

Effective Ways to Engage Learners Actively in an Online Classroom Setting in Malaysian Higher Education Institutions

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Abstract: *Online learning in higher education institutions is becoming evident as they strive to sustain an appropriate educational environment. The COVID-19 epidemic raised concerns regarding student engagement, as many educators faced challenges in transitioning to delivering classes online. This paper aims to evaluate the influence of online learning on students' engagement and identify effective strategies that can promote active participation among learners in online classrooms within Malaysian higher education institutions. The participants in this study consist of various public and private universities in Malaysia, chosen based on the Times World University Ranking 2021. 389 questionnaires were distributed through simple random samplings to respondents who expressed their willingness to participate in the survey. The results demonstrated a significant connection between online learning and student engagement, both essential for the effectiveness of the online classroom setting. In the interim, the study suggests several innovative approaches, such as You Talk, Resource Pool, and Classroom Meet, to promote active student engagement through online activities. The findings will significantly impact the Ministry of Higher Education and university management in implementing reforms in policies and resources aimed at improving student engagement.*

Keywords: Online Learning, Student Engagement, Higher education institutions, Online Learning Effectiveness, Resource Availability

1. Introduction

The COVID-19 outbreak of 2019 had an unprecedented negative impact on the traditional education system in the modern world. The increasing significance of online learning is becoming evident in higher education institutions globally as a strategy to maintain effective educational practices (Bovermann, & Bastiaens, 2020). The online learning platforms offer a range of methods for managing, planning, delivering, and tracking the educational process. Educational institutions regard the quality of learning delivered through online methods as being on par with traditional classroom learning. Additionally, the online delivery of course content presents a viable option, encompassing both theoretical elements (such as recorded webinars, video lectures, and conferences) and practical components (including recorded videos pertinent to the courses) (Ibili, 2020). Simultaneously, the COVID-19 epidemic has raised significant concerns about student engagement, as many educators faced challenges in shifting to online teaching and learning while maintaining motivation for all students (Habeahan et al., 2022). In recent years, notable advancements have been made in instructional technology. Tailoring learning experiences enriches the variety and depth of e-learning content

(El-Sabagh & Hamed, 2020; Yang et al., 2013). E-learning promotes active student involvement in the learning process, independent of time and place, leading to favourable educational results (Chen et al., 2010; Lee et al., 2019). In recent times, higher education institutions have noticed a notable increase in the adoption of adaptive e-learning techniques.

However, regarding online learning, the freedom of the internet, its advantages, and simple acquisition, storage, portability, and flexibility (Hu & Li, 2017) ensure the solution of space-time challenges. The learner's engagement is defined as the degree of involvement of the learner and the student's effort put into the instructional learning activities that would count for their academic success (Fatawi et al., 2020).

But along with all its potential boons, the online learning phenomenon has come up with some of the most significant issues students and teachers have faced. Students have issues applying it to their term time, motivation, group work, and learning environments. For some students, this flexibility takes a tad too much for granted (Coman et al., 2020). In addition to that, online learning satisfaction is in question. In a very broad sense, student satisfaction depends on certain variables: student, teacher, course, technology, system design, environment (Tsai & Tsai, 2003). There will be the other part, as facing the difficulty called the teacher, in getting students to participate in the online learning process and teaching activities.

It is because all the students should be equal in terms of being engaged and should participate. However, the degree of engagement and proactivity towards learning is different from one student to another. Engagement and liveliness are classified at low, medium, and high levels. Teacher creativity is very important in keeping students engaged and exploring active participation in learning.

Individual engagement may vary. The prerequisite for a student to gain knowledge is active participation in a school; a student who does not engage will be the least inclined to attain success. On the other hand, student engagement is one determinant of their learning outcome because it goes beyond mere practice or test scores. Being engaged in one's study activates learners' curiosity, creativity, and satisfying relationships with others. However, distance learning students will experience participation differently from traditional education because of the lack of daily interaction between teachers and students in terms of personal face-to-face sessions. In this sense, teachers should be able to keep the students continuously engaged through multiple means. Discuss, among other things, the primary concepts of persistence and self-belief, which could allow students to own their learning as an improved factor with which to enhance their level of involvement.

2. Literature Review

2.1 Online Learning

This represents a form of education delivered through online platforms, with the latest terminology emerging to characterise this method of instruction and learning. Online teaching, learning, and related distance learning have been extensively utilised in studies concerning terms such as video conferencing, eLearning, (long) distance learning, online distance teaching by time, online learning, and mobile learning. The primary concept of online tutoring is that regardless of the terminology used—be it distance, online, or virtual learning or teaching—it consistently pertains to the teaching process and learning conducted at a distance, whether in terms of space, time, or both, as noted by Bozkurt and Sharma, 2020.

2.2 Student Engagement (Dependent Variable)

According to Axelson and Flick (2010), it involves defining student engagement as the extent of participation and enthusiasm shown by students regarding their learning process and the degree of their connection with college and between peers. For Fletcher (2011), learner engagement describes any lasting relationship a student forms with learning, educational institutions, or the educational field. According to Fletcher (2011), student engagement is increasingly accepted as an indicator of effective classroom teaching and institutional excellence (Axelson & Flick, 2010). Skinner and Belmont (1993) have associated student engagement with motivation, claiming that engaged students exhibit continuous active participation in learning activities and positive emotional disposition. In addition, such individuals tend to take challenging tasks, direct their education efforts, thereby translating their potential into effort and concentration, and express positive feelings such as enthusiasm, curiosity, and interest during learning. The Glossary of Education Reform (2016) describes student engagement as measuring how focused, inquisitive, excited, hopeful, and enthusiastic a student can be while learning or receiving instruction. In addition, it encompasses a student's motivation to learn and progress in education.

Barkley and Major (2020) have thus used the words "passion" and "excitement" in their studies to analyze students' full engagement. Student engagement is a continuous process and product of the interacting influence between motivation and active learning. Porter (2014) characterises student engagement in a confrontational way.

The instructional mechanisms and alterations employed in real face-to-face classrooms are not easily transferable to virtual learning environments. Tools and techniques must be customised for the physical lack experienced by online students (Khan et al., 2017). Kennedy (2020) presents three lenses to identify student 'engagement' in an e-learning context and gives tips to educators for improving student involvement with the virtual environment. The first involves understanding student participation in online learning from an out-in perspective rather than the interactional perspective and academic approach of student engagement in learning design.

Which parties that might engage should be responsible for creating and maintaining a high level of student involvement? There seems to be an increasing responsibility for educational institutions to address this. Accomplishment of this responsibility will require an efficient and effective instructional system from institutions and educational systems to cater to enterprising students (Kuh, 2009).

Thus, engagement, in its extended definition, goes beyond the extent of activity by which students are drawn into their learning to become an indicator of the extent to which institutions are active in involving their students. In other words, both learners and institutions are charged with the task of ensuring the quality of student learning. From the viewpoint of Axelson and Flick (2010), students need to invest the necessary efforts to improve their knowledge and skills. In contrast, institutions should create a suitable atmosphere that supports student learning.

According to the findings, meaningful learning through technology or computer-mediated learning is shaped by three interrelated factors outlined in the Community of Inquiry (CoI) framework: social presence, cognitive presence, and teaching presence, as discussed by Carrillo and Flores (2020), Kabilan and Annamalai (2022), and Pereira et al. (2021). The concept of social presence refers to how students feel socially and emotionally connected and how they are perceived as "real people" within an authentic online learning community.

Cognitive presence pertains to an individual's capacity to create meaning through continuous reflection and dialogue within a collaborative learning environment. Teaching presence integrates social and cognitive presence by applying design, facilitation, and instructional strategies related to the curricular content within an online learning environment (Garrison & Arbaugh, 2007). This phenomenon has indeed been observed within the framework of the OTL educational environment over the last two years. The OTL took place during the extended lockdown period of over two years. It is recognised for its wealth of evidence-based, innovative, and practically orientated strategies shared by scholars from higher education institutions in addressing the challenges faced.

From a long tradition of Online Teaching and Learning (OTL) delivery, whether asynchronous, synchronous, or a mix of both, one fact becomes evident: the method comes with some challenges in student engagement. For all these modes considered to be equally effective, the fact that the lattermost form is the "norm" in higher education may be due to its immediacy (Andrew et al., 2021; Brady & Pradhan, 2020). Scholars indicate that the student engagement mechanism in an online teaching-learning setting is less effective than traditional face-to-face classrooms. Student engagement, composed of emotional, behavioural, and cognitive connections to learning, is enhanced through four psychosocial constructs within a framework: self-efficacy, emotional responses, belongingness, and well-being (Kahu & Nelson, 2018).

Such a learning environment in Malaysian universities results from the closure of academic institutions around March 2020. Local universities have invested much in student engagement to reduce dropout rates (Abdullah et al., 2022). Among these efforts is the introduction by universities of Teaching and Learning (TNL) for educators to develop these skills to bring seamless online classes (Abdullah et al., 2022). The sudden switch to online learning has had its share of challenges for students, some of which include poor study environments, hardware and software obstacles with which one might communicate, and a lack of readiness for the change in educational approach (Nassr et al., 2020).

2.3 User Friendliness (Independent variable 1)

It comprises the learners and the instructor, as indicated by Ifijeh et al. (2015). As Rawashdeh et al. (2018) confirm, Canvas and Blackboard are the most preferred online education platforms among users, who widely use communication tools such as Zoom, Teams, Google, and social media platforms such as TikTok, Twitter (the new X), and Facebook. Moreover, the importance of Learning Management Systems (LMSs) in facilitating synchronized communication among learners and instructors for online courses has been emphasized (Junior & Marquesi, 2009, as cited in Rawashdeh, 2021). Most higher learning institutions have made considerable investments in the acquisition, maintenance and installation or management platforms of online learning to provide and improve online learning and teaching (Ifijeh, 2015).

The application of the technology acceptance model, as outlined by Davis (1989), aims to address the external factors influencing students' adoption of new technologies within their learning environments. According to the TAM framework, the intention to adopt online learning technologies is significantly influenced by two main factors: perceived usefulness and perceived ease of use (Davis, 1989, cited in Huang, 2021). The Theory of Reasoned Action (TRA), which complements the Technology Acceptance Model, is utilised to examine students' attitudes toward technology adoption (Fishbein & Ajzen, 1975; Davis, 1989 as cited in Huang, 2021). The concept of perceived ease of use, often referred to as "user-friendliness," reflects students' views on the simplicity and learnability of new technologies (Huang, 2021).

2.4 Course Design (Independent variable 2)

Course design is the philosophy and conceptual framework aimed at cultivating a more enhanced cognitive environment for students. As per Dee Fink (2010), the primary objective of course design is to furnish students with increased learning prospects within a setting that values and bolsters their intellectual progression. Enhanced engagement with course material tends to prompt higher levels of student involvement and initiative, consequently impacting learning outcomes. Elements encompassed in the design of an online learning course include the arrangement, interface, evaluation methods, appraisal, and avenues for instructor-student communication. Moreover, Dee Fink (2010) underscored the importance of structuring and presenting educational components in an interactive learning format.

Activities and evaluations within courses are often intertwined with active participation, student collaboration, diverse learning preferences, time allocation, and positive outlooks. The degree of professional obligations accepted or declined by students prior to the start of the semester commonly mirrors the level of student-faculty interaction and their receptiveness to assessment feedback. The delivery method of course materials ought to be systematically organised, foreseeable, and diversified (Shea et al., 2022, as referenced in Garrels & Zemliansky, 2022).

Mehta, et al. (2017), in their study, underscored the critical role of course design in establishing an efficient online learning milieu. Instructors must be ready to dedicate a substantial amount of time and effort towards crafting an online course. Many educators venturing into hybrid course instruction often feel compelled to modify their courses to align with online learning standards extensively (Mehta et al., 2017). To develop impactful courses, educators must comprehensively comprehend the subject matter they intend to teach, given that online education transcends mere dissemination of lectures and evaluation of students through quizzes and examinations.

2.5 Availability of Resources (Independent variable 3)

Resources of learning are characterized as materials that could be utilized to support learners in obtaining, documenting, and analyzing learning content. Within the realm of online education, an online learning resource is a material accessible through the World Wide Web. These resources may encompass HTML files detailing course objectives, tasks, lecture notes, or responses to queries from specific chapters. Illustrative exercises or assessments, audiovisual lectures, or documents containing hyperlinks to external webpages could all be illustrations. In online education, instructional materials are also pivotal in enhancing student involvement. Instructors employ a diverse array of instruments and exercises such as audiovisual presentations, virtual discourse platforms, live streaming sessions, video-integrated assessments, independent quizzes, weekly and monthly tasks, prescribed readings, and references to other beneficial materials to stimulate student participation and optimize the learning process (Hew, 2016).

Numerous college students still lack fundamental competencies and knowledge necessary to independently navigate online learning platforms, a deficiency that could potentially impact their level of engagement with academic coursework. Many students have been informed of the deficiencies associated with emergency remote learning, including insufficient resources, substandard instruction and educational content quality, unsupportive home-based learning environments, limited internet connectivity, mental health challenges, and minimal exposure to digital learning formats. Educators face similar challenges, compounded by escalating work

demands, particularly when transitioning all traditional learning resources to a digital format (Fung et al., 2022).

2.6 Digital Literacy (Independent variable 4)

Digital literacy has been expanded to mean the skills and competencies needed to search for, locate, evaluate, and manage electronically accessed information. Thus, social media makes digital literacy stretch its arms from the early understanding of simply being able to share something on Facebook to upload a video to YouTube. A few essential digital literacy skills are thus enough in today's online world to help us achieve our objectives and, in some cases, our everyday lives. Given the worldwide economy and computer technology advances, digital literacy can improve teachers' professional learning in online communities (Li & Yu, 2022).

For some scholars, the definition of digital literacy states that it is the nexus of competencies and skills to argue for the proper use of digital technology (Shopova, 2014). According to Helsper et al. (2020), digital literacy spans several areas of life as a benefit to well-being by providing social interaction and access to professional growth, but it could also serve as a potential buffer from some of the adverse effects of online risks on well-being.

As a basic component of digital literacy, digital skills allow learners to understand many information sources and channels. They gain confidence about the degree of accuracy, reliability, and even clarity regarding received information and gain more independence in their learning process through diverse skills acquisition. It is also important to note that digital literacy implies those higher-level critical and evaluative skills often included in the media literacy literature and computer competencies (Vissenberg et al., 2022). Ferrari (2012) gives a complete description of digital literacy: it involves skills, attitudes, and intellectual aptitudes to acquire, access, retrieve, store and organize information. This emphasises using technology and media wisely, creatively, flexibly, and ethically in solving problems and producing knowledge (Shopova, 2014).

Such an association between information literacy and digital literacy frameworks raises the challenge of integrating digital information, data, media, and many other literacy types. For example, Alexander et al. (2017) argued that they defined digital literacies as a mix of information and media literacy. Calvani et al. (2009), as quoted in Arono et al. (2022), discovered that digital literacy is an immeasurable mix of power and competence for allowing free movement in analysis, selection, and critical evaluation of data and yet preserving individual freedoms and dignity, as well as knowledge about rights and responsibilities. This shows that digital literacy does not add value to any job role.

2.7 Indicators of Student Engagement

Cognitive, emotive, and behavioral engagement are the three widely understood elements of student involvement (Frederick et al., 2004; Frederick et al., 2016). Participation, perseverance, and good behaviour are all related to cognitive engagement, as are learning approaches, self-control, and understanding; positive feedback to the learning environment, friends, and teachers are related to affective engagement, as are a sense of belonging and interest; and behavioral engagement is related to all three.

Conventional classroom engagement is characterized by the following behaviors: learning effort, contribution in class activities, collaboration, the resolution of intellectual issues, learning satisfaction, a sense of belonging, and learning enthusiasm (Gunuc, 2014; Kahu, 2013; Burch et al., 2015; Hu et al., 2008; Abbott, et al., 1998).

Previous research and writings have shown that many different variables affect how actively students participate in online courses. For a case study, Lazareva (2018) interviewed 14 persons in Uganda. The study contends that students' engagement in online courses is significantly influenced by two main factors: the availability of support from knowledgeable peers and the motivation provided by in-person classmates. Additionally, the research highlights several other important aspects: (a) the ability of students to collaborate on problem-solving and learning tasks, (b) the speed and reliability of their internet connections, (c) the access for less-experienced students to informal online learning groups where they can seek assistance from more proficient peers to remain engaged, and (d) the availability of collaborative learning opportunities.

2.8 Hypothesis Development

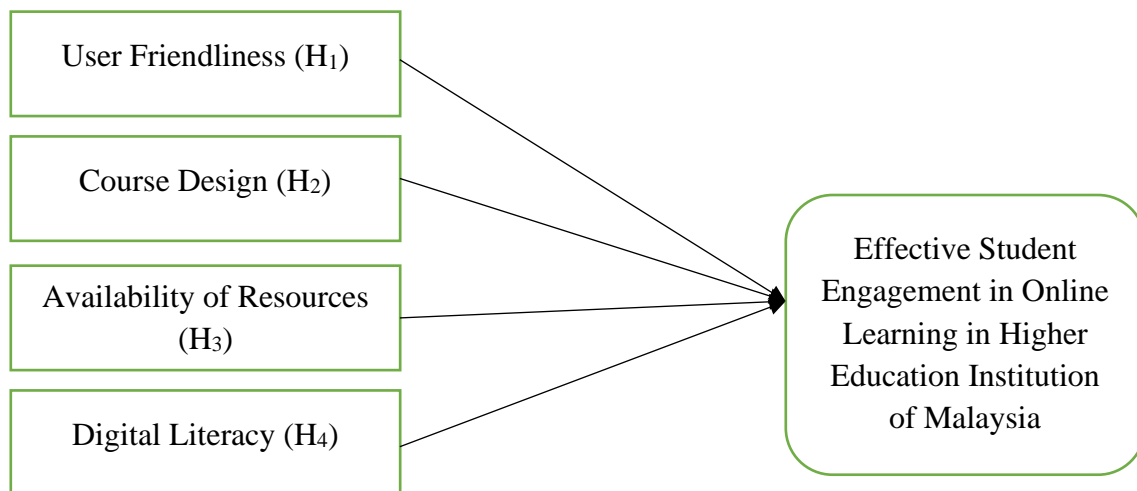


Figure 1: Factors that affecting the student's engagement in online learning in higher education institution Malaysia

Source: Developed by the researcher based on previous studies

H₁: User friendliness (UF) is a factor that contributes to effective student engagement in online learning in higher education institutions in Malaysia.

Henderson et al. (2015) hold that problems with students adapting to technology for online learning are because almost all online learning systems are poorly designed as regards users. That is, users must adjust to the systems. Sun and Wang (2014) also say in Lin (2022) that when people use a user-centered approach in developing technology, each student will personalize the technology according to their own needs and therefore contribute to enhancing the online learning experience. Lin (2022) proved in his research that making the online learning platform device-dependent could trigger children's involvement in online participation.

According to Author Deka (2021), there is a significant correlation between system quality and student satisfaction with online learning systems; such student satisfaction directly varies accordingly based on system quality. Pham Le and Do (2021) argue further that the perceived ease of use of online learning platforms positively affects students' performance during online learning. A correlation was found between poor mental health and student engagement during online study, according to the study by Al-Kumaim et al. (2021), suggesting that the inability

of students to adapt to new modes of online learning negatively affects their mental health resulting in reduced student engagement.

H₂: Course design (CD) of online learning is a factor that contributes to effective student engagement in online learning in higher education institutions of Malaysia.

This variable pertains to course design, which impacts student engagement. The adequacy or quality of online course content may be linked to its effectiveness in meeting student needs (Adeyinka & Mutula, 2010, cited in Mtebe & Raphael, 2018). Deka's study (2021) identified a positive relationship between course design, content, and student engagement. Khlaif et al. (2021) argue that there is a positive correlation between high-quality digital content developed for courses and the engagement of students. Deka (2021) found in his study that the engagement of online learners is influenced by both the course content and its design.

Tualaulelei, Burke, Fanshawe, and Cameron (2021) highlight that a key aspect of course design significantly impacts the generation and sustenance of student interest and learning support. Gedera (2014), as referenced by Tualaulelei et al. (2021), emphasises that educators possess the authority to choose online, intellectual, and material resources, rather than focussing on their application, to enhance student engagement effectively. Knight et al. (2014), as referenced in Tualaulelei et al. (2021), emphasise that technology by itself does not dictate practice; instead, its significance is shaped not only by its design but also by how it is utilised within a particular context. Understanding technology, the needs of their students, subject-specific content, and effective instructional design is essential for educators to create engaging courses.

H₃: Availability of resources (AOR) of the factor that contributes for effective student engagement in online learning in higher education institutions of Malaysia.

The impact of resources on student engagement is the third variable to consider. According to Khlaif et al. (2021), the absence of technological tools negatively influences student engagement in remote learning. Bedenlier et al. (2020) highlighted the challenges related to the lack of home resources, equipment, and internet connectivity in ensuring fair and effective online education. Some students had to rely on borrowing resources, such as computers and internet access, from schools and other institutions, as noted by Chiu (2021).

Despite being assigned tasks dependent on broadband internet access by instructors, students reported their inability to finish assignments due to a lack of internet connection or computer access (Bedenlier et al., 2020). Disengaged students often cited a lack of cognitive readiness for online learning, feeling inadequate in this environment (Bedenlier et al., 2020). The shift to emergency online education has further widened the digital divide, emphasizing the critical importance of ensuring students have online access during these challenging times. Chiu et al. (2021) emphasized that providing students with reliable technology and internet connectivity can enhance their academic engagement with professors and peers, ultimately promoting a sense of support and competence.

H₄: Digital literacy (DL) has an influence on effective student engagement in online learning in higher education institutions of Malaysia.

Digital literacy serves as the fourth factor influencing student engagement. It encompasses a particular set of knowledge, attitudes, and skills that enable students to effectively navigate the internet and related technologies, thereby qualifying them as digitally proficient (Byungura et

al., 2018, as cited in Werang & Leba, 2022). Numerous researchers agree that there is a positive relationship between digital literacy and student engagement. Sadaf et al. (2017) noted that increased student participation is often cited as a key reason for incorporating digital literacy into educational environments. By integrating digital literacy into the classroom, there is significant potential to boost students' engagement with the material. Educators view the use of digital tools to immerse students in various learning experiences as an effective approach to spark their interest (Sadaf, 2017).

Digital literacy enhances the links between real-world experiences and academic content, leading to more opportunities for student engagement. By incorporating digital literacy into teaching, educators can ignite students' interest in topics that might otherwise seem dull or unexciting. According to Sadaf et al. (2017), digital literacy is crucial in engaging students by bridging their everyday experiences and activities with the classroom environment.

3. Methodology

3.1 Research Design

This design seeks to provide an answer to the question of what elements go into making online instruction effective in Malaysian higher education institutions. Thus, this study uses a cross-sectional design to employ empirical research. Data was gathered using a questionnaire in one attempt over two months in 2024 to address the research questions and objectives. Malaysian students enrolled in postsecondary education institutions received the questionnaire.

3.2 Population and Sample

The target population for this study was 389 respondents from the total population of 1,107,834 in both public and private higher education institutions in Malaysia in 2022. This study applied simple random sampling, whereby selection was made from various departments and faculties. 385 samples have been selected target population using Raosoft sample calculator. The criteria for the sample selection were that the respondents should have good knowledge of online teaching activities in their institutions, and they should actively have participated in those activities. Questionnaires were sent out to 400 respondents, and 375 responses were received. Thus, the response rate was 93.7%.

3.3 Measurement Items

A questionnaire was derived based on prior studies. From reviewing the existing online learning and student engagement literature, 27 measurement items were created to operationalise the obstacles recognised and the execution of CSR. Table 1 shows the measuring objects and their sources.

In this study, two instruments were used to collect relevant data. First, this study relies on primary data collected through a structured questionnaire. The questionnaire contained three parts. Part A contained demographic information about the respondents, while Part B included questions on the student engagement and Part C on the factors affecting online learning. Structured interview questions were designed so that the respondent was required to answer questions in Likert type scale ranging from one (strongly disagree) to five (strongly agree). These responses were used to measure all the independent variables and dependent variable.

Table 1: Measurement Items

Constructs	Measurement items	Sources
Section A: Demographic Profile		Nabil Hasan Al-Kumaim, Abdulsalam K. Alhazmi, Fathey Mohammed, Nadhmi A. Gazem 4, Muhammad Salman Shabbir and Yousef Fazea (2021).
Section B: Student Engagement		Ladino Nocua, Andrea Catalina, Cruz Gonzalez, Joan Paola, Castiblanco Jimenez, Ivonne Angelica, Gomez Acevedo, Juan Sebastian, Marcolin, Federica, Vezzetti, Enrico (2021).
Section C: i. User-friendliness		Huang, C.H (2021) Khan, Mohammed, Arshad, Vivek, Mohammed Nabi, Kamalun, Maysoon, Khojah and Muhammad Tahir (2021).
ii. Course Design		Dazhi Yang (2017); Norah Al-musharraf and Shabir Khahro (2016)
iii. Availability of resources		John Mark R. Asio, Ediric D. Gadia, Erlinda C. Abarintos, Darwin P. Paguio, Melner Balce (2021). Jiahua Zhou and Qiping Zhang (2021). Khalid M. Alabdul wahhab, Syed Yousaf Kazmi, Waqas Sami, Khaled Nasser Almujeel, Mohammed Hamed Alanazi, Khalid Falah Alanazi, Abdullah Meshal Moyana, Mohammad Shakil Ahmad, Tariq A. Alasbali, Fahd Al Alwadani(2021).
iv. Digital Literacy		John Hannon and Brian D'Netto(2007). Jeong-Bae Son, Sang-Soon Park and Moonyoung Park(2017).

Source: Compiled by the researcher

4. Result and Findings

4.1 Scale and Reliability

The questionnaire was pre-tested with one of the higher education institutions before it was distributed to actual respondents to check on reliability. Feedback was received, and corrections were made accordingly. Cronbach's Alpha coefficient was used for the reliability of the total questionnaire items, and all five items were above the conservative threshold of 0.70.

Table 2: Cronbach's Alpha-Reliability Test

Cronbach's Alpha	N of Items
0.74	5

4.2 Correlation Analysis

To quantify the degree and direction of relationships between two continuous variables, correlation analysis is used. A thorough correlation analysis between several variables, including "Digital Literacy (DL)," "Course Design (CD)," "Availability of Resources (AOR)," User Friendly (UF), and Student Engagement (SE), is shown in the table below.

Table 3: Correlations Analysis among variables chosen

	1	2	3	4	5
1. SE	-				
2. UF	0.28**	-			
3. CD	-0.65	0.34**	-		
4. AOR	0.61*	0.22**	0.12**	-	
5. DL	0.62*	0.19**	0.20**	0.85*	-

** Correlation is significant at the 0.01 level (1-tailed)

*Correlation is significant at the 0.05 level (1-tailed)

According to the correlation matrix above, "user friendliness," "course design," and "availability of resources" are significantly correlated with "student engagement in online learning.". It also has a strong correlation to digital literacy. "UF" notably associates SE, AOR, and DL. It also has a moderate correlation with CD. "CD" is inversely correlated with SE while strongly correlated with UF, AOR, and DL. A significant correlation exists between "AOR" and DL, CD, UF, and SE. The "DL" also strongly correlated with AOR, UF, CD, and SE.

4.3 The Factors affecting online learning and Student Engagement (Regression results)

The regression model presented below, and the result of the analysis as shown below:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \varepsilon$$

Where

Y = Student engagement

X₁ = User Friendliness

X₂ = Course Design

X₃ = Availability of Resources

X₄ = Digital Literacy

Table 4: R² and ANOVA

R = 0.70^a

R square = 0.49

Adjusted R square = 0.44

Standard error = 0.55

ANOVA						
	Sum of Squares	Df	Mean Square	F	P	Remark
Regression	15.394	5	3.08	10.228	0.000 ^b	Significant (P<0.05)
Residual	16.256	54	0.30			
Total	31.650	59				

a. Predictors: (Constant), UF, CD, AOR, DL

The model's performance is summed up with pertinent analysis in the regression table above. The multiple correlation coefficient, denoted by R, has a range of -1 to +1. Given that .70 is captured at 0. It indicates that there is a good relationship between Student Engagement and UF, CD, AOR, and DL. The coefficient of determination is represented by the R square, which has a range of 0 to 1. Given that the R square value is 0.486, UF, CD, AOR, and DL account for 46% of the variation in the student engagement percentage. With an adjusted R of 0 point 439, only 44 percent of UF, CD, AOR, and DL are the factors influencing online learning in Malaysian higher education institutions. The findings indicate that there exist additional factors that influence the efficacy of student engagement in online learning within Malaysian higher

education institutions. The significant F value suggests that the independent variables are appropriate for examining effective student engagement. The variables in the model suitability are compatible.

Table 5: Coefficients Analysis

Model	Coefficients	Std Error	t Stat	P-value	Lower 95%	Upper 95%
1 (Constant)	-1.34	1.73	-0.78	0.43	-4.83	2.12
UF	0.59	0.43	1.35	0.18	-0.28	1.45
CD	-0.33	0.12	-2.66	0.10	-0.57	-0.08
AOR	0.17	0.14	1.18	0.24	-0.13	0.46
DL	0.53	0.29	1.83	0.73	-0.05	1.10

a. Dependent Variable: SE

The hypothesis that UF positively influences student engagement in online learning by 0 point59 is rejected because the significance level is 0 point18 (>0 point05). Therefore, the hypothesis cannot be accepted. In other words, the UF is not relevant. Likewise, UF and DL are unacceptable since their significance levels (of 0 and 0 points, respectively) exceed 5 percent. But CD exhibits a negative sign that is significant at the one percent level (sig 0.10). This shows that only CD, out of the five variables, has any effect on students' participation in online learning. Therefore, online learning ought to be strategic in nature and guided by a vision from the university administration.

The model results mentioned above show how the tested elements contributed to the identification of the variables influencing online learning student engagement in Malaysian higher education institutions. Except for CD, which indicates a negative impact, all variables in the regression model have a positive effect on the dependent variable, which is student engagement.

Table 6: Hypothesis Results

Hypothesis	Supported / Not Supported
H₁: User friendliness (UF) is a factor that contributing for effective student engagement in online learning in higher education institutions of Malaysia.	<p>Is not a significant element or obstacle to the success of online learning and student participation. We found that there is no significant correlation between user friendliness and student engagement based on the results of our multiple regression analysis.</p> <p>As we conducted additional research to support the lack of significance in the relationship between user friendliness and student engagement, we discovered that the respondents' demographic characteristics had a significant impact on the variables.</p> <p>For example, the relationship between user-friendliness and student engagement has been influenced by age group, gender, and study level.</p> <p>Supported</p>
H₂: Course design (CD) of the online learning is a factor that contributing for effective student engagement in online learning in higher education institutions of Malaysia.	<p>A negative value of 0.33 and a big value of 0.01 are displayed in Table 5. This suggests that CD is an important factor influencing students' participation in online learning. This should be noted by management and strategically considered in future decisions.</p> <p>The research's conclusions demonstrate the beneficial relationship between course design and student participation. Deka's (2021)</p>

research, which found a positive correlation between course design and student engagement, also supports this finding.

The results of this study are corroborated by Khlaif, Salha, and Kouraichi (2021), who discovered a positive correlation between student engagement and the caliber of digital content.

Supported

H₃: Availability of resources (AOR) of the factor that contributing for effective student engagement in online learning in higher education institutions of Malaysia.

This availability of resources is not an impediment for the effective student engagement in online learning. The findings from this research showcase that availability of resources and student engagement are positively linked. The findings from this study is supported by Khlaif et al., (2021).

In Khlaif et al., (2021)'s study concluded that lack of availability of technological devices has led to negative student engagement in the online learning environment. This is because students feel disengaged while doing their online learning and are unable to engage in cognitive learning processes (Bedenlier et al., 2020).

Supported

H₄: Digital literacy (DL) has an influence on effective student engagement in online learning in higher education institutions of Malaysia.

Table 5 shows that the DL variable was rejected and that it is not a factor that effectively engages students in online learning in Malaysian higher education institutions. The results of this study demonstrate the beneficial relationship between digital literacy and student engagement.

Authors: Byungura and associates., (2018) as referenced in Werang and Leba (2022) concur that there is a link between student engagement and digital literacy that is positive. Sadaf and associates. (2017) demonstrates in his research how a strong connection is made between digital literacy and the classroom setting. Conversely, Howard et al. (2016) has demonstrated in his studies how using digital technology encourages student participation.

Supported

5. Conclusion and Recommendations

5.1 Conclusion

When the variables are tested independently with the dependent variable, the analysis aims to show the correlation between them. The hypothesis was adequately supported by the analysis's findings. In contrast, the study employed multiple regression analysis to investigate the ways in which the four independent variables interact to produce variations in student engagement. During this analysis, two new findings were made. First, there is no connection between user-friendliness and student engagement. The second finding is that the multiple regression analysis shows that the independent variable (resource availability) has a negative t-value, indicating that it has a negative effect on the variance of student engagement.

5.2 Limitation

Sample size is one of the drawbacks. The study only looks at Malaysian university students. The questionnaire was only sent to the top 3 public and private universities based on the Times Higher Education World University Rankings, since the target respondents were selected using cluster sampling. Because the target respondents' range had been limited, the results may not

accurately reflect all Malaysian university students and may not be significant enough to generate a trustworthy study.

An even more accurate study could have been conducted if a larger sample size had been considered. The respondents' involvement in the study is its second limitation. We had to use online platforms like WhatsApp and Instagram to distribute the surveys because it was difficult to interact with and reach the university students due to their dispersed, remote locations throughout Malaysia. It took several reminders to get the responses from some of the respondents we approached, who were so focused on their work that they neglected to complete the survey. Some university students did not have time to carefully read and complete the survey because they were studying for final exams when it was distributed. Their lack of urgency and focus may have affected their honest judgment when conducting this survey. Therefore. Hence, it might affect the accuracy of the responses received.

Apart from that, a shortage of resources is also one of the barriers in this study. Although many journals and articles related to our study may be easily obtained online, many of the top-quality journals and articles are not accessible since they require online journal purchases. Hence, the study was conducted without fully using existing journals.

6. Conclusion

To conclude, in this chapter, past research was used to support the findings obtained under each hypothesis. Two new findings were obtained that will be considered as a new discovery and a contribution to this field of topic. Implications of the study have been discussed to understand the meaning behind the findings obtained in the study. The limitations of this study have been addressed through the recommendations given to future researchers.

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