	Percentage				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have enough background knowledge to understand the course.	12.7	52.0	27.3	6.00	2.00
I have received a similar topic in my class before.	10.7	42.0	31.3	11.3	4.67
I can understand the course material easily.	10.0	48.0	37.3	4.00	0.67
The synchronous activities helped me to do the asynchronous activities.	17.3	55.3	24.0	3.33	0.00

Students' perception of team-based learning

The participants had commonly been involved in team projects with students from their own university prior to partaking in the OSC (Table VI). The percentage was much lower for team projects involving students from different universities and different countries. In the group that was assigned by the instructors, the participants agreed that their group was diverse. The participants felt a positive impact on team-based projects towards the learning experience with students from diverse backgrounds. The majority of the participants agreed or strongly agreed that the team-based projects increased their ability to work with students from different backgrounds, enhanced their learning experience, helped them to understand what area they needed to improve and to understand the problem better, and left a positive remark that they are willing to work in a team with students from other

universities in the future. The percentage of the participants who answered agree or strongly agree was more than 70% for each question.

Language barrier

On the impact of the language barrier, whether the English proficiency of the student or their peers affected the team discussion was assessed (Table VII). A Pearson χ^2 test of independence showed that there was a significant association between self-perceived English proficiency and the difficulty in performing team discussion ($\chi^2 = 131, p < 0.01$). The self-perceived English proficiency negatively correlated to the difficulty level in team discussion ($\tau b = -0.267, p = 0.001$). In contrast, other team members' English proficiency did not significantly correlate to the hindrance in the team discussion ($\tau b = -0.138, p = 0.098$) (Table IV).

Table VI: Students' previous experience in team-based learning and the impact of team-based learning

Previous experience in a team project for educational purposes (n=151)					
Categories	Number (%)				
Involving students from the same university					
Yes	133 (88.1%)				
No	14 (9.27%)				
Do not remember	4 (2.65%)				
Involving students from other universities					
Yes	70 (46.4%)				
No	70 (46.4%)				
Do not remember	11 (7.28%)				
Involving foreign students					
Yes	52 (34.4%)				
No	95 (62.9%)				
Do not remember	4 (2.65%)				
Impact of the team-based learning (n=150)					
Categories	Strongly agree (n, %)	Agree (n, %)	Neutral (n, %)	Disagree (n, %)	Strongly disagree (n, %)
My group had students with diverse backgrounds.	40 (26.7%)	75 (50.0%)	28 (18.7%)	4 (2.67%)	3 (2.00%)
The team-based projects increased my ability to work with students from different backgrounds.	53 (35.3%)	73 (48.7%)	23 (15.3%)	0	1 (0.67%)
Having team members from other universities enhanced my learning experience.	66 (44.0%)	68 (45.3%)	10 (6.7%)	4 (2.67%)	2 (1.33%)
The feedback that I received from other students helped me to understand what area I needed to improve.	24 (16.0%)	85 (56.7%)	35 (23.3%)	4 (2.67%)	2 (1.33%)
The feedback that I gave to other students helped me to understand the problem better.	26 (17.3%)	95 (63.3%)	26 (17.3%)	1 (0.67%)	2 (1.33%)
I am willing to work in a team with students from other universities in the future (for educational purposes).	88 (58.7%)	53 (35.3%)	8 (5.3%)	0	1 (0.67%)

Table VII: Impact of the language barrier and technical difficulties

Language barrier (n=152)	
Self-declared English proficiency	
Excellent	10 (6.58%)
Good	92 (60.5%)
Not very good	49 (32.2%)
Bad	1 (0.66%)
Comparison of one's English proficiency to other students	
Higher than average	28 (18.4%)
Same as average	109 (71.7%)
Lower than average	15 (9.87%)
All of the active team members are from the same country	
Yes	40 (26.3%)
No	112 (73.7%)
In general, team discussion was difficult due to the language barrier†	
Strongly agree	10 (8.93%)
Agree	31 (27.7%)
Neutral	41 (36.6%)
Disagree	23 (20.5%)
Strongly disagree	7 (6.25%)
Technical difficulty (n=151)	
Time difference	
No time difference	75 (49.7%)
1-2 hours	59 (39.1%)
3-4 hours	14 (9.27%)
More than 4 hours	3 (1.99%)
Regarding the time difference, how comfortable the schedule of the OSC was (only show participants that had time difference, n=75)	
Very comfortable	17 (22.4%)
Comfortable	28 (36.8%)
Neutral	21 (27.6%)
Uncomfortable	9 (11.8%)
Very uncomfortable	0 (0%)
Technical difficulty‡	
Network/internet problem	80 (53.0%)
Familiarity with the software/platform	42 (27.8%)
Technical problem with the software/platform	26 (17.2%)
Other	2 (1.32%)
No technical difficulty	43 (28.5%)

†n=112, results from the participants whose active team members were from the same country were removed.

‡percentage of the total respondents (not total responses as students may choose more than one answer)

Technical difficulty

The majority of the respondents (49.7%) had the same time zone as the OSC (Table VII). Among those in different time zones, a small proportion (11.8%) were uncomfortable with the schedule of the OSC. The discomfort was proportionally higher in respondents having a larger difference in time zone ($\tau_b=0.338$, $p = 0.001$) (Table IV).

Network/internet problem was the most frequent technical problem experienced by the participants (53.0%). A quarter of the respondents, mostly not from the host university, indicated unfamiliarity with the software/platform.

Open-ended questions

The questionnaire included questions that asked students to identify one aspect of the OSC that they like or dislike the most. Table VIII summarizes the answers to the open-ended questions. The aspects that frequently appeared in the favourable responses were collaborative work with students from diverse backgrounds ($n=58$), course material and the speakers ($n=43$), and course design and software/platforms ($n=25$). The aspects that the students dislike included the assignments ($n=31$) and interaction with team members in collaborative work ($n=23$). Twenty-five students answered that they did not have anything that they dislike in the OSC.

Table VIII: Summary of the responses to open-ended questions about what students like and dislike the most in the online summer course[†]

Aspect	Representative answers [†]
Like	
Course design and software/platforms (n=25)	<i>"Asynchronous and synchronous activity going together which made the communication among teammates effective and learning better."</i> <i>"The part that I like is during game sessions or quizzes, and when showing videos about medicinal plants in Turgo."</i>
Course material and the speakers (n=43)	<i>"Great lecture and lecturer, well-prepared material, the content of the material, teamwork, I've learnt everything here, I'm satisfied and love this course."</i> <i>"The most thing that I like from this course is I have a lot of insight about traditional medicine in other Asian countries."</i> <i>"The diversity in academic backgrounds of the professors, lecturers, etc. that presented various lectures during the course."</i>
Collaborative work with students from diverse backgrounds (n=58)	<i>"Being able to connect with other students from other universities or even another country."</i> <i>"I really like the time to discuss with our team. I really like to share our mind, opinion, etc."</i> <i>"I got to collaborate with diverse students."</i>
Improving English language skills (n=7)	<i>"This course really develops my English skill."</i>
Overall impression (n=13)	<i>"It's free but still maintains the best quality."</i> <i>"I love all of part in this course, and I think OSC is a wonderful experience during the pandemic."</i>
Dislike	
None (n=25)	
Assignments, especially the amount and the deadline (n=31)	<i>"Too many tasks but it makes more communication in our group."</i> <i>"The deadlines for the assignments were a little time-restricted; it was a challenge completing some of them on time."</i>
Network/internet problem (n=10)	<i>"I have a problem with the internet connection."</i>
Platform/software (n=16)	<i>"I was confused when using eLok for the first time, but now it's okay. Next time maybe you could give us a more detailed video simulation on how to use eLok."</i> <i>"Thinglink can only be used by some people."</i>
Interaction with team-members in collaborative work (n=23)	<i>"Certain teammates are very difficult to contact and thus often make group discussions feel very one-sided."</i> <i>"It's hard to make the other members active in the discussion."</i>
Language (n=7)	<i>"The language barrier with other members."</i>
Time difference (n=9)	<i>"The only thing that bothers me is the time difference."</i>
Delivery of the course (n=19)	<i>"It is tiring to do zoom 4 hours a day."</i> <i>"Sometimes the project's instruction is a little bit bias and confusing."</i>

[†] Grammatical errors and typos were corrected whenever necessary without changing the content.

Discussion

Team-based learning is an effective method to improve the active participation of students in an online class. Team-based learning involving students from different universities and countries may amplify the learning experience by working in a culturally diverse environment. Online team-based learning focusing on traditional medicine was successfully organised. The course was generally well-received by the students and the learning objectives were achieved by most of them. Challenges arose in organising and implementing online team-based learning due to the diversity of the participants. However, the benefit that the students got offset those challenges.

The course material and the speakers were carefully designed to suit all levels of higher education study in various higher education institutions. Although the curricula of the institutions might be different,

especially those in other countries, the proportion of students that perceived having enough background knowledge and similar topic in their class did not significantly differ regardless of their home institutions. The level of study had more influence on whether the student had enough background knowledge or had received a similar topic before. The background knowledge of the student, usually determined by the seniority of the student, has been proven to dictate their cognitive engagement during team-based learning. Interestingly, junior students tended to have higher engagement due to the novelty of the course materials and the team-based learning method itself (Rotgans *et al.*, 2018). Nevertheless, most students indicated that the course was easy to understand. Many students also praised the course material and the speakers by pointing them as the most favourite part of the OSC. For the evaluation of course comprehension, the team-based projects and other asynchronous

assignments were designed so that the students used their understanding of the lectures as the basis to complete the tasks. The active participation of the students to search for literature and formulate ideas were required to excel in the assignments. The participants agreed that the synchronous activities helped them to accomplish the asynchronous assignments. The objectives were successfully achieved as all students scored beyond the passing grade in the first team-based project and 48 out of 49 groups passed in the second team-based project. The results agree with previous literature on the hybrid learning method whereby the combination of team-based learning with lectures has been proven to improve learning outcomes and students' acceptance compared to either method alone (Yang *et al.*, 2014).

The diversity of the participants was the most compelling feature of the OSC. Most of the OSC participants had never been involved in team-based learning with students from different universities or countries prior to attending the OSC. Team formation by the instructors is critical to ensure group diversity. A group with a heterogeneous level of competence, such as a mix of junior and senior students in the OSC teams, increases the learning gains and improves the students' perception of the quality of the work especially for the less competent members (Donovan *et al.*, 2018). The diversity of the OSC participants was not only reflected in their different levels of study, but also in the different universities they attended across several countries. Thus, the preparedness level of the participants was surely diverse as the curriculum of study is different between countries. Even, the pharmacy curriculum is not standardised within Indonesia. The diverse origin of the students within a team increases their knowledge and develops the personal and social experience of the students. In a diverse team, the personal and social attributes that could be developed through team projects includes patience, tolerance towards diverse opinions, openness to other perspectives, and eagerness to enter unfamiliar environments, especially in the academic context (McLean *et al.*, 2006). Participants mostly rated that their group had sufficient diversity. Moreover, diversity was frequently mentioned as an aspect the participants appreciated.

The biggest challenge in conducting online team-based learning is to motivate and ensure students actively participate in completing the projects. Attendance is important in team-based learning as it correlates with students' performance, in a similar way to lecture-based learning (Jakobsen *et al.*, 2014). A minimum of 75% attendance was required to pass the course. While the students' attendance in the course was generally very high, the manually registered attendance may not reflect actual presence or engagement of the students.

Manual attendance may suffer from low efficiency, dishonesty, and is prone to error which might influence statistical analysis involving the data (Cao *et al.*, 2018). Of the two groups who did not pass the team-based project in the second week, both only had one to two active members. Dropout is a common phenomenon in an online course. It could be driven by factors related to the student (such as low motivation, time management, and lack of background knowledge) or the course (such as course design and low engagement with the instructors and other students) (Dalipi *et al.*, 2018). Therefore, the authors actively asked students to report if their groups had less than four active members and the groups were subsequently merged whenever necessary. Engagement during an online course is usually lower with time, evidenced by the reduction of page viewing, activities completion, and assignment submission (Jakobsen, 2019). However, more complaints were received on this matter during the first major team-based project which was given in the first week of the course. Some inactive members during the first team-based project might have felt more motivated as the authors followed up and gave feedback on the first team-based project. On the other hand, the active members of groups with minimum active members during the whole course could feel less motivated. As the core activity was the team-based project, the team member's contribution in finishing the projects was rather a deciding factor in whether the students enjoyed the OSC in general. In a course that is conducted for a longer period, regrouping of the active members and distributing the inactive members equally could increase the overall outcome. Zheng and Pinkwart (2017) regrouped students based on group interaction and learning performance during a MOOC. The regrouping reduced the rate of student dropout and increased the cohesiveness within the group (Zheng & Pinkwart, 2017). Although the active participation of each of the team members varied, the teamwork during the completion of the projects in the OSC was averagely rated as excellent. The reported data on teamwork quality could be biased as less than half of the participants completed the survey on group dynamics. It is possible that only participants who were satisfied with their group completed the survey.

English proficiency and technical difficulty (time difference and network/internet problem) were identified as factors that interfered with team-based learning. Students who had lower English proficiency found it difficult to engage in team discussion. The asynchronous method via discussion forums or social media messaging apps was a better way to overcome this problem as students used written communication so that they have more time to process the information and give responses. The time difference is one factor

that cannot be avoided in online learning in Indonesia, let alone in a course that involves international students. In addition, internet problem is a common problem during online learning in developing countries, especially in smaller cities (Adnan, 2020; Dhawan, 2020). Students' familiarity with the online environment (such as previous software and media usage, computer and internet self-efficacy) also affects the possibility of experiencing technical problems during online learning. Students who are familiar with the online environment used in the learning activities would be quicker to solve technical problems if they appear (Dhawan, 2020; Wei & Chou, 2020). Due to these factors, students may miss the deadline or cannot find a convenient time to finish the project. In this OSC, a one-day deadline (for the minor assignments) and a three-day deadline (for the major assignments) were given as the OSC was conducted in a short period. Several complaints to extend the deadline were received during the OSC and it was reflected in the open-ended question in the questionnaire on unfavourable aspects of the course. It is advisable to have a more flexible time, such as having a longer period to finish the assignments whenever possible. It will reduce the workload of the students as well as increase the possibility of having more team members actively participate while maintaining the team dynamic. With extended deadlines for assignments, team members who have network/internet problems may have more opportunities to participate in completing the project.

Limitations

A comparison between the pre-test and post-test scores could ideally be used to quantitatively indicate whether the students fulfil the learning objectives. However, the students' score of the tests was low, of which the authors felt that the results did not reflect the students' comprehension of the course. Difficulty was encountered in formulating the test questions as many speakers were guest lecturers and expert practitioners and the authors had not received the detailed course module before the start of the course. In addition, the background of the participants was largely varied. Therefore, carefully formulated tests should be given to students to quantitatively assess the students.

Conclusion

Online learning with team-based project was conducted as a summer course with the topic of traditional medicine. The course was attended by

students from several countries. Students indicated positive experiences during the learning activities due to course materials and delivery, the quality of the speakers, and intercultural diversity among students and speakers. Inactive participation of the students in team-based projects remained as the biggest hindrance to successfully conducting the course, which was partly caused by the language barrier and technical difficulty. Instructors should take these factors into account to design a suitable environment that fully encourages students' participation and engagement. While technical difficulties are inevitable during online learning, online team-based learning was still found to be an effective method to fulfil learning objectives for a wider audience.

Conflict of interest

The authors declare no conflict of interest.

Source of funding

The authors did not receive any funding.

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