# Students' engagement: empirical investigation into technology acceptance and pre-class activities

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## Article Info

## ABSTRACT

The COVID-19 pandemic has led to a significant transformation in the field of education, with a notable shift towards online learning worldwide including higher education institutions. However, one of the major concerns faced by educators is ensuring students' active participation and engagement in the online learning environment. In maintaining the quality of education and achieve desired learning outcomes, it is crucial to understand the factors that influence students' engagement. The main objective of this study is to investigate the impact of technology acceptance and pre-class activities on the engagement levels of higher education students in online learning platforms. To conduct the research, a cross-sectional approach was employed, and data was collected from 1,692 students at Sunway College and Sunway University through a Google survey form administered between January and March 2022. The findings of this study reveal a positive and significant correlation between students' acceptance of technology and their level of engagement in the online learning process. Moreover, the study highlights the empirical significance of pre-class activities in fostering student engagement in online classes. These research findings provide valuable insights for educational institutions, practitioners, and policymakers, enabling them to enhance the effectiveness of online learning initiatives.

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## 1. INTRODUCTION

The utilization of technology within the education sector is prevalent. In Malaysia, the education policy has stated a clear delineation of the government mandate to support the role of technology to scaffold teaching and learning. During the pandemic, there has been a significant surge in the adoption and utilization of online learning platforms and information and communication technology (ICT). The latest data that we obtained from Department of Statistics Malaysia revealed that the number of individuals in Malaysia using computers has seen a growth of 3.0%, rising from 88.3% in 2021 to 91.3% in 2022. The number of individuals with internet connection experienced an increase of 1.1%, rising from 94.9% in 2021 to 96.0% in 2022 [1]. Based on the findings of Selvanathan *et al.* [2], 384 respondents from 12 different public and

private universities in Malaysia wherein students expressed a significant amount of frustration with their inability to interject during teaching sessions.

Effective teaching and learning occur when students possess the ability to participate actively in lessons, engage with the materials, and engage in appropriate learning opportunities using self-regulated learning techniques. These strategies should consider the students' existing knowledge in the subject matter being taught [3]. This shows that educators should design a teaching and learning session that is able to relate with what the students already know thus enable them to engage better in class. Nowadays, most educators have adopted a blended learning approach for their classes. Blended learning is a broad term. Essentially, it includes some aspects of face-to-face classes as well as online learning [4]. Evidence suggests that to improve the engagement of students' learning, customization for blended learning approaches with the support of face-to-face construct or online consultation is desirable [5]. The study indicated that blended learning may have a greater than average impact on students' motivation. Particularly, asynchronous online learning is more adaptive than traditional face-to-face learning [6]. Pre-class activities is one of the techniques that creates opportunities for independent learning in which students will be given the educational materials to be studied first before face-to-face or live sessions with educators. In essence, pre-class activities have the potential to facilitate student engagement during class, leading to effective teaching and learning sessions.

Due to the COVID-19 crisis in early 2020, higher education institutions swiftly shifted from in-person instruction to online platforms. Over two years have passed since this transition took place. Nevertheless, educators remain primarily concerned about student engagement [7]. Research on Indonesian technology acceptance in online learning and factors influencing its success identified that technology acceptance of the user is one of the big steps towards progress in online learning platforms. In the research, they applied the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model to study technology acceptance among students which consist of seven constructs named: performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit. They also added two constructs which were trust and learning value. For them, technology acceptance as an indicator was highly valued in the process of online learning platform development. Other research revealed that suitable facilities, technical support, and good access to the internet make it easier for students to use online learning [6], [8]. In brief, previous research showed that technology acceptance is one of the important constructs that should be explored to identify the quality of online learning and teaching [9]. Moreover, students' technology acceptance of blended learning was investigated by majority of studies in a systematic review [10]. However, the systematic review showed that students' technology acceptance and pre-class activities which correlate with students' engagement in online classes are rarely acknowledged empirically. Yet, these constructs are pivotal to be studied in relation to e-learning. Furthermore, the review of literature proclaims that most of the research attempted to identify students' preferences, behaviors, academic achievements, and satisfaction on online learning [11]–[14] but research areas on students' engagement influenced by technology acceptance and pre-class are few to find. With the stated disparities, this study intends to probe the probability of technology acceptance and pre-class activities that influence the higher education students' engagement in online learning platforms.

Student engagement is critical for learning, particularly in an online teaching and learning environment [15]. For online learning to be successful, students must get themselves involved in learning activities, participate inter-relatedly through their emotions, behaviors, and cognition [16], [17]. Malan proposed that the accumulation of five forms of engagement into the module was well received by students, resulting in a higher percentage of students successfully completing the module [16]. These five forms of engagement included social, cognitive, behavioral, collaborative, and emotional. Students' reflections suggested that the learning was cognitively stimulating, social participation was dependent on personal preferences, and group work was always a challenge. On the other hand, another study [17] stated that students who participated through affective engagement were less engaged, whereas students who engaged cognitively were more involved. Thus, it can be implied that cognitive engagement may be more pertinent than affective engagement in online learning.

Online learning is comprehensive as it includes a few approaches. The main two approaches are synchronous and asynchronous. A literature review summarized that synchronous activities were viewed as more engaging by students, which included the presence of instructors [17]. Some asynchronous activities were also viewed as engaging as the instructor responds to student remarks on a discussion board. Specifically, activities that required watching pre-recorded videos or summarizing comments from peer conversations, both undertaken in the absence of live interactions with instructors or peer groups, were found to be less engaging. In the same vein, Farrell and Brunton [18] indicated that students' engagement in online learning was affected by several psychosocial factors such as their peers, online instructor, and students' self-efficacy. These results are likely to be related to the role and presence of the instructor and peers that might enhance the students' engagement.

One of the common understandings about online learning is that it hinders active student engagement due to limited interaction. In comparison to the face to face or conventional modality, online mode is deemed as more challenging for active student engagement, especially when it comes to group discussions during class [19]. A systematic review has outlined student engagement into two primary dimensions: cognitive engagement and affective engagement. Within the realm of cognitive engagement, factors considered encompass academic performance, motivation to learn, self-regulated learning, and self-perceived digital literacy. In contrast, affective engagement among students encompasses dimensions such as the value ascribed to online learning, a positive attitude toward online learning, satisfaction with online learning, and the presence of stress and anxiety in the online learning environment [20].

Technology acceptance in general terms is how users accept the use of technology. In blended learning, the use of technology is unavoidable. There is a consensus that majority of the students agreed that blended learning is crucial to ameliorate future online process [21]. From the literature, numerous studies [10], [22], [23] accessed students' adoption of technology with the guidance of technology acceptance model (TAM), which was determined by two factors–perceived usefulness and perceived ease of use. TAM was discovered to be the most prevalent model for predicting people's willingness to adopt online learning [10]. In view of all that has been deliberated so far, one may suppose that TAM is a reliable model to investigate the acceptance of technology, hence it was adapted in the present study.

A considerable amount of literature has been published on students' technology acceptance and e-learning [21], [22], [24], [25]. The study by Ibrahim *et al.* [21] highlighted several findings related to students' acceptance, as half of the students in the research rated that e-learning is akin to enhanced physical learning. Majority of the participants agreed that e-learning can replace physical learning during the lockdown. To facilitate e-learning, most students stated that educators' e-learning skills, interaction and good e-learn system are crucial. Three-quarters of the participants agreed that interaction between students and educators existed. One of the factors in relation to students' technology acceptance on e-learning is greatly affected by the interaction of students. In Kim *et al.* study [22], perceived ease of use is significantly affecting perceived usefulness. Both constructs are equally important indicators for technology acceptance. It is not unforeseen that the affective perceived usefulness has significant positive effects on cognitive aspects, which is crucial in adapting new technologies. Therefore, the management of higher education should put efforts to improve students' positive attitude towards online learning because the attitude of learning may directly impact the students' engagement [26]. Other authors have similar concerns in which respondents appraised that e-learning classes were less active than traditional classes [27]. Salloum *et al.* [28] added that information sharing, and qualities of universities have a favorable impact on students' adoption of e-learning. The studies presented thus far provide evidence that lack of interactive practice may affect the engagement of students and influence the interest and quality of learning. Collectively, these studies support the notion that perceived ease of use affects perceived usefulness and the behavior of learning that influence the students' engagement; hence may affect the quality of learning.

The benefit of online learning is associated with the aspect of technology acceptance. As stated by Bączek *et al.* [27], 73% of the respondents appraised e-learning as enjoyable and there were no differences between male and female students or years of study. Majority of respondents find that among the advantages of online learning include learning from home, having regular access to online materials and learning at their own pace in more comfortable surroundings. However, among major disadvantages are lack of interactions and technical issues [27]. The online mode was well-received by all participants, and they stated that online sessions ensured time-saving and improved their academic performance. Similarly, Kim *et al.* [29] also argued that students' academic engagement in higher education institutions tends to be enhanced by the adoption of digital technology by students, who naturally are proficient with technology because of their exposure to technology-rich environments. A variety of perspectives were expressed on this issue as some students claimed that they ran across some difficulties during sessions and online assessments, including methodological, content perception, technological, and behavioral issues [30]. Many papers have studied the advantages of online learning, but the students' engagement and the advantages need to be further explored as well.

Pre-class activities are a great method to get students engage with the subjects taken before they attend classes. Videos, reading and quizzes may be included in such activities. In online learning, pre-class exercises play a crucial role. One of the challenges, however, is lack of students' engagement in pre-class online activities [31]. In a systematic literature research finding by Mei [32], three main areas to instill the best conditions for enhanced pre-class engagement have been identified: technological, pedagogical, and student perceptions. Students prefer pre-class videos rather than reading materials. The accessibility of online materials is linked to students' learning satisfaction. Instructors' clarity guidelines are vital to avoid inefficient learning. A well-structured online platform allows students not only to navigate smoothly but also to receive early formative feedback for individualized learning. To encourage students to complete pre-class preparation, offered incentives were suggested. In addition, the more difficult the pre-class preparation, the less enthusiasm students have for the activities which lower their engagement. Hence, the investigation on

the significant relationship between pre-class and students' engagement can be included to enhance the insights on e-learning and to improve the learning outcomes. This finding was also highlighted by Kinsella *et al.* [33] in which pre-lecture resources such as screencasts and multiple-choice questions (MCQs) can be useful aids to facilitate learners' engagement. On top of that, it was also evident that most of the students did actively engage with the optional activities. Students attempted to gauge their prior knowledge on the topic and revised the concepts they were struggling with. However, it is noteworthy to mention that other findings stated otherwise. Lui and Li [34] explored the relationship between students' pre-knowledge of Geography and engagement in massive open online courses (MOOCs), arguing that although the general trend shows students with less pre-knowledge of geography will have less frequency of engagement behavior, but interestingly none of them are statistically significant. In other words, students' involvement in pre-class may not be a predictor to their engagement behaviors. From the various sources of literature, it is noticeable that some findings are contrary to previous studies which have suggested that pre-class activities improve students' engagement. Hence, this study will add on to the empirical research in focusing on exploring the relationship of pre-class activities and students' engagement.

In the realm of education, understanding how various factors influence student engagement is crucial for enhancing learning experiences. As we delve into this area, our investigation is framed by specific queries that aim to dissect the interplay between technology, preparatory activities, and student involvement. The research questions guiding our study are: i) is there a significant relationship between technology acceptance and students' engagement? and ii) is there a significant relationship between pre-class activities and students' engagement? These questions are foundational in exploring the potential strategies for improving educational practices and outcomes.

## 2. METHOD

### 2.1. Study design

The study design utilized a quantitative approach. According to Creswell [35], a quantitative approach can be used to study the relationship between variables in a particular time. Quantitative approach can be used in survey or experimental research [35]. Mehrad and Zangeneh [36] stated that quantitative approach is an advantage to be used when the research explores the hypotheses objectively through a survey. Data analyzed in this study was obtained from a survey conducted online among students in Sunway University and Sunway College who took general studies subjects offered by the general studies department (GSD) as the subjects adopt blended learning style in teaching and learning through the e-learning platform referred to as Blackboard Collaborate Ultra. The present study adopted cross-sectional survey design in which its aim was to study students' level of technology acceptance and pre-class activities in relation to their engagement in online learning classes.

### 2.2. Participants

G*Power, a tool introduced by Faul *et al.* [37] is used by many researchers in calculating sample size and therefore, it was employed in determining sample size for the current study. To provide 95% statistical power, it was shown that a total sample of 107 respondents should be recruited. Table 1 illustrates a total of 1,692 respondents that were selected using purposive sampling, with the specific criteria being that they were: i) local students and ii) enrolled in general studies subjects taught in the Malay language. The respondents comprised of 59.6% female (n=1,008) and 40.4% male students (n=684). Among the respondents, 6.6% were at the certificate level (n=112), 11.6% were at the diploma level (n=197) and 81.8% were at the degree level (n=1,383). Chinese students were majority of the respondents (n=1,404, 83.0%), followed by Malays (n=126, 7.5%), Indians (n=91, 5.4%), mixed races (n=52, 3.1%) and Bumiputera other than Malay students (n=19, 1%).

Table 1. Profile of survey respondents (n=1,692)

| Demographic | Variable | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 684 | 40.4 |
| | Female | 1,008 | 59.6 |
| Level of studies | Certificate | 112 | 6.6 |
| | Diploma | 197 | 11.6 |
| | Degree | 1,383 | 81.8 |
| Races | Chinese | 1,404 | 83.0 |
| | Malay | 126 | 7.5 |
| | Indian | 91 | 5.4 |
| | Mixed | 52 | 3.1 |
| | Others | 19 | 1.0 |

## 2.3. Procedures

The study was conducted online through Google Form. Students were invited during the live class sessions to answer the survey questions in which they were given the Google Form link through WhatsApp, Telegram and the e-learning platform. It was conducted during the first semester (January to March 2022). The respondents answered the questionnaire voluntarily at their own convenience.

## 2.4. Measure

The survey is a self-report questionnaire named General Studies Subject Questionnaire 2022 (*Soal Selidik Subjek Mata Pelajaran Umum/MPU*). All items were created in Malay language hence explained the samples criteria. Subsequently, the items were translated by an expert for reporting to ensure consistency of the translated version. It consists of demographic items and 70 items related to students' perceptions and attitudes towards e-learning and blended learning classes. From the 70 items, 13 items were identified by the researchers to measure technology acceptance variables. These items were consistent with constructs on TAM [38] and users' perception on e-learning [23]. Items measuring technology acceptance variables including "Blended learning is more flexible." and "I am keen to use ICT for learning purposes." There were 5 items measuring pre-class activities and 6 items measuring students' engagement. The pre-class items were adapted from Ishak and colleagues [39], and the engagement items were modelled based on the items in a study conducted by Kamil *et al.* [40] which are deemed relevant to the employed items respectively. Items measuring pre-class activities consist of questions, such as "I can access pre-class activities easily" and "When I submit pre-class activities, I will get the marks instantly." On the other hand, students' engagement variable was measured using questions, such as "The interaction between me and the lecturer helped me to understand the course" and "I enjoyed using the chat room to comment and to ask questions to the lecturers." A 5-point Likert scale was used for all items in this study and the items for each variable showed good reliability estimates (Table 2).

## 2.5. Statistical analysis

The IBM SPSS statistics 27 was used to analyze the data as all data were quantitative in nature. Through Cronbach alpha, internal consistency of the constructs was examined. Descriptive statistics such as frequencies, mean values, standard deviations and ranges were calculated to determine the respondents' demographic data, averages of total score for each variable as well as averages of each item answered by respondents. Pearson correlation looked at the relationship between technology acceptance, students' engagement and pre-class activities. Lastly, multiple linear regression analyzed both technology acceptance and pre-class activities as predictors to students' engagement.

## 3. RESULTS AND DISCUSSION

Table 2 shows mean values, standard deviations, ranges and reliability estimates of each scale. The Cronbach alpha shows high internal consistency for all scales ranging from .922 to .958 indicating that the survey items are intercorrelated at an acceptable and reliable level in the present study [35]. The scores for technology acceptance range from 13 to 65. Based on Table 2, it shows the mean for technology acceptance in the present study was high (M=52.722, SD=8.877). The scores for pre-class activities range from 5 to 25 and the mean of the present study also shows a high score (M=21.141, SD=3.612). The same goes to students' engagement scores in which the scores range from 6 to 30 and the mean in the present study shows a high score (M=22.665, SD=4.626).

Table 2. Means, standard deviation and reliability coefficients of variables

| | Mean | Standard deviation | Range | Cronbach alpha |
|---|---|---|---|---|
| Technology acceptance | 52.722 | 8.877 | 48 | 0.958 |
| Pre-class activities | 21.141 | 3.612 | 20 | 0.922 |
| Students' engagement | 22.665 | 4.626 | 24 | 0.937 |

Table 3 portrays mean values and standard deviations of each item for technology acceptance construct. Technology acceptance construct was measured by four sub-constructs specifically perceived usefulness of learning (PUE), perceived self-efficacy of using e-learning, perceived ease of use of e-learning (PEE) and behavioral intention of using e-learning (BIE). The first sub-construct was measured by PUE1, PUE2, and PUE3. The second sub-construct was measured by PSE1, PSE2, and PSE3. The third sub-construct was measured by PEE1, PEE2, PEE3, and PEE4. The last sub-construct was measured by BIE1, BIE2, BIE3, and BIE4. The total score of technology acceptance was calculated from the sum of scores across the four subconstructs. From the table, it showed that the mean for each item is above average (M>2.5).

Table 3. Students' perception of e-learning (n=1692)

| Code | Variables | Mean | Standard deviation |
|---|---|---|---|
| I. Perceived usefulness of learning | | | |
| PUE1 | Blended learning is more flexible. | 4.149 | 0.836 |
| PUE2 | Blended learning allows me to learn general studies subjects anywhere without going to the lecture hall. | 4.154 | 0.836 |
| PUE3 | I prefer to answer quiz online compared to answering exam questions physically at the exam hall. | 4.123 | 0.926 |
| II. Perceived self-efficacy of using e-learning | | | |
| PSE1 | I have a positive attitude towards using e-learning as a tool to learn general studies subjects. | 4.045 | 0.817 |
| PSE2 | I am ready to face challenges in using online platform for learning. | 3.987 | 0.827 |
| PSE3 | I am good in ICT. | 3.956 | 0.827 |
| III. Perceived ease of use of e-learning | | | |
| PEE1 | I can access learning materials easily. | 4.114 | 0.826 |
| PEE2 | I can access notes and lecture videos easily. | 4.128 | 0.828 |
| PEE3 | I am comfortable using blended learning method. | 4.047 | 0.831 |
| IV. Behavioral intention of using e-learning | | | |
| BIE1 | I am interested to learn using blended learning method. | 4.011 | 0.828 |
| BIE2 | I always take the opportunity to learn something new through blended learning method. | 3.995 | 0.817 |
| BIE3 | I am keen to use ICT for learning purposes. | 3.981 | 0.842 |
| BIE4 | Learning through blended learning method is necessary. | 4.030 | 0.849 |

Table 4 shows mean values and standard deviation on pre-class activities. Pre-class activities was measured by five items coded as PRECLASS1, PRECLASS2, PRECLASS3, PRECLASS4 and PRECLASS5. Similar to technology acceptance construct, each pre-class activities item consists of mean value that is above average (M>2.5). Table 5 presents student engagement items measured by E1, E2, E3, E4, E5, and E6. The mean across the items below ranges from (M=3.690, SD=0.875) to (M=3.845, SD=0.880) which indicated that the scores are above average.

Table 4. Pre-class activities (n=1692)

| Code | Variables | Mean | Standard deviation |
|---|---|---|---|
| PRECLASS1 | I know how to access pre-class activities. | 4.343 | 0.789 |
| PRECLASS2 | I can access pre-class activities easily. | 4.278 | 0.810 |
| PRECLASS3 | When I submit pre-class activities, I will get the marks instantly. | 4.341 | 0.806 |
| PRECLASS4 | Pre-recorded videos on e-learning help me understand the topics taught. | 4.018 | 0.902 |
| PRECLASS5 | Pre-class activities allow me to have flexible learning. | 4.160 | 0.824 |

Table 5. Student engagement (n=1692)

| Code | Variables | Mean | Standard deviation |
|---|---|---|---|
| E1 | I am always motivated during online class learning. | 3.690 | 0.875 |
| E2 | Discussions between the lecturer and the students always happen during online class. | 3.822 | 0.883 |
| E3 | Discussions between friends during online class help me to understand the subject. | 3.756 | 0.876 |
| E4 | Lecturers always encourage the students to interact with each other during online class. | 3.845 | 0.880 |
| E5 | The interaction between me and the lecturers helps me to understand the course. | 3.804 | 0.864 |
| E6 | I enjoy using the chatroom to comment and to ask questions to the lecturers. | 3.747 | 0.921 |

## 3.1. Correlation

Table 6 presents the result of intercorrelations between variables. The results show that technology acceptance was positively correlated with pre-class activities, r(1,691)=0.850, p=0.000 and students' engagement r(1,691)=0.717, p=0.000. Pre-class activities also positively correlated with students' engagement r(1,691)=0.635, p=0.000. There were large correlations between all variables in Table 3, suggesting quite strong relationships. All relationships are statistically significant.

Table 6. Intercorrelations between technology acceptance, pre-class activities, and students' engagement

| Variables | Technology acceptance | Pre-class activities | Students' engagement |
|---|---|---|---|
| Technology acceptance | - | 0.850** | 0.717** |
| Pre-class activities | - | - | 0.635** |

**p<0.005

### 3.2. Standard multiple regression

Standard multiple regression assesses the ability of two independent variables (technology acceptance and pre-class activities) to predict levels of students' engagement. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Table 7 reveals a significant regression equation, $F(2, 1,689)=904.283$, $p=0.000$. 51.7% variance of students' engagement can be predicted from the variable technology acceptance and pre-class activities. The regression equation is written as students' engagement=2.607+0.333 (technology acceptance)+0.119 (pre-class activities). Coefficient for technology acceptance is 0.333. Hence, for every unit increase in technology acceptance, it is expected that students' engagement increases by 0.333. Technology acceptance is a statistically significant predictor for students' engagement, $p=0.000$. Coefficient for pre-class activities is 0.119. Thus, for every unit increase in pre-class activities, it is expected that students' engagement increases by 0.119. Pre-class activities is a statistically significant predictor for students' engagement, $p=0.004$. In other words, both hypotheses of the present study are accepted.

Table 7. Summary of standard multiple regression analysis for variables predicting students' engagement (n=1,692)

| Standard multiple regression table | |
| --- | --- |
| Variables | B |
| Constant | 2.607 |
| Technology acceptance | 0.333** |
| Pre-class activities | 0.119** |
| R² | .517 |
| F | 904.283 |

**$p<0.005$

### 3.3. Technology acceptance

E-learning plays a crucial part in the development of teaching and learning approaches for higher education. However, e-learning can only be successfully implemented if users embrace the technology. Therefore, this study sought to investigate the relationship between technology acceptance, pre-class activities, and students' engagement among students who are taking general studies subjects in Sunway University and Sunway College. It was predicted that technology acceptance and pre-class activities influence students' engagement in blended learning.

Findings from this study indicated that technology acceptance is a significant predictor to students' engagement. This is consistent with Önal [41] in which the researcher found that with technology acceptance, students have better engagement. In addition, Sukendro et al. [8] found a high correlation between perceived ease of use and attitude, when students perceive that eLearn is easy to use, they had a more positive attitude in using eLearn. This is further supported by Kala and Chaubey [25] in which they found that technology acceptance has a positive and significant relationship with students' engagement in online learning classes. Thus, it can be concluded that technology acceptance is an important indicator of students' engagement. Based on the previous knowledge about acceptance of technology, students reported a reduction in motivation and engagement during the COVID-19 pandemic [12]. Findings from the research concluded that the quality of education declines and it can become an undesirable outcome. Students have low acceptance toward online learning and lack of desire to learn, so the cycle will repeat. Hence, higher education institutions and the stakeholders need to stop the negative cycle, so that students would be more motivated to attend the online classes.

### 3.4. Pre-class activities

In learning process, the interaction and engagement of educators and learners are important. Tichavsky et al. [42] claimed that the catalyst behind students' preference for face-to-face (92%) to online learning was related to interaction; in which 50% resulted from interaction with the instructor. In a similar line, findings of this study confirm that students' engagement scores were high. In GSD, pre-class activity is implemented with the purpose of increasing students' pre-class online engagement and assisting them in preparation for the online class. During the pre-class activity, students are required to view the videos, read the materials and answer the questions related to the chapter via the eLearn pre-class session. Formative marks are recorded for every pre-class activity.

An unlimited attempt was set which students can do many times to ensure they have understood the contents before they attend the online class. The students are encouraged to work in groups for their pre-class activities. With such, they are motivated to participate in the activities. The respondents in this study have illustrated that pre-class activities are related to the engagement in online learning. These results are aligned

with the findings from the systematic review [31] that to encourage students' engagement, pre-class learning activities preparation is crucial. The review has provided insight into the factors that hinder participation in pre-class learning, whether psychological or physical, resulting in inadequate preparation that could jeopardize the success of flipped learning. Lee and Choi [43] asserted that a well-designed and well-monitored pre-class learning would help flipped learning to achieve its desired learning outcomes significantly.

In Förster *et al.* [44] study, pre-class activities improve students' understanding of the subject. Students who viewed the pre-class videos before attending the in-class sessions achieve better exam results and retain more knowledge. It is plausible that the prior knowledge gained from watching the pre-class videos was merged with fresh knowledge from the in-classes session to create stronger interwoven schematic structures. It could imply that information acquired through pre-class exercises promotes the growth of a closely-knit cognitive structure through exercises which are conducted later in the class. Reminding students to watch the relevant videos would help them prepare for upcoming in-class activities. Another approach to motivate students to be prepared for in-class tasks is to offer incentives, bonus points, or ranking scores depending on the quantity and time of videos seen. When compared to their classmates, the students might utilize these rankings scores as an additional self-regulatory yardstick. The study seems to imply that in the pre-class learning, the multimedia modality and learners' self-directedness have a substantial impact on students' readiness and engagement. Hence, this seems to imply that this present finding is consistent with the recent published studies.

Interestingly, the findings of this present study also broadly support the work of other studies in this area linking pre-class activities with students' engagement. Huei [45] emphasized that students are likely to engage themselves in a learning process if they get involved in learning tasks, such as discussion, pop quizzes or MCQs. It is also worth noting that it is indeed very encouraging to compare the findings of this present research with those found by Blaser [46], in which it is stated that students are required to attend classes with some background knowledge or preparation to ensure that student-centered learning can be carried out effectively in the class.

## 4. CONCLUSION

This study has uncovered significant associations between technology acceptance and student engagement in online learning classes. Another key finding indicates that pre-class activities play a crucial role in promoting student engagement during class sessions. These findings have practical implications for the blended learning approach and highlight the advantages of online learning. The study suggests that pre-class activities can effectively motivate students to participate and actively engage in class, making them a valuable teaching tool. Educators should take note of these findings when integrating technology into their teaching practices. Additionally, higher education stakeholders can leverage on these findings to support the continuous implementation of online learning classes. For instance, Sunway University and Sunway College can develop programs that can fully harness on the online learning capabilities to attract students. These findings constitute a noteworthy addition to the extant body of research, given the significant consensus expressed by participants regarding the pre-class approach.

Furthermore, this study found considerable time savings for both educators and educational institutions. Specifically, a three-hour class can be restructured into a one-hour pre-recorded video session supplemented by pre-class activities, such as quizzes, followed by two hours of face-to-face classes, which in turn, provides students with the flexibility to engage in the preparatory materials at their convenience. As a result, students are equipped with the prior knowledge required which would optimize learning time of physical sessions. This approach can alleviate the teaching burden on instructors and allow students to cultivate independent learning. The findings can be generalized and adopted for other subjects using the same model. It is noteworthy to mention that the existing body of literature predominantly supports the notion that students exhibit a preference for face-to-face over online classes, with limited empirical evidence available regarding the effective implementation of pre-class activities. Nonetheless, our research reveals a substantial level of student acceptance for blended learning and contributes to the empirical evidence by illustrating that the incorporation of formative assessments through videos and quizzes in the pre-class segment can serve as an effective pedagogical approach in the contemporary post-pandemic educational environment. This implication holds substantial importance, potentially providing invaluable guidance to Malaysia educational policymakers and curriculum developers working on the creation of new subjects.

The study, similar to others, has its set of limitations. One limitation pertains to the lack of in-depth exploration into specific aspects of pre-class activities, such as the extent to which students engaged with pre-class videos or performed on pre-class quizzes. Additionally, observations during online class sessions revealed that certain students faced difficulties in completing the pre-class quizzes before the live class began. Consequently, the level of student engagement and commitment to completing pre-class activities

could significantly impact their learning outcomes and overall engagement. Therefore, further research is warranted in this area to address these aspects. Another limitation of the study involves the absence of investigation into students' perspectives and opinions on the ways pre-class activities contribute to their classroom experience and academic performance. To bridge this gap, future research could employ a qualitative approach to identify essential themes in students' perceptions of pre-class activities. These valuable insights would enable educators to continuously enhance the quality of pre-class activities and maximize the effectiveness of the blended learning approach implemented in their classes.

## ACKNOWLEDGEMENTS

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