Journal of Education and e-Learning Research
Vol. 9, No. 3, 147-154, 2022
ISSN(E) 2410-9991 / ISSN(P) 2518-0169
DOI: 10.20448/jeelr.v9i3.4103

Combining Synchronous and Asynchronous Learning: Student Satisfaction with Online Learning using Learning Management Systems

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Abstract

Students' satisfaction, knowledge, skills and attitude towards learning (KSAs), engagement and interaction in online learning are essential indicators in ensuring that the Learning Management System (LMS) is utilised effectively and efficiently. However, most students become passive listeners and observers during online teaching and learning activities on the LMS platform, both in synchronous and asynchronous learning. Therefore, this study aimed to identify student satisfaction in terms of KSAs, engagement and interaction with a combination of synchronous and asynchronous learning in online learning platforms. A questionnaire was distributed to 163 students from a higher education institution. The results showed that student satisfaction was at a high level in KSAs; there was a significant positive relationship between KSAs, interaction and student engagement which led to student satisfaction. Therefore, a teaching design which combines synchronous and asynchronous learning methods could be applied by educators to enhance students' KSAs, interaction and engagement to help raise their satisfaction levels.

Keywords: Student satisfaction, KSAs, Student engagement, Student interaction, Synchronous learning, Asynchronous learning.

Citation | Siti Zuraidah Md Osman (2022). Combining Synchronous and Asynchronous Learning: Student Satisfaction with Online Learning using Learning Management Systems. Journal of Education and e-Learning Research, 9(3): 147-154.
History:
Received: 6 May 2022
Revised: 13 July 2022
Accepted: 25 July 2022
Published: 10 August 2022

Publisher: Asian Online Journal Publishing Group

Funding: This study received no specific financial support.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.
Transparency: The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.
Ethical: This study followed all ethical practices during writing.

Contents

Contribution of this paper to the literature

A combination of learning methods can provide learning satisfaction, with a variety of teaching methods, learning activities and assessment styles. This diversity can increase KSAs, engagement and interaction and make way for the learning platforms developed by lecturers to be fully and effectively used by students.

1. Introduction

Since 2020, e-learning has been widely implemented using the Learning Management System (LMS) platform, particularly in educational institutions that demand an online learning management procedure (Heo & Han, 2021). The Movement Control Order (MCO) has mandated the use of the LMS as a learning platform for students based on the "anytime, anywhere" premise (Rasmitadila et al., 2020). Various LMS features also facilitate content management, learning activities, assessment and sharing of teaching materials, collaboration and communication between instructors and students.

The usage of technology, digitalisation and e-learning has changed the education style of the twenty-first century and modified the role of traditional learning to be more efficient and appropriate for the new era (Rabiman, Nurtanto, & Kholifah, 2020). Rabiman et al. (2020) opined that successful online training involves robust integration of contact and cooperation, exposing its collaborative nature. In particular, student engagement relies on them being able to know more if they study more, practise problem-solving more and get feedback from their professors and peers; this may result in more profound knowledge of what they have acquired (Kuh, 2005). In the past decade, researchers have explored the impact of learning via videotaped or live presentations by lecturers on student engagement. Taylor, Lipscomb, and Rosemier (1969) found that live presentations of information were equally successful as filmed content presentations for high and low ability students in relation to student-lecturer interactions. A study was conducted by Moore (1989) on three forms of interaction in distance education: learner–content, learner–instructor and learner-learner interactions.

Independently and indirectly, e-learning increases classroom learning performance under predefined requirements. The two fundamental forms of e-learning are synchronous and asynchronous. Blended learning is an example of combining synchronous and asynchronous learning; during one learning session, students meet with lecturers in synchronous courses and complete assignments or teaching and learning activities online as self-directed learning (Amitii, 2020).

2. Problem Statement

A study by Nik-Ahmad-Zuky, Baharuddin, and Rahim (2020) found that the challenges of using the LMS for teaching and learning require students' knowledge, skills and attitude, good internet access and a more significant commitment by lecturers to upload learning materials on LMS platforms. In line with these challenges, Mahmoudi-Dehaki, Chalak, and Heidari Tabrizi (2021) found that the LMS requires creating a comfortable learning environment with student involvement in online learning sessions leading to achievement of targeted learning outcomes.

In addition, the factors contributing to LMS failure can be classified under eight steps: revenue sharing and content, communicative interaction , structure, learning engagement, evaluation, user interface, social interaction and informal learning and mobile features (Alhazmi, Massey, & Ezzadeen Kaed, 2021). According to the needs analysis done on students who have similar characteristics to the study sample, more than fifty per cent of students who are at home use personal mobile data with moderate internet networking connections. The lack of physical and social presence affects student engagement and interaction, which are significant factors affecting satisfaction with online learning (Salta, Paschalidou, Tsetseri, & Koulougliotis, 2022), which in turn affect students' knowledge, skills and attitude towards online learning.

According to Al Mamun, Lawrie, and Wright (2022), students with prior understanding tend to disengage themselves during online classes since they already understand the contents. However, according to Siti Noridah (2012) only students who understand will engage. Those who do not understand become listeners and observers, both in synchronous and asynchronous learning on the LMS platform (Ummah, Sulisworo, & Abd Rahman, 2021). Not all lecturers interact with their students during online lectures (Joyner, 2018), while students who interact less with the material on the LMS platform or fail to complete the tasks on the platform, have lower grades (Kalelioğlu, 2017). However, students who interact with their peers also fail to complete their assignments on the LMS platform (Turner & Baskerville, 2013).

Therefore, this study combines synchronous and asynchronous learning in the teaching and learning process and examines the relationship between student engagement, interaction and KSAs and their satisfaction with learning using the LMS platform.

3. Literature Review

Due to the COVID-19 pandemic, almost every country globally switched to online environments for teaching and learning activities (Pandey et al., 2022; Sambo, Bello, & Sule, 2021). As a result of the transition, LMS as a teaching and learning platform has been fully utilised. According to Zhang, Ghandour, and Shestak (2020), LMSs such as Moodle, Edmodo, Schoology, OpenLearning and Google Classroom are the most common platforms used worldwide as a source of lecture information, educational materials, assignments and teaching and learning activities, as well as to provide feedback on specific courses. For example, in Malaysia, the Ministry of Higher Education has established rules requiring all school teachers to utilise Google Classroom as a platform for teaching and learning activities for students staying at home (Tamin & Mohamad, 2020).

In addition, higher education institutions employ Moodle as a learning management system (LMS). One of them is e-Learn@USM, a Moodle platform that has been in use since 2009 at one of Malaysia's higher learning institutions (Kee, Omar, & Mohamed, 2012). Thus, not only Malaysia, but China (Qin, Orchakova, Liu, Smirnova, & Tokareva, 2022), India (Roy & Brown, 2022) and UAE (Kabata, 2022) countries also use LMS as one of the top

online learning platforms to manage their learning courses. Thus, the usage of and access to e-learning platforms is growing. It has become mandatory in higher education institution courses that do not employ laboratory practice, to conduct teaching and learning activities in a blended way (Nik-Ahmad-Zuky et al., 2020).

According to Bradley (2021), LMS platforms provide better access to teaching and learning materials for teachers and students and allow teachers to organise teaching management and formative assessment, resulting in more diverse and efficient tools for student engagement and interaction. Besides well-organised online classrooms, students can utilise the LMS platform to register for classes, connect with peers and lecturers, provide feedback, submit assignments and check grades or instructor remarks, which help them improve their KSAs (Mufliharsi, Mayuni, Nuruddin, & Lustyantie, 2022). Student engagement in the classroom is essential for student relationships and happiness, and teachers play an important role in developing student engagement (Yılmaz, 2022). Active learning is promoted by student engagement. According to Reeve (2013), student engagement emphasises learning activity and encourages active learning. It consists of four aspects of highly inter-correlated multidimensional constructs: behavioural engagement, emotional engagement, cognitive engagement and agentic engagement (Rozinah & Osman, 2014).

Learning through LMS in live presentations by lecturers and uploaded pre-recorded video lectures in synchronous and asynchronous learning influence student-lecturer interactions. There are three types of interaction in distance education: learner–content, learner–instructor and learner-learner (Kuo, Walker, Schroder, & Belland, 2014), in which students gain knowledge through video lectures as the main method of content delivery and discuss with lecturers and peers on the LMS platform (Ferree et al., 2022). Furthermore, learning material can be accessed at any time and from any location. This online tool has the potential to help students learn in groups or independently with their devices, and includes interactive learning tools for interaction (Ibrahim, Sunardi, & Isnaini, 2022).

Autonomous learning skills are essential for students today because they can provide several benefits, such as providing equal opportunities for students of various levels, encouraging confidence and responsibility and focusing on students' knowledge, skills and attitude (KSAs) (Adler & Milne, 2010). Students will be able to test their potential and seek to enhance their knowledge of the importance of learning if they have both group and independent learning skills. Apart from that, students may decide their learning objectives and track their progress. This is in line with the opinion that students with the right KSAs and learning ability would be able to determine their own learning needs, develop learning targets, choose appropriate learning methods and monitor and analyse their personal progress (Hadi, Haryanto, Asriadi, Marlina, & Rahim, 2022).

Thus, educators must come up with an instructional design for LMS teaching and learning sessions before utilising the LMS platforms. Throughout the learning process, students' requirements must be considered while using the LMS platforms for engagements, interactions and the development of KSAs. Therefore, this study combines synchronous and asynchronous learning for both lecturers and students to be able to use LMS platforms effectively to improve the teaching and learning process, as well as to acquire better pedagogy, technology and assessment tools (Alvi, Bilal, & Alvi, 2021) in order to meet learning objectives. Pedagogical and technological development (in software used at home or in personal computers) is essential in the use of Information and Communication Technology (ICT), to enable LMSs to be fully utilised and be more usable. Hence, designing courses in LMSs with a successful combination of synchronous and asynchronous learning is one way of doing this. In addition, the instructional designs must be based on the students' online learning profiles to ensure that they are satisfied in terms of engagement, interaction and KSAs when utilising the LMSs.

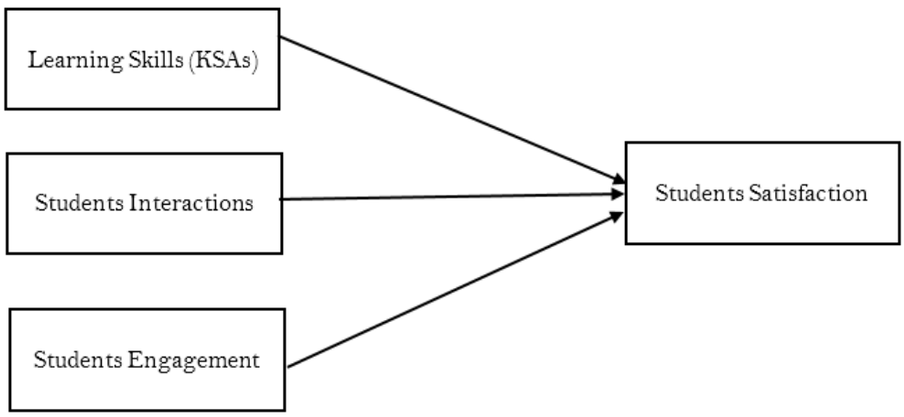

Figure 1. Research framework.

3.1. Research Framework

Figure1 shows the research framework used in this study to identify student satisfaction, through learning skills, student interaction and student engagement in online learning, that combines synchronous and asynchronous learning. In addition, this study also looks at the relationship between learning skills (KSAs), interaction and student engagement with student satisfaction.

4. Method

This action research was conducted according to the model of Action Research on Learning in Gogus (2012). This study began with the observation of issues and problems identified through student feedback before each teaching and learning session. A survey was conducted among students to find out their previous learning experiences using LMS platforms, from the aspect of online learning locations, types of internet networks, ICT devices used and internet network speed levels. Based on this preliminary information, the researcher designed a course that combined synchronous and asynchronous learning in each teaching and learning session. The researcher then analysed students' satisfaction with the learning design. The lecturers practised reflection after

each lesson by considering student feedback after the teaching and learning sessions and returning to the process of improving the design of the next lesson. After lessons were completed, the researcher identified the levels and relationships between students' learning skills, interaction and engagement with their satisfaction in using an LMS that combines synchronous and asynchronous learning on one of the platforms used by higher education institutions in Malaysia.

This action research is a quantitative study using a questionnaire instrument distributed online to 163 respondents who were students of an education program, enrolled in a course that used LMS as a platform for the online teaching and learning process. This is a descriptive study in the form of a survey that reports the information obtained via the questionnaire. The study data was obtained from the questionnaire made up of five parts, namely part A on demographic information, part B on student satisfaction (10 items) from Roach (2014), part C on learning skills (KSAs) (22 items) from Adler and Milne (2010), part D on student interaction (5 items) from Kuo et al. (2014) and section E on student engagement (14 items) from Reeve (2013). This questionnaire used a 5-point Likert scale, with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. The KSAs questionnaire scale was as follows: 1 = no level, 2 = level low, 3 = partial quality level, 4 = quality level, 5 = every quality level. All questionnaires were modified from previous studies. Data from the respondents were analysed using the Statistical Package software for Social Sciences (SPSS) version 26.

The questionnaire's reliability was assessed using the consistency reliability test between items. As Table 1 shows, the Cronbach alpha value is above the criteria decided by Nunnally (1978) (as cited in Ogunkola and Archer-Bradshaw (2013)), which indicates that the reliability value of 0.7 is acceptable. Therefore, the questionnaire used in this study has high-reliability.

Table 1. Reliability of research questionnaire.

Variable	Number of Items	Cronbach alpha
Student Satisfaction	10	0.79
Study Learning Skills (KSAs)	22	0.96
Student Interaction	5	0.80
Student Engagement	14	0.90

Table 2. Synchronous and asynchronous mixed learning designs taught through the LMS platform.

Student Feedback	Week	Topic	Teaching Materials on LMS platform and Activities	Learning Approach
Student Feedback: More than 50 percent Location: Home Internet Type: Personal data ICT Equipment: Laptop Internet speed: Simple	10	*Design & Development in ICT Education*	synchronous: Online teaching (Webex) Teaching *slides (Google Slides)* Discussion (WhatsApp) asynchronous: e-Notes (PDF) Teaching *slides (Google Slides)* Attendance (eLearn@USM) Weekly assignments – Storyboard (MS Word) Webex recording and all notes and assignments (eLearn@USM/WhatsApp)	synchronous (1 hour) asynchronous (2 hours)
Student Feedback: More than 50 percent Location: Home Internet Type: Personal data ICT Equipment: Cellphone Internet speed: Simple	11	*Creativity in ICT Education – Matters*	asynchronous: Teaching videos (Youtube) Teaching *slides (Google Slides)* Activities – photo collage (Google) Description of learning tools (Google) Attendance (eLearn@USM) Weekly tasks – Creative tools and activities (Padlet) Video recording and all notes and assignments (eLearn@USM/WhatsApp)	asynchronous (3 hours)
Student Feedback: More than 50 percent Location: Home Internet Type: Personal data ICT Equipment: Laptop Internet speed: Simple	12	*Emerging technologies in teaching and learning - Multiple technology platforms, applications & approaches*	synchronous: Online teaching (Webex) Web page (Website; 200 tools) Teaching *slides (Google Slides)* asynchronous: Attendance (eLearn@USM) Teaching *slides (Google Slides)* Activities – discussions (Forum- eLearn@USM) Webex recording and all notes and assignments (eLearn@USM/WhatsApp)	synchronous (1 hour) asynchronous (2 hours)
Student Feedback: More than 50 percent Location: Home Internet Type: Personal data ICT Equipment: Laptop/mobile Internet speed: Simple	13	*Shows, Videos, and Reverse Instructions for Creating Content Online*	synchronous: Online teaching (Webex) Web pages (Websites; 200 tools, broadcasts, YouTube studios) asynchronous: Reverse class (BlendSpace) Attendance (eLearn@USM) Weekly tasks – snarls (Anchors) Webex recording and all notes and assignments (eLearn@USM/WhatsApp)	synchronous (30 minutes) asynchronous (2 hours 30 minutes)
Student Feedback: More than 50 percent Location: Home Internet Type: Personal data ICT Equipment: Laptop Internet speed: Simple	14	*Education 4.0: Education and the Industrial Revolution to 4*	synchronous: Online teaching (Webex) Teaching *slides (Google Slides)* asynchronous: Attendance (eLearn@USM) Activities – discussions (WhatsApp) Webex recording and all notes and tasks (WhatsApp)	synchronous (1 hour) asynchronous (2 hours)

4.1. Teaching Design

The LMS platform (eLearn@USM) was used in combining synchronous and asynchronous learning for 5 weeks after the mid-term break. A new plan was prepared for each week. Table 2 shows the design for each synchronous and asynchronous learning session on the LMS platform, designed to suit student needs. Every week, before the classes started, students provided feedback on location, internet usage and available applications. All students could access the materials and complete all assignments and activities that needed to be done online. The course discussions not only included lectures and tutorials but also took place through the WhatsApp application.

5. Results and Discussion

5.1. Results

Tables 3, 4 and 5 show the demographic information on gender, race and field of study analyzed on 163 students who registered for a course that used the LMS platform.

Table 3. Number and percentage of gender.

Gender	Frequency	Percent
Male	25	17.2
Female	135	82.8
Total	163	100

Table 4. Number and percentage of race.

Race	Frequency	Percent
Malay	125	76.7
China	19	11.7
India	5	3.1
Others	14	8.6
Total	163	100

Table 5. Number and percentage of fields of study.

Field of study	Frequency	Percent
Art	100	61.3
Science	24	14.7
TESOL	25	15.3
Special education	14	8.6
Total	163	100

As shown in Table 6, the results of the research analysis found that students showed overall satisfaction with the combination of synchronous and asynchronous learning on the LMS platform. The highest average score was (mean = 4.56, SD = 0.56) for the item "The course as a whole is a valuable learning experience." Meanwhile, the lowest average score was (mean = 3.35, SD = 0.9) for the item "I will take other courses that apply class lectures".

Table 6. Average value and standard deviation of questions / items on student satisfaction.

Question Items	Mean	Standard Deviation
The course as a whole is a valuable learning experience.	4.56	0.56
Knowledge of technology more than other sources helps with my understanding	4.53	0.55
The ability to replay video lectures helps me study	4.50	0.61
Talking to my classmates helps me study	4.45	0.66
Teaching videos that resemble classroom teaching help me learn	4.24	0.71
Video lectures are easy to access	4.20	0.72
Video lectures help me study	4.18	0.80
Compared to the classes I attended, this course was the most interactive	4.12	0.85
I would usually watch lecture videos for a week	3.96	0.87
I will take other courses that apply class lectures	3.35	0.90
Total Mean	4.21	0.43

Table 7 shows the results of a comprehensive analysis of each student in higher education taking courses that combine synchronous and asynchronous learning using the LMS platform. The highest mean score was (mean = 4.39, SD = 0.69) for the item "Desire to continue learning in the future", whereas the lowest mean score was (mean = 4.01, SD = 0.75) for the item "conversational communication skills".

Table 7. Average value and standard deviation of question/items on student learning skills (KSAs).

Question Items	Mean	Standard Deviation
Desire to continue learning in the future	4.39	0.69
Ability to work as a team member	4.36	0.60
Skills to plan your own work	4.34	0.63
Communication skills in writing	4.28	0.64
Organizational and time management skills	4.25	0.67
Understanding yourself	4.24	0.71
Views on multidisciplinary skills	4.24	0.67
Computer technology proficiency	4.20	0.70
Skills for implementing change	4.20	0.68
Knowledge of the concept of a case being studied	4.18	0.62
Confidence	4.16	0.68

Question Items	Mean	Standard Deviation
Understanding the subject in a real organization	4.16	0.62
Understanding the yield limit of a problem	4.15	0.66
Ability to be creative	4.14	0.71
Ability to solve problems	4.13	0.64
Ability to identify the problem of the subject being studied	4.13	0.65
Ability to use subject concepts in unique situations	4.13	0.64
Flexibility and adaptability	4.10	0.66
Willingness to learn	4.10	0.71
Conceptual and analytical skills	4.09	0.74
Ability to lead others	4.03	0.76
Conversational communication skills	4.01	0.75
Total Mean	4.18	0.51

Table 8 shows the results of the analysis of student interactions when using the LMS platform with a combination of synchronous and asynchronous learning. The highest mean score was (mean = 4.34, SD = 0.70) for the item "Online course materials help connect my personal experiences with new concepts or new knowledge." Meanwhile, the lowest average score was (mean = 4.01, SD = 0.60) for the item "I ask questions to lecturers through various electronic methods such as e-mail, discussion boards, instant messaging applications and other methods".

Table 8. Average value and standard deviation of student interaction question items.

Question Items	Mean	Standard Deviation
Online course materials help to connect my personal experiences with new concepts or new knowledge	4.34	0.70
Online course materials help me to better understand the content of the class	4.33	0.63
I can easily access online course materials	4.27	0.79
Lecturers answer my questions on time	4.14	0.67
I ask questions to lecturers through various electronic methods such as e-mail, discussion boards, instant messaging applications and other methods.	4.01	0.60
Total Mean	4.23	0.51

Table 9 shows the results of the overall analysis of students in each course that combines synchronous and asynchronous learning using the LMS platform. The highest mean score was (mean = 4.42, SD = 0.54) for the item "I try hard to do my best in this class." Meanwhile, the mean score was lowest (mean = 3.43, SD = 0.89) for the item "During this class, I expressed my tendencies and opinions".

Table 9. Average value and standard deviation of questions/items on student engagement.

Question Items	Mean	Standard Deviation
I try hard to do my best in this class	4.42	0.54
This class is fun, I like to learn something new in this class	4.40	0.67
I feel comfortable in this class	4.37	0.64
When I complete assignments for this class, I try to relate what I have learned	4.35	0.55
I try to adapt all the different ideas to gain understanding.	4.29	0.54
I create my own examples to help me better understand certain concepts	4.28	0.56
When we do assignments in this class, I feel interested	4.26	0.62
While studying in this class, I try to relate to what I learn	4.22	0.58
During this class, I listen carefully	4.02	0.66
I pay attention to this class	4.01	0.66
I tell my professor what I need	3.74	0.83
When I need something in this class, I ask the lecturer	3.68	0.91
I tell my professors what interests me	3.52	0.87
During this class, I express my tendencies and opinions	3.43	0.89
Average	4.07	0.46

Table 10 shows a significant positive relationship between students' learning, student interaction, students' engagement and student satisfaction after students attend courses that combine synchronous and asynchronous learning on the LMS platform.

Table 10. Correlation between KSAs, interaction, student engagement and student satisfaction.

Variable		Student Satisfaction
KSAs	Pearson correlation	0.449**
	Sig. (2 tails)	0.000
	N	163
Student Interaction	Pearson correlation	0.621**
	Sig. (2 tails)	0.000
	N	163
Student Engagement	Pearson correlation	0.576**
	Sig. (2 tails)	0.000
	N	163

Note: ** The correlation is significant at the 0.05 level (two-tailed).

5.2. Discussion

This study aimed to determine the effects of students' learning experiences, interaction and involvement on their

satisfaction with courses carried out synchronously and asynchronously through the LMS platform. All respondents agreed that synchronous and asynchronous learning using the LMS platform provides learning satisfaction with their courses (Pereira & Guerreiro, 2021). In addition, college students who take this course interact and engage in the online teaching and learning process using the LMS platform (Sumardi & Muamaroh, 2020) synchronously and asynchronously. Furthermore, it was found that higher order learning skills (KSAs), interaction and student involvement raised satisfaction levels among students who took these courses.

This study also found that students did watch video lessons for a week. Consequently, the use of the LMS platform in online synchronous and asynchronous learning provided access to learning materials and interactive activities to help students learn as in physical face-to-face classes. Students were not sure about taking other courses that applied lectures in the classroom. This unsure feeling may have been due to the feasibility of the online learning process in which the learning material in the LMS platform helped with students' readiness to attend the class.

In conclusion, students who are given flexibility in learning synchronously and asynchronously on the LMS platform can improve their abilities in teamwork, communication, adapting to problems, adding insight and content and be able to make decisions to solve problems (Sutarni, Ramdhany, Hufad, & Kurniawan, 2021). In addition, students learning through this method, who will one day become teachers themselves, can also increase their knowledge and competency of technology in preparing creative teaching lessons and materials to meet the challenges of using technology in real school settings (Wilujeng, Tadeko, & Dwandaru, 2020).

Synchronous and asynchronous learning activities on the LMS platform also help students connect with what they learn through completing assigned tasks and activities. In addition, access to materials and lecturers is also easier. It helps students ask questions and give feedback to lecturers in both synchronous and asynchronous online or face-to-face interactions and on social media applications such as the WhatsApp application. This synchronous and asynchronous combination shows that students interact with materials and activities on the LMS platform both with lecturers and with peers (Tobing & Pranowo, 2020).

The combination of synchronous and asynchronous learning on the LMS platform also allows students to try their best to associate what they have learned through examples, in completing assigned tasks and activities (Ganeser & Robert, 2021). In addition, this study found that students are also interested in the latest technology and pay attention to their learning needs. However, some students are hesitant to inform the lecturers about their needs and interests in taking the course. Some students are hesitant to express their views during teaching and learning activities, during both synchronous and asynchronous learning (Makumane, 2021). This synchronous or asynchronous learning combination clearly shows that lecturers need to pay attention to the needs and interests of students and focus on activities that emphasise discussion so that students can express their opinions.

6. Conclusion

In conclusion, the design of synchronous and asynchronous learning using LMS platforms has the potential to be applied by all educators in coming up with designs that use LMS platforms in their teaching and learning activities. This study found that the combination of synchronous and asynchronous learning on LMS platforms provides satisfaction to students in terms of learning skills, students' knowledge, skills and attitude in online learning, interaction and student engagement. In addition, the framework and methodology used can be replicated in studies with other students based on their demographic profiles such as age, internet network and new variables that can assist educators, such as the design and interface of the LMS platform learning accessibility and motivation of the learners

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