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Challenges and Barriers of Blended Learning Among Asian Health Sciences Students: A Pilot Study

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ABSTRACT

This study explored the perception, engagement, learning experiences, as well as challenges and barriers in blended learning (BL) or the combination of multiple delivery methods designed to complement educators and learners, of students in the health sciences courses in Universiti Putra Malaysia (UPM). A qualitative approach was performed using focus group discussions (FGDs). Eight medical, eight nursing and seven biomedical students were selected according to a set of criteria. Three FGDs were conducted using a semi-structured topic guide. Data were collected through audio-recordings and transcriptions. Data coding and analysis were performed using inductive content approach. Three topic highlights were developed from the analysis. Students referred to BL as an online learning platform which does not involve lectures nor lecturers. They agreed that BL allows self-directed and collaborative learning, besides it fits their learning styles. Some of them highlighted some limitations of BL when it comes to slow-learners, student-lecturer engagement and the existing infrastructure. The students also shared their good and bad experiences regarding BL, as well as feedbacks to help improve its implementation. There are a mix of positive and negative perceptions and experiences highlighted in this study. The integration of BL to the existing traditional learning style is challenging. Therefore, by examining the strengths and weaknesses of BL that have been identified in this study, it is hoped that the students' learning experiences could be made better. Future studies could investigate more on BL implementation in larger student population to ensure its beneficial aspects towards enhancing students' learning progress.

Keywords: *Blended learning, Health science courses, Qualitative approach, Undergraduates*

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INTRODUCTION

Nowadays, students from various institutions worldwide are exposed to different learning styles. The traditional learning (TL) style involving face-to-face interaction, when used alone, is no longer considered adequate as it does not promote collaborative learning among students and lack of encouragement of higher-level thinking skills (1). The new generation of students who are exposed to the digital media from young age, may need an approach different from TL for a more effective learning (2). In addition, the recent COVID-19 pandemic has only emphasised the need to use methods other than the face-to-face interaction in ensuring the continuation of teaching and learning while practicing social distancing restrictions. Hence, the BL approach is deemed to be the way forward in teaching and learning. Blended learning (BL) has evolved over the years and has been applied in many organisations as an alternative or supplemental form of a more effective learning. BL has grown to become more popular when a growing number of medical institutions started using the Internet as a digital platform for teaching and learning fora (3). The term BL was first applied in early 2000 when Cooney et al. reported the perception of play and work activities in a pre-kindergarten and a first grade classroom (4). They observed the classroom activities and interviewed the children and their teachers. Interestingly, students and teachers described some of the activities as both play and work, hence a BL experience.

Malaysia has also initiated BL as part of its 2015–2025 blueprint on education and as a means of transforming its current pedagogical practices (5). The definition of BL includes the combination of multiple delivery methods designed to complement educators and learners, in addition to supporting learning and app-learned behaviour (6). It involves event-based activities, such as face-to-face encounters in the classroom between students and

teacher, live e-learning and self-paced learning (6). BL is known for its advantages in engaging educators and students, as well as its allowance for continuity in the learning process (6). It can be delivered at any location and time. BL is also adaptive to individual learning needs (7) and promotes both independent and collaborative learning experiences (8). In terms of learning method, some students may prefer to learn on their own while others may prefer to rely on lecturers to receive direct lectures. BL can cater for both student-centred and teacher-centred learning methods. It is also compatible with the student-centred approach because it enables students to experience self-paced learning, enhance learning strategies and enhance peer-assisted learning (9). On the other hand, face-to-face interaction in BL enhances learning with some elements of teacher-centred learning.

Student-centred learning allows the learner to be responsible for learning effectively using his/her own methods and styles without relying on lecturers (10–11). However, there are some barriers in student-centred learning approach. Students who are used to teacher-centred learning may become anxious of the approach (12).

Furthermore, student-centred learning is perceived as a Western learning approach (13) and may not necessarily suitable for countries with limited resources and different learning cultures. This approach might also be difficult to be implemented in large classes commonly associated with many university undergraduate courses (13).

A changing pattern in medical education from teacher-centred approach (pedagogy) to student-centred approach (andragogy) has been observed in the recent years (14). The students' preference for a certain types of learning depends upon their familiarity with that particular method (14). Nonetheless, most first-year medical students in India and Iran have been found to learn better through teaching methods that employ blended activities (14–15).

On the other hand, Stevenson and Sander found that first-year medical students are wary of the practicality of the student-centred approach to learning (16). Some teacher-centred lecturers have also assumed that students are only capable of accepting knowledge transfer instead of creating their own understanding and perceptions (17). On that note, the implementation of BL in Asian countries, like Malaysia, may face additional challenges. Students in Asia are described as hard-working and have high regard for their teachers and the value of education (18–19). However, some Western academics view Asian students' learning style as rote, passive and silent (20). Activities in Asian classrooms are usually dominated by teachers (21). Asian students regard their teachers as highly competent and, therefore, accept the teachers' inputs for its entirety (22). This style of learning is associated with low level of learning as compared to the higher level of learning achieved through the use of deep learning strategies and students' active involvement in classroom activities (20).

BL's implementation also faces challenges due to its technological, organisational and instructional designs (23). A research conducted by Liyanagunawardena et al. at Yellow Fields University, Sri Lanka, found that the lack of infrastructure is a major barrier to the implementation of its online study programmes' components. So much effort was needed to resolve infrastructure problems while Internet connectivity issues may be solved by creating more student-friendly connectivity centres (24). Instructional design is also important in BL so that students can understand what is expected from their learning. In order to be more effective in becoming one of the best solutions to problematic teaching and learning styles in higher education (25), BL concepts need to be thoroughly understood. Since some students may have little experience in BL, adequate time needs to be allocated for them to adapt to BL.

In Malaysia, Azizan reported that the Open University of Malaysia (OUM) has been optimally using the BL approach in their teaching and learning activities. OUM provides a learner-centred environment via the use of various media and ICT which helps prepare learners for lifelong learning (26). Universiti Putra Malaysia (UPM) is also implementing BL through a learning management system which serves as the standard platform for lecturers to share the instructions for learning, as well as the resources, course information and other learning activities. In UPM, BL is 30% online, complemented by 70% face-to-face learning sessions. On this note, programmes such as medicine put emphasis on having clinicals and practicals as face-to-face sessions, whereas online classes focus on cognitive-based instructions. However, during this pandemic, all teaching is conducted online, including both practicals and clinical skills teaching.

This study was conducted before the pandemic and we are interested to know if our students from different backgrounds and courses have similar perceptions regarding BL. We aimed to explore the BL engagement and learning experiences of students from the medical, nursing and biomedical courses in the Faculty of Medicine and Health Sciences (FMHS), UPM. Understanding the challenges faced by the students when utilising BL may help educators to ensure well-adaptation of this approach, for a more effective learning outcome.

METHODS

This study applied a qualitative approach through focus group discussions (FGDs) to explore the BL perceptions and experiences of medical, nursing and biomedical undergraduate students of the Faculty of Medicine and Health Sciences, UPM. A case study approach was used to explore the students' experiences on BL.

Setting

This study took place in the Faculty of Medicine and Health Sciences, UPM from 28th May until 7th June 2018.

Students

This study involved groups of students from three different undergraduate programmes of the Faculty of Medicine and Health Sciences in UPM. Medical, nursing and biomedical undergraduate students who have gone through their courses in a blended mode (30% online learning) were selected. The medical and nursing students were in the second semester of their first academic year while biomedical students were in the second semester of their third academic year. They were invited to voluntarily participate in the interview. Eight medical, eight nursing and seven biomedical students agreed to take part in this study. They were selected based on the criteria in Table 1. Maximum variation sampling were undertaken, taking into consideration the gender and ethnicity distribution. Table 2 shows the distribution of the participants based on the groups of students, gender and ethnicity.

Table 1: Guideline to students’ criteria

Inclusion criteria	Student from the Faculty of Medicine and Health Sciences, UPM volunteered to be in the study. Have received BL for at least a year from the same lecturers who taught all three courses. The same BL material was also received by the whole batch.
Exclusion criteria	Students who have participated in any BL research before.

Table 2: Description of the participants

Students	Gender	Ethnicity		
Biomedical	Female	5	Chinese	2
	Male	2	Indian	1
				Malay
Medical	Female	3	Chinese	3
	Male	5	Indian	2
				Malay
Nursing	Female	5	Chinese	3
	Male	3	Indian	0
				Malay

Data Collection

FGD was used in order to put the students at ease in sharing their opinions. The interviews were carried out using a semi-structured guide (see Table 3). Each interview was performed by an experienced moderator, at a seminar room in one of the departments in the faculty. It is a multipurpose room commonly used by both academic staff and students. The interviews were conducted in either Malay or English, depending on the students’ preferences, to allow them to express their feelings, thoughts, perceptions and experiences without any hesitation. An assistant moderator helped in recording the audio, taking notes on the order of the speakers and observing the students’ interactions as well as the whole process. Taking approximately two hours for each group, all three FGD interviews were audio-recorded and transcribed verbatim, with the students’ identities anonymised by a transcriber.

Table 3: Semi-structured guide for interview session

I am going to ask you several questions. Please respond based on your experiences.

Students' understandings about BL

1. What do you understand about BL?
2. Give some examples of BL that you have gone through?
3. How is BL different from the traditional teaching?

Students' experiences with BL

1. How did you feel about the classes?
2. Did you understand the topics well?
3. Did you find the topics more interesting with BL?
4. Did going through the classes motivate you to learn more about the topics?
5. Would you suggest BL to be continued? Please provide reasons.
6. Do you prefer BL over traditional classroom?
7. What do you like best about BL?
8. Do you have any suggestion for improvement?

Students' accessibility to online portal for BL

1. What do you think of the existing online portal?
2. What do you like best about the portal?
3. Did you face any difficulty when using the portal?

Data Analysis**Transcribing**

The audio-recordings during the interviews were transcribed verbatim by a transcriber. An identifier was created for each transcript, for instance "Participant 1". Back to back translation of Malay conversations into English was performed by two researchers during the data analysis. Meaning-based translation was produced by using contextual meaning to help convey what the students meant (27).

Data coding and analysis

Each FGD was conducted on a respective day immediately followed by its transcription, translation and open coding. Thereafter, cross-coding among HS, RAM and SAN was undertaken. Researchers went through discussions which allowed them to confirm the emerging codes and reach an agreement. This study utilised

inductive content analysis based on three predetermined categories, namely, the students' understanding on BL, their general perceptions on BL, as well as their experiences on the existing student portal (28).

Ethical issues

Ethics compliance was obtained from the Ethics Committee of the university (Ref. No: UPM/TNCPI/RMC/1.4.18.2 [JKEUPM]). Before the interview, written informed consent for interview participation and publication of non-identifiable information in journal were obtained from the students. All methods were carried out in accordance to the relevant guidelines and regulations.

RESULTS

Through the FGDs, the participants were able to share their understanding and perception of BL. They discussed their BL

experiences and made several suggestions for further improvement of the current student portal. The findings are presented according to the predetermined categories, i.e., understanding on BL, perception on BL and participants' experiences on BL. Summary of codes emerged from the FGD is presented in the attachment.

Understanding on BL

The participants' views on BL varied. Most of them perceived BL as a teaching session that does not consist of any lecture or lecturer's presence in class.

There are videos obtained from YouTube, there are videos of the lecturer himself giving the lecture but in a video form so we don't have to attend the class. (Participant 3: Medical)

For me, I think BL is basically no lecture. Meaning I don't have to go to the lecture hall. (Participant 3: Medical)

What's different is that we don't get to meet the lecturer in person and we don't get to actually ask questions. (Participant 8: Medical)

During the discussion, the medical and biomedical student groups mentioned that BL involves online method and uses Internet, whereby lecturers are able to upload resources.

My context from what I experienced, BL somehow involves IT form of teaching such as videos, online slides and some short interactive. (Participant 4: Medical)

They mentioned that resources such as videos and lecture notes are uploaded online prior to classes. Earlier access helped students to have an overview of the topics. Upon further discussions, the participants also shared their understanding of several approaches of BL. Putra Blended Learning Assistive System and Technology (PutraBLAST) is one of those, where all

lecture notes are uploaded. PutraBLAST is a system that contains the learning content, teaching and learning assessments, and helps in tracking and monitoring the learning progress in UPM. Aside from the lecture notes, there are also a combination of activities such as games, modules and group discussions which enhance interactive learning process among the students.

Interactive learning was emphasised by the nursing and biomedical students.

I think BL is more, need student to contribute to the knowledge. It's not from the, only from the. Like in school right, only from the lecturers, only from the teachers. But students [sic] are also involved [sic] in teaching [sic] other [sic] group members. (Participant 7: Nursing)

In my opinion, for the BL sometimes we got like a group discussion and then teach. Like you learn a topic then teach other group about it. (Participant 5: Biomedical)

BL, as mentioned by most students, also involves preparation before class which consists of pre-reading and pre-studying in order for them to prepare for quizzes or presentations.

I think the objective of this BL is to tell the student to do the pre-reading before entering the class. (Participant 8: Nursing)

And then BL actually requires [sic] us to do preparation beforehand, like we have to prepare the information for the presentation. Even for the application like that we have to study first and then to take out the important point to present to people. (Participant 6: Biomedical)

We need to do pre-reading before the class started because we have the quizzes. (Participant 8: Nursing)

Perceptions on BL

Advantages of BL

The students have various perceptions on BL which include its advantages and limitations. The majority of them agreed that BL facilitates self-directed learning whereby they are able to do their own revision at their own time preference. They can also watch the uploaded videos repeatedly until they can fully understand the particular topic.

There's one thing that I like about BL is that you can actually repeat while you see it compared to a lecture where it's a one-way form of interaction between lecturer in one way, after that you just like forget unless you record it. (Participant 5: Medical)

If I am lost, I can watch the video again and recap. Keep repeating what I do not understand. (Participant 3: Nursing)

So by having e-learning or BL, we can review the updated lesson content anytime that we prefer. (Participant 7: Biomedical)

Biomedical students further added that it helped them in preparing for exams or quizzes since they can always do revisions earlier. On top of that, BL complies with their personal requirements of following their pace and learning environment needs. Pace comes at the right time when there is flexibility in choosing their own revision period.

BL when you can choose the time, you can choose the pace. There's a time where you can fully understand you actually sit down and fully concentrate. This is the good thing about the flexibility. (Participant 5: Medical)

Students also get to concentrate better when they study in their own preferred atmosphere such as in their room. They

are able to focus more and have better understanding of the topics they are studying since they have no distractions. Apart from that, BL addresses different types of students' learning styles. As stated by the medical, nursing and biomedical students, videos or diagrams attract their attention and boost their interest to study in a more in-depth manner. This indirectly eases the process of memorising and understanding the lessons better.

As we all has [sic] been saying about videos and all, sometimes like when we were in the lecture hall, all based on words and we do have diagrams but it's just static so when we watched videos, things are moving and it's [sic] colourful so logically it attracts [sic] more attention. (Participant 7: Medical)

Another thing is it is more to visual. So it is beneficial to those who learn via visual. So, the student can memorise the video contents. (Participant 2: Nursing)

In my opinion, the videos uploaded by the lecturer are easy to understand. They also use good examples and animations and also, the videos can attract our interest. Furthermore, the duration of the video is not that long such as 30 minutes of viewing. It's [sic] usually not more than 10 minutes. (Participant 1: Biomedical)

Medical and nursing students have the most experience in using the student portal. Basically, there are notes, videos and questions in the portal which are accessible anytime, anywhere. According to the medical students, the uploaded materials are well-organised and easy to be viewed.

They attached questions itself there, so when we go to PutraBLAST to refer to the lecture notes, they upload there. There's questions along with it so it really helps compare to what everyone said. Other courses, some are really organised with the lecture notes and

the questions. And also, they do send links over there also to watch videos. (Participant 7: Medical)

So, PutraBLAST has everything in there. For instances the lecture slides, videos, the quiz. (Participant 3: Medical)

In my opinion, despite whatever people said about PutraBLAST I find it quite helpful because it's [sic] centralised. It's like Facebook, everything is there. (Participant 3: Medical)

Providing opportunity for collaborative learning is another beneficial aspect of BL. Students interacted more with their classmates since some assignments needed them to perform group work. This had eventually made them more active in class activities and enhanced their self-confidence. Discussions and sharing of opinions had helped them to better understand the respective topics. Nevertheless, most medical and biomedical students further mentioned that BL had motivated them to be an independent learner. For instance, when they needed additional information on certain topics, they can always search for it on the Internet or by reading about it. This was because some of the lessons uploaded by the lecturers may not contain the full information; thus, this compelled the students to independently do extra research.

Challenges of BL

On the other hand, the students also highlighted a few limitations of BL, which are summarised into three factors, namely student, student-lecturer interaction and non-conducive learning environment. As for the student factor, BL requires high commitment from students. This means those who cannot commit may be left behind in their learning. For instance, those who do less pre-reading may have less understanding of the topics.

If from the first class that we started BL, if the student didn't start doing the pre-reading by our own self, they cannot do any question or maybe they can but get very low mark in the class. (Participant 6: Nursing)

But if I do not have enough time to prepare or I have to settle other works, and the lecturer is going to give a quiz in tomorrow's class, then I will be lost. But actually the lecturer has already uploaded the materials since about one to two weeks before. But sometimes we forget or we have too many things to do. So, when I go to tomorrow's class, I will be lost because the lecturer only discusses [sic] particular questions that students ask. But for me, I do not understand starting from the beginning of the lesson. That is the obstacle. (Participant 2: Biomedical)

Similarly, procrastinators may not be able to catch up with lessons if they are bad in time- and self-management, as mentioned by a medical student. Besides that, students may not get better understanding of the topic if they do not take extra effort in searching for more inputs.

But one of the things that I would like to highlight in our discussion is the disadvantage of BL is the tendency to procrastinate. We take advantage of that by using that "doing at our own pace". Once we have the freedom we have the tendency to misuse it. So, I think one of the risks [sic] or disadvantage [sic] of BL is when the videos are being supplied and we have the ability to use it at our own pace, is that we tend to procrastinate and not watch it at all. (Participant 3: Medical)

Another concern for students is that late adopters may face problem in utilising BL as they need some time to get used to it especially among nursing and biomedical students. This is because they were not

approached with BL since their first year of study. Having adaptation issue affects their examination results as some of them really find it difficult to cope with BL.

On the other hand, less interaction occurred between lecturers and students due to less face-to-face sessions. Students met their lecturers in person less frequently than they would normally do, thus, they had lesser time for question-and-answer sessions. Students still feel that it is necessary to meet lecturers often for any inquiries.

What's different is that we don't get to meet the lecturer in person and we don't get to actually ask questions. (Participant 8: Medical)

Apart from the aforementioned factors, non-conducive learning environment may also influence students' learning process. For instance, an infrastructure issue particularly the Internet connection, may be an obstacle. BL needs strong Internet connection to allow watching or downloading the uploaded videos. Strong Internet connection is also needed to access the student portal; otherwise, the portal will become slow and only continues to buffer with no end in sight. Not only that, the system itself, specifically the notification part, confuses the students.

PutraBLAST always shows [sic] that you have a new assignment for some course. Always mention that "you have the new assignment" but when I click it, there is no new assignment. (Participant 4: Nursing)

But the system is like if you want to know whether a lecturer has uploaded section or not, then you have to go to PutraBLAST and open the specific course because they didn't inform you which lecture uploaded for which course. So, you have to click into the course and then you have to remember which one is the old one and which one is the new one. (Participant 8: Medical)

The student portal is also said to be not universally used by all lecturers. Hence, it is not standardised for all subjects. The students found this is a little bit inconvenient and confusing, especially among the late adopters whose exposure to the student portal is limited.

Barriers to BL

Students mentioned certain barriers in adopting BL, which include the student portal system and Internet availability. These barriers delayed the submission of their assignments or their participation in online activities. Some assignments needed to be submitted through the portal yet due to Internet limitation, students needed some time to find spots with good Internet coverage in order to submit their work online.

Like about the Wi-Fi in college, there was once when it was raining heavily and none of us could use the Wi-Fi. It was really bad and another is we have a lot of BL on online obviously all of us will be constantly trying to open and it gets worse when everyone tries to go on at the same time. It gets really slow. So, it's really annoying. (Participant 6: Medical)

Students' Feedback on BL Implementation

Students, therefore shared their suggestions to overcome the problems they faced. They suggested that the student portal be developed into a type of application like WhatsApp, so that it can be downloaded in both mobile phone and computer. Besides, these applications have notification that alert students on updates and the notification can easily be seen as it will be displayed on the mobile screen. An application will also allow them to directly ask questions to the lecturers. On the other hand, some students preferred the system to remain the same with only slight improvement, especially when it comes to the notification issue. They proposed the use of the official UPM

student e-mail rather than the student portal website.

I will suggest that to upgrade the PutraBLAST website because we didn't get notification through email. Besides that, when lecturer uploads [sic] anything we didn't get any notification so we cannot know that the thing is uploaded or not. Because all of students [sic] and lecturers have [sic] email right for specific UPM account. So whenever lecturer posted any forum or any assignment feedback or anything there [sic] should be an email notification. (Participant 7: Biomedical)

On top of that, the majority of the medical students preferred more question-and-answer sessions between lecturers and students, thereby suggesting that online forum discussions be conducted. This was supported by nursing and biomedical students as well. According to them, forum discussions may enable everyone to get direct answers from their lecturers and share their opinions with their fellow students.

Maybe can open like 1 forum. While watching the video, maybe live or not it's ok, as long as the video can be accessed [sic] by lecturer and accessed [sic] by student at the same time, when I watch [sic] the video I can, "Oh [sic] this part I don't understand." I can directly type the question and the lecturer maybe online then can refer the question and answer the question in the forum online. (Participant 4: Nursing)

I suggest the lecturer to attach related questions and answers for each posted video. So, I could imagine which part is important and must focus on. I mean, for lecturers to upload a lot of questions, with the answers, and the topics that we can study. Or the lecturer could give questions in advance but we could all discuss in the class. (Participant 2: Biomedical)

Nursing and biomedical students further shared that they prefer to have the combination of BL and TL. This was based on their point of view that BL is mainly by online mode. Therefore, in their opinion, combining BL and traditional teaching method with the lecturers would enhance students' understanding of the topics that they are learning.

As for me, I would prefer the traditional method to be remained together with BL. Meaning, we will still have face-to-face session and also BL. So, we can do pre-reading, lecture, post-reading. These will make us memorise even more of the lectures. (Participant 8: Nursing)

However, as agreed upon by most students, it is important for individuals to make their own effort in utilising BL as a tool of study. They should be more productive and independent in getting extra knowledge. Lest, procrastination may cause them trouble throughout the learning process.

On individual. I mean we have to how I should say, put our own effort. If let's [sic] say e-learning [sic], doctor uploads [sic] and we review only [sic] at the last minute so it won't really benefit us. (Participant 7: Biomedical)

DISCUSSION

Qualitative data within the three groups showed the students' understanding, perceptions and experiences regarding the BL approach.

Most students from all the three courses understood BL as a method of education without lectures—that is, they do not have to go to the lecture hall and meet their lecturers in person. They gained information of the respective subjects from online videos, slides, modules and exercises. These information are either uploaded on YouTube or on the student portal by the respective lecturer. These

resources can be accessed by students before classes to help them in understanding the topics beforehand and to prepare them for the upcoming quizzes. Besides students, instructors may also have the misconceptions that BL is a teaching method without lectures and lecturers. In the study by Fadde and Vu, they mentioned that there is a misconception that asynchronous online instruction is not as effective as face-to-face teaching; however, this misconception has drastically changed between 2003 and 2013 (6). Overtime, they find asynchronous online learning to be at least as effective as face-to-face learning, if not better. However, it does not address the problem on the lack of interaction between the lecturer and the students; hence, it was proposed that the learning management system of BL be implemented along with synchronous online learning where the issue on the lack of interaction is addressed.

The majority of the students agreed that online teaching enhances interactive learning whereby more face-to-face and group discussions occurred, as also shared by De Leng et al. and Salim et al. who suggested that BL provides more opportunity for students to interact with lecturers, especially when they need further information or help in understanding particular lessons (29–30). Some studies also showed that BL enhances interaction and improves the discussion in the succeeding meetings of lecturers and students (30–31). This has indirectly motivates the students to value their time and have better learning perspectives (29, 32).

This study found that students have both positive and negative perceptions of BL. In terms of its advantages, most of them believed that BL encourages self-directed learning. It allows them to fully understand the topics by providing online resources that can be accessed repeatedly at anytime and anywhere. It matches their learning pace and allows them to choose their own personal time and atmosphere whenever they plan to concentrate on studying the uploaded notes. In other words, it allows

the students flexibility in time and place whenever they deem it optimal for their brain to absorb new information (33). This is supported by Algahtani who mentioned that e-learning as a whole permits students to study at their own pace which increases students' satisfaction and relieves them from stress. Besides, it empowers students in higher educational institutions to achieve their education and personal aims without the need to attend scheduled courses (34).

Unlike traditional face-to-face instruction, web-based learning allows students to get instant additional information that can easily be applied to their existing knowledge (34). Thus, the students also like BL because it uses more online or uploaded short videos, colourful visuals, and moving diagrams than normal written notes. These enhance their interest in learning and ease their memorisation process when trying to retain information as compared to normal reading. They also get to think creatively and learn beyond the requirements of the courses when they are attached to the online resources (35). Respective websites, multimedia resources and online chat rooms provide opportunities for students to gain knowledge related to their objectives and personal experiences, and to be trained in interdisciplinary perspectives (36).

BL is also thought to have enhance collaborative learning among students since they often have activities that require group works. Even though some of them might be busy with activities on campus, they can still support and update each other through online for both academic and social interactions (37). According to Driscoll and Carliner, online approach engages students through a learning experience with activities that involve analysing, synthesising and evaluating information while gaining knowledge (38). This is supported by Holmes and Gardner, who stated that e-learning helps in assessing the students and their personal educational learning while enhancing interactivity among them through collaborative learning and exposure to globalisation and cultural

diversity, regardless of time and place (39). Nevertheless, e-learning has helped improve not only the communication and interaction among students but also between them and their educators (6, 39). In addition, Urdan and Weggen summarised e-learning as a faster learning platform, smarter access to information, enhanced interactivity and collaboration among students, as well as the ability to learn regardless of time and place (40).

The medical and biomedical students also mentioned that they need to do extra research via internet or more reading to gain further inputs regarding the discussed topics. Referred to as independent learning motivation, this drove them to be more productive and less dependent on sources provided by their educators. As mentioned by Knowles et al., BL increases the learner's control and responsibility over their own learning as compared to the traditional learning delivery. Motivation to learn more seemed to be greater among students operating within a BL environment (41). Due to this, some studies have found that knowledge-gaining among students receiving BL is better than those attending normal classroom courses (42–43).

Despite its benefits, BL also possesses a few limitations as experienced by the students. In this study, medical, nursing and biomedical students shared that students should have their own willingness in finding extra inputs and avoid procrastination. Otherwise, they might not be able to catch up on the topics. As supported by Standen et al., even though e-learning would be an ideal learning approach, without effort and consistent study time throughout the learning process, the students' performances may still be negatively affected (44). Besides, not all students can adapt well with a BL environment, especially those suffering from low grades (44). Students who are not familiar with BL prior to adopting it may face problems since they may take longer time to adapt (44).

Students felt that BL with less interaction/communication with the lecturers makes them less productive in learning. As reported, online and face-to-face approaches can be reorganised to match the students' learning styles in a BL environment (44). In a study by De Fátima Wardenski et al., the students commented that they need a better mix of face-to-face and virtual activities to get better guidance and support (45).

Not only that, there is also another limitation to a successful BL process faced by students: the Internet connection issue. A medical student mentioned that the more students surf the Internet, the slower the connection becomes. It took more time for them to download or watch the resources uploaded by the lecturers. As stated by Kaur, the students found it a bit difficult when they had to be online at the same time as it requires higher-speed Internet connection and better workstations (25).

As widely-known, students tend to use electronic resources regularly, and they positively react to online learning on top of traditional learning (46). In a similar scenario, students in this study prefer that the student portal be made as an application so that it can be downloaded and hence, make it easier for them to frequently check for notifications or notes updates. This will lessen the possibility of them being left behind in their learning and also helps them work on their assignments on time.

All groups of students also suggested that frequent online forum is conducted to enable more question-and-answer sessions to be facilitated between them and their lecturers. This would ensure that everyone involved have a fair share of the same information and knowledge. Besides, quizzes or exercises related to the notes or videos uploaded by the lecturers would be a good way to test the students' understanding of the respective topics. This is supported by Smart and Cappel, who stated that simulation exercises in an online module could be an effective way of testing students' understanding and ensuring their

well-adaptation to the BL environment (46). Some students in the study made efforts and took this approach as a challenge for themselves in acquiring knowledge (46).

Other than that, as mentioned by the nursing and biomedical students, they felt that the combination of TL and BL made it even easier for them to improve on their learning and knowledge-gaining. As is widely-known, TL allows students an immediate face-to-face access with their lecturers as well as peer discussion and group works (47). Meanwhile, online learning as part of BL allows the information to be virtually-presented and shared online with everyone without the need of being physically present (47). These are some of the reasons that they cited for requesting the lecturers to use both TL and BL approaches. Nevertheless, to successfully acquire knowledge through BL, most students have the same opinion that they must drive their personal willingness and effort. They emphasised the need to avoid procrastination and too much reliance on the provided materials; rather, be independent in looking for extra knowledge. These comments are parallel with the findings from a previous study, which states that BL benefits students by encouraging them to have more independence in looking for information while studying at their own time and pace (48).

It is worth noting that during this COVID-19 pandemic, all schools, universities and colleges have been instructed to close. All teaching activities have been conducted online, which impacted the face-to-face aspect of BL activities. Nevertheless, as most of the lecturers have been exposed to BL, they already possess some skills in conducting online teaching. Furthermore, even before the pandemic, UPM Centre for Academic Development has already been organising trainings for lecturers in various methods of online teaching.

LIMITATIONS AND STRENGTHS OF STUDY

Our study only involved one university with only a limited number of students, which may not represent other settings. However, we deem the inclusion of students from different courses, such as medical, nursing, and biomedical sciences, as one of the study's strengths as it gave us insights on the perceptions of students from different fields of study. Bias was also reduced by making sure that the interviewers were not among the teachers teaching the students.

CONCLUSION

This study highlights the aforementioned students' personal understanding, perceptions and experiences of BL, as well as their feedback in helping to improve it. BL is perceived to have helped improve students' independence in searching for additional knowledge. However, there are still challenges faced by students in constantly adapting to BL. A solution to this may require the re-designation and more improvement of BL for the undergraduates. Future studies could focus more on implementing BL in a larger population to observe its significance and success.

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ETHICAL APPROVAL

Ethics compliance was obtained from the Ethics Committee of UPM (Ref. No: UPM/TNCPI/RMC/1.4.18.2 [JKEUPM]).

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