

Investigating Student Strategy in Online Learning: The Role of Student Interaction and Engagement in Online Distance Learning among UiTM Students

Fauziah Saadah Abdul Halim¹, Turisiana Ahmad Buhari ^{1*}, Dr Noor Hanim Rahmat², Dr Lee Sze Seau³

¹ Akademi Pengajian Bahasa, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

² Associate Professor, Akademi Pengajian Bahasa, Universiti Teknologi MARA, Pasir Gudang, Johor, Malaysia

³ Faculty of Social Sciences and Liberal Arts, USCI University, Kuala Lumpur, Malaysia

*Corresponding Author

DOI: <https://dx.doi.org/10.47772/IJRISS.2024.8080310>

Received: 12 August 2024; Revised: 27 August 2024; Accepted: 29 August 2024; Published: 21 September 2024

ABSTRACT

The increasing accessibility and flexibility of online distance learning have transformed the educational domain. Despite positive changes, the effectiveness of online learning still hinges on student interaction and engagement. The study explored engagement strategies for students in online distance learning. Participants completed a 19-item Likert-scale survey based on Moore's (1993) three types of interaction: learner-to-learner, learner-to-instructor, and learner-to-content. The survey, adapted from Martin and Bolliger's (2018) framework, addressed effective strategies for enhancing these interactions and identified the most and least valuable engagement strategies. Survey results showed that students generally prefer peer support to motivate task completion, a teaching style that encourages active participation, and user-friendly content. Students highly value active participation, multiple communication tools for staying connected, instructor encouragement, ongoing interactions after classes, peer support, and content accessibility. Nevertheless, they place less importance on immediate assistance from asynchronous activities, online activities that enhance critical thinking, seeking help from peers, collaborative learning for understanding, and synchronous activities offering immediate assistance. The findings can add to the body of knowledge and improve online distance education by further researching strategies and impacts on different types of learners, learning styles, and diverse cultural backgrounds to foster equality and inclusion in online education.

Keywords: student engagement; online distance learning; online learning strategy; learner interaction

INTRODUCTION

The COVID-19 pandemic caused a significant rise in online learning, and as a result, education has rapidly moved to online platforms. While many institutions opt to return to traditional and physical classroom-based teaching or resort to hybrid learning, online learning is here to stay. This shift towards digital education has been facilitated by technological advances, with more universities and online learning platforms offering online courses, including Massive Open Online Courses (MOOCs) and micro-credentials. However, the concept of online learning that we know today has its roots in history, where instances of distance learning started as early as the 19th century. These instances of distance learning have been accomplished via mail correspondence, radio, and television long before the Internet was created. Receiving education from a distance exists because humans have always been fascinated by learning new things, even if it means not having physical access to a tutor. The wider availability of computers by the 1960s led to learning from university computer terminals. By the mid-1980s, the University of Toronto offered the first fully online course. These examples suggest that receiving education despite not being present in a typical classroom environment is viable, and its implementations

\continue to evolve.

There have been debates among practitioners and researchers on the definitions and categorisation of digital learning types, leading to a variety of terms such as distance learning, e-learning, blended learning, and digital learning. However, these terms often overlap and are used interchangeably, reflecting the evolving nature of digital education. Distance education, the precursor to e-learning, involves physical separation between students and instructors, typically facilitated by the Internet. Distance education and distance learning do not mean the same thing as the latter refers to the learners' ability. In contrast, distance education is learning at a distance (King et al., 2001). E-Learning, specifically defined by Güllü et al. (2016) and Aixia and Wang (2011), encompasses online courses and programmes that leverage technology to enhance access, collaboration and learning quality. Blended learning combined face-to-face instruction with online components, offering flexibility and a personalised learning experience (Garrison & Kanuka, 2004). Digital learning encompasses all forms of learning facilitated by technology, regardless of the device and location (Fraszczyka & Piip, 2020). Sangrà et al. (2012) and Rodrigues et al. (2019) further categorise e-learning as technology-driven, delivery-system-oriented, communication-driven, and educational-paradigm-oriented, each emphasising different aspects of digital learning.

As new technologies emerged, the term evolved from describing the limitations associated with "distance," such as time and space, to the various types of instructional materials used that occur between the learner and the instructor, which are held at different times or places (Guilar & Loring, 2008; Conrad, 2006; Newby et al., 2000). Subsequently, a recent version of distance learning is online learning, where access, connectivity, and flexibility to education are improved (Ally, 2004; Hiltz & Turoff, 2005; Oblinger & Oblinger, 2005; Conrad, 2002; Benson, 2002). Benson (2002), Carliner (2004), and Conrad (2002) further defined online learning as access to learning experiences that capitalise on the use of technology.

All in all, online platforms are the best solution to making learning accessible to all. However, there is the question of online engagement. Technological advances, even when designed and applied appropriately, do not guarantee effective learning and student engagement, which is an issue as student engagement indicates successful classroom instruction. Researchers outlined three dimensions that support the social construct of learning engagement, namely behavioural engagement, emotional engagement, and cognitive engagement (Hew, 2016; Wang, 2007; Fredricks et al., 2004). Cohen et al. (2022), in their article concerning key elements that propel student online engagement, encapsulate the idea of student engagement with student learning, success, motivation, and retaining what was taught. Considering the pertinent elements of learning engagement, Hollister et al. (2022) investigated student attitudes and behaviour relating to online learning engagement during COVID-19. Their study of 187 undergraduates at a public research institution found that 72 percent of students believe that the low engagement due to the shift to online platforms damaged their online learning experience, leading to struggles in staying connected to peers and instructors and managing work.

1.1 Statement of the Problem

The pandemic, technological advancements, and social and economic challenges have changed many aspects of our daily lives, and the education sector is not spared from undergoing major modifications. The lessons learned from the coronavirus critical period were that physical classrooms or face-to-face learning are not sensible options. The way to move forward to retain some form of normalcy is via online learning.

In a SWOC analysis (Strengths, Weaknesses, Opportunities, and Challenges) conducted on e-learning methods, Dhawan (2020) mentioned that these online methods allow customisations of learning procedures and processes to suit the learners' needs. On the other hand, Johan et al. (2014) found that the flexibility of learning from any location is the principal benefit of e-learning. Sadeghi (2019) mentioned six advantages of distance learning in her study, namely having flexibility in time and location, scheduling, and earning for livelihood, as well as saving time and money and easing mobility. These findings indicate that online learning has its advantages and, therefore, is an ideal learning mode.

Despite three years of adaptation to online or remote learning environments, there is an ongoing debate regarding the level of student engagement and participation in these settings, particularly among students at Universiti

Teknologi MARA (UiTM) Shah Alam (Masitah et al., 2024; Delwis et al., 2024; Faddliza et al., 2024). Research by Paulsen and McCormick (2020) suggests that online learners often experience lower levels of collaborative learning and reduced quality of interactions compared to face-to-face learners. Delwis et al. (2024) have highlighted the critical role of technological accessibility in fostering engagement, where students with reliable internet and technological tools were more engaged. Similarly, Faddliza et al. (2023) noted that personalised engagement strategies, such as addressing students by name, significantly enhance participation, though students experience anxiety or self-esteem issues when spotlighted. Furthermore, Masitah et al. (2024) observed that hybrid models combining online, and face-to-face learning could better accommodate students' needs, promoting sustained engagement. Another relevant concern is the effectiveness of online learning, where the question is whether online teaching and learning activities work. This query is further complicated by insights showing that while the total number of students using online learning environments has increased, the proportion of students' engagement has decreased over time (Spitzer et al., 2021), coupled with the complexities and the critical need for satisfying primary student needs like autonomy, competence, and relatedness in online environments (Chiu, 2022; Salas-Pilco et al., 2022). Hence, this study is conducted to investigate engagement in online learning.

1.2 Objective and Research Questions

This study aims to investigate student engagement strategies in online distance learning and their effectiveness. The following two questions guided the study:

1. Which strategies do UiTM students perceive effective in enhancing peer-to-peer, learner-to-instructor, and learner-to-content engagement in the online learning environment?
2. Which strategies do UiTM students identify as most valuable and least valuable in engaging them in the online learning environment?

LITERATURE REVIEW

This section reviews the literature on online engagement, strategies, and effectiveness in online learning environments concerning peer-to-peer interaction, learner-to-instructor interaction, and learner-to-content interaction.

2.1 Peer-to-Peer Interaction

Positive experience from peer interaction is critical to cognitive and social development. Vygotsky (1978) introduced the term Zone of Proximal Development (ZPD) and believed that when learners are in the ZPD for a particular task, they can complete it successfully if appropriate guidance is provided. ZPD, as defined by Vygotsky, is “the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through collaboration with more knowledgeable others (peers) or adult supervision” (Lantolf & Thorne, 2007; Vygotsky, 1978). More knowledgeable others have a better understanding or higher ability than the learner concerning a particular task, process, or concept (McLeod, 2004). Sato and Ballinger (2016) suggested that challenges and problems learners face are solved faster when they are engaged in peer interaction, as they tend to ask for feedback and clarification from their peers more than their instructors. They further elaborated that in Web 2.0 platforms, the effectiveness of peer interaction is affected by four factors: 1) task type, 2) learners' proficiency level, 3) learner relationship, and 4) interaction modality.

2.2 Learner-to-Instructor Interaction

Moore's Transactional Distance Theory (TDT) helps explain learner-instructor interaction in remote learning, emphasising physical separation as the obstacle in this form of learning. The theory suggests that disengagement, lack of motivation, and isolation will occur with high transactional distance. In distance learning, this separation in location influences teaching and learning through the creation of psychological and communication space between the learner and instructor (Moore, 1997). The theory further emphasises that the transaction (interaction) between the teacher and students needs to consider three factors: dialogue, structure, and learner autonomy

(Moore, 1997, cited in Falloon, 2011).

Another theory regarding learner-to-instructor interaction in online/distance learning is the Community of Inquiry model developed by Garrison et al. (2000), which presents three key elements that will impact the learning experience: teaching presence, cognitive presence, and social presence. Among the related significant examples that pertain to learner-to-instructor interaction in this model, as suggested by Iturbe-LaGrave (2020), are the importance of communication and interaction with the instructor (social presence), instructional design and instructing and assisting students with questions and understanding (teacher presence) and motivating students to engage with course content (cognitive presence). To explain learner-to-instructor interaction, the focus and importance rest on the element of social presence, which is described as the learners' ability to project themselves socially and emotionally and be recognised as a 'real person' when interacting with the teacher (Iturbe-LaGrave, 2020).

2.3 Learner-to-Content Interaction

Again, Garrison, Anderson, and Archer's Community of Inquiry model (2000) can be used to explain learner-to-content interaction. The model looks at three critical elements of educational experience and can be used to show the importance of engagement in the learning content. The notion is that these three key elements, namely teaching presence, cognitive presence, and social presence, will impact the learning experience. According to Iturbe-LaGrave (2020), cognitive presence is having students cognitively engage with the course content in four phases: 1) Triggering the event (issue or problem), 2) Exploring, reflecting, and discussing, 3) Constructing the meaning during the discussion, and 4) Applying the knowledge (the course and outside the classroom).

With existing studies on learner-content interaction, the quality of interaction is a constant point of contention (Thach, 2018). In specific, learner-to-content interaction is limited by obsolete interaction interfaces; thus, researchers have tried to enhance user interface quality (Chen et al., 2017). One school of research experiments with eye-tracking technology to analyse learners' interaction with multimedia interfaces (Acarturk & Ozcelik, 2016). Other researchers propose enhancing learner-content interaction by presenting realistic scenarios, discussions with guiding questions, and synchronous conferencing or guest talks (Martin & Bolliger, 2018). Future research needs to inform the design and production of distance learning course materials with empirical research on learner-content interaction or investigate learners' strategies to process content (Xiao, 2017).

2.4 Past Studies

This section presents past studies on online engagement, strategies, and effectiveness in online learning environments.

2.4.1 Peer-to-Peer Interaction

Various studies have been done on peer-to-peer interaction. Sadykova (2014) investigated the learning experience and the significance of peer interaction between US students and their non-US counterparts in an online learning environment. A mixed-method study was used to explore the experiences of 12 international graduate students who enrolled in a MOOC course. The students responded to a Likert scale survey, followed by online interviews. The study also examined the respondents' course logs, reflective journals, and online discussions and forums. Findings showed that overall, the students value group activities and peer support as the most important factors that allow them to connect with their online peers and help them learn from their experiences, share ideas, discuss, and learn 'how-tos.' Sadykova (2014) suggested that facilitators for online courses should create a conducive learning environment that focuses on productive and relationship-oriented peer-to-peer interaction for peer-to-peer knowledge acquisition.

A study by Baten et al. (2019) explored the characteristics and values of online peer interactions in developing speaking skills. Sixty respondents from Amazon Mechanical Turk with different age groups and educational backgrounds were required to pre-record their responses to five common job interview prompts. Participants were to comment on each other's pre-recorded videos and rate their peer's performances on the appropriate use of similes, volume modulation, and gestures. Findings showed a significant improvement in the respondents' speaking skills, and results showed a relationship between receiving comments and improved performance.

Xia et al. (2013) conducted a study to improve participation and peer interaction in an online discussion forum. Strategies used by the teachers to increase student participation in discussion forums are awarding bonus marks, posting reactions, developing learning communities, and providing quicker response time to students' posts. The participants were students from Geographic Data Analysis, a hybrid course. Although 85 students enrolled in the online course, only 30 actively participated in the forum discussion. The Pearson Correlation Coefficient was carried out to explore the relationship between roles and level of participation. Results showed a mild relationship between the level of participation and the student's results. Xia et al. (2013) proposed that timely responses from the instructor should be a priority for students' engagement and active learning.

Another study to measure peer learning and performance was conducted by Chiu and Hew (2018) using the stepwise regression analysis, exploring the factors influencing peer learning and performance through online discussion forums. 1563 students from a Humanity and Art MOOC Course participated in the study, where peer learning and performance were measured through the number of peer reviews submitted and the total quiz scores. The online course required ten hours of learning time and two hours of videos with discussion forums, quizzes, and peer reviews. Results showed that students who viewed forum discussions obtained higher scores than those who commented and voted. Chiu and Hew (2018) explained that the lack of participation in forum discussions, particularly in MOOC courses, is because they are different from traditional courses. Students enrolled in these courses are more likely to learn for self-improvement, and participate in forum discussions based on their interests, rather than course requirements; where forums are recommended and encouraged and sometimes used as course assessments. Chiu and Hew (2018) recommended further studies to include learners' backgrounds, such as educational level and age, as these factors could influence learners' participation.

Next, a study was conducted to measure peer interaction and collaborative learning by Aghaee and Keller (2016). The study aimed to investigate learners' perceptions of the usefulness of ICT for peer interaction and the factors that influence the quality of peer interaction. A mixed-method approach was used on 55 respondents in the bachelor's and master's degree thesis writing process; interaction was investigated in these three areas: peer review, active participation, and final opposition. Results showed that there was not enough motivation among the respondents to provide good peer reviews and that providing online forum discussions would benefit collaboration and guidance between peers and improve the quality of the peer review. Aghaee and Keller (2016) suggested that for quality peer interaction to occur, there must be clear and structured information and instructions about the tasks and students' understanding of the tasks and their importance. It was also suggested for future research that student-teacher interaction in an online environment would provide deeper insights into the qualities of interaction.

Past studies on peer-to-peer interaction have shown the importance of ensuring a conducive learning environment or learning community (Sadykova, 2014; Xia et al., 2013) for the students, promoting productive and collaborative relationships, and gaining a deeper understanding of factors that contribute to the quality of interaction (Chiu & Hew, 2018; Aghaee & Keller, 2016), such as learners' motivation and the importance of understanding peer-to-peer tasks.

2.4.2 Learner-to-Instructor Interaction

The rise in online learning has led to a significant shift in student-teacher interaction. Teacher-instructor dynamics are now redefined, and scholarly interactions are no longer restricted to the physical classroom. Learner-to-instructor interaction is fundamental in an online learning setting as it promotes an active and supportive educational environment. Buelow et al. (2018) posited that apart from academic depth and critical thinking, faculties are more inclined to ensure active learning engagement. In their survey of 417 online learning university students, Buelow et al. (2018) found that the professor's feedback is essential and saw the "lack of responsiveness and timeliness of grading as disengaging."

Studies have shown that the instructor is an essential factor that determines the effectiveness of online learning. In their study on interaction levels in online distance education, Mohammed et al. (2017) found that teachers who use various methods, such as Question and Answer and group work, can help encourage student-teacher and student-student interaction. Concerning attitudes, Mohammed et al. (2017) mentioned that students are less inclined to interact with their teachers. Subsequently, teachers' attitudes and skills, such as using online mediums

and pedagogic knowledge, can help students better interact with their teachers.

On the other hand, a study by Sun et al. (2022), which investigated the influence of teacher-student interaction on the effects of online learning, was conducted with 398 college students and found that the level of teacher-student interaction has positive effects on students' learning outcomes. The study suggests that the psychological environment and the learning engagement between the teacher and the student serve as important and influential factors in the success of learning and facilitate learning for the students.

2.4.3 Learner-to-Content Interaction

Research on learner-content interaction has dispersed worldwide, with studies from Malaysia to the United States, Ghana, China, and Vietnam discussed in this section.

Online learners in Malaysia met some challenges, specifically during the Covid-19 pandemic. In a study exploring how 42 undergraduates at the University of Malaysia Sabah engaged in language learning during the first Movement Control Order (MCO), where teaching and learning were done entirely online, Soon, et al. (2022) found that the student engagement with the learning materials or content primarily correlates to the crucial role of telecommunications, where the stability of the internet connection determines the success of the learning. When synchronised learning could not be done, instructors had to make sure that other materials, such as recordings of the online lectures or offline practices, would be carried out asynchronously. This suggests the importance of monitoring and adapting materials to ensure the success of online learning. Meanwhile, a study examining how 233 undergraduates from various programmes at Universiti Tun Hussein Onn Malaysia engage in online English language courses found that students had a favourable view of learning the courses. Overall, they felt confident using online learning content and are highly engaged with their learning despite technology gaps, and issues with documentation and the nature of online instructions (Abdul Kadir, 2023).

Chen et al. (2017) explored a web-based interaction-aware virtual learning environment (VLE) – WebIntera-classroom – which aims to augment learning interactions by increasing learner-to-content and learner-to-instructor interactions. In the WebIntera-classroom, a ubiquitous interactive interface integrates a pen-and-paper interface with a web-based whiteboard to promote effective learner-to-content interactions. Chen et al. (2017) also developed a learning analytics tool that allows instructors to supervise learner interactions. In addition, they implemented a high-granularity Learning Analytics Engine (hgLAE) to broadcast, record, and play a lecture recording. The hgLAE identified hotspots in a lecture recording and raised students' awareness when they watched the recording. The WebIntera-classroom was implemented in 11 universities in China, and its effectiveness was evaluated through 464 questionnaires and 60 interviews with one university. Student performance was also compared with the traditional classroom. Findings indicated high user satisfaction and improved performance compared to traditional classrooms. Chen et al. (2017) proposed future research to differentiate whether students spend longer on the content due to difficulty or curiosity.

Mukuni et al. (2020) examined if there was any difference in male and female perceptions of learner-content interactions and how they play a role in learner engagement. 147 undergraduates from four online courses in the United States completed the 'Student Perception of Engagement in an Online Course' survey. Twelve questions investigated aspects such as their interests in the subject matter, narrated lecture videos provided as a class resource, interactive assignments, critical thinking, and problem-solving assignments. The findings showed no significant differences between the genders. Mukuni et al. (2020) proposed that critical thinking assignments have open-ended problems. Furthermore, although narrated lecture videos were engaging, Mukuni et al. (2020) recommended that the videos be 3-20 minutes or longer to be segmented.

Thach (2018) studied learner-content interaction in an online English language learning course at a university in Vietnam. 210 first-year Bachelor of Arts students specialising in interpreting and translating an online English course participated in the research. Thach (2018) utilised a commercial platform to explore, practice, and test sections, supported by automatic speech recognition (ASR) technology in the listening and speaking practice. Data, including learners' time on task, were retrieved from the teacher management system (TMS). The participants responded to a survey questionnaire adapted from the Online Learning Readiness Scales (OLRS) based on feedback from five experienced instructors. The quantitative data from the survey were processed using

simple descriptive statistics and a chi-square test using the SPSS Version 21. The qualitative data were analysed using content analysis. The students were confident in using the online course but did not particularly appreciate its usefulness. Overall, it was found that the course was taught in a blended mode, but what was practised online had little connection with what was taught in the classroom. Next, students found listening and grammar the most useful activities. One limitation is that the ASR did not provide explanations for answers in the reading practice. Another finding was that students found the 'listen and repeat' nature of speaking practice ineffective. Thach (2018) emphasised that continuous technical support is crucial to promote autonomous learning and recommended that educators pay attention to the quality of interaction rather than quantity. Thach (2018) also accentuated that online courses require the instructor's continuous guidance and implementation of structure and rules.

A study in Ghana was conducted on the factors that enhance effective interaction between students and learning contents in a technology-mediated learning environment (Owusu-Agyeman & Larbi-Siaw, 2018). Random sampling identified 500 undergraduate respondents in a university in Ghana from the faculties of engineering, computing, information systems, and information technology business. Then, purposive sampling selected twelve interviewees from three faculties for the focus group discussion. Survey constructs informed by the literature resulted in nine key variables, measured on a five-point Likert scale. Owusu-Agyeman and Larbi-Siaw (2018) conducted a factor analysis and correlation analysis of surveys and applied thematic analysis of interviews. Findings underlined that effective student-content interaction is strongly enhanced by expansive learning through its five key elements: epistemic relation, contradictions, digital learning content, conglomeration of views, and cognitive transformation (Owusu-Agyeman & Larbi-Siaw, 2018). The intervening effect of network relations (to create opportunities for students to congregate to develop knowledge and skills) and mediating technology (LMS to promote interaction and develop opportunities for interaction) was highly recommended. Designs of future courses should consider the five key elements identified, and more research should be conducted into strategies to stimulate interest in the content (Owusu-Agyeman & Larbi-Siaw, 2018).

Using Moore's (1989) theory of interaction as a framework, Zimmerman (2012) analysed learner-content interaction through timing and quantity. 139 students who enrolled in a management course in the Southwestern United States in the same term used the same format and materials. The same instructor asynchronously taught the course using the Blackboard CMS, where students relied entirely on online materials. Students were required to complete a discussion assignment and a weekly five-question quiz. The CMS system automatically recorded the time spent reviewing any content tied to the course upon access. Correlation and multiple regression analysis were performed using SPSS Version 20. Findings showed that students who spent more time with the content required less time to complete the quiz, and those who took less time to complete the quizzes scored higher. Moreover, students who spent more time with the content scored better grades. Zimmerman (2012) advised designers to develop easy-to-access content and engaging materials to improve learner-content interaction. Future studies should also conduct mixed-method studies to understand the quality of interaction and the motivation behind it.

Past studies on learner-content interaction contributed to several insights that informed the present study. Research has been conducted on a wide range of interventions, such as Blackboard CMS (Zimmerman, 2012), Webintera-classroom (Chen et al., 2017), commercial platform in a blended environment (Thach, 2018), with a singular message: focus on the quality of interaction. Secondly, the instructor should consistently monitor the students even with automated systems. The research recommendation points towards the demand for more qualitative investigations into user experience.

RESEARCH METHOD

The sample consisted of students from Universiti Teknologi MARA (UiTM) Selangor who took online classes across three faculties: Information Management, Akademi Pengajian Bahasa (Academy of Language Studies), and Health Sciences. A total of 50 participants completed the online survey. The target respondents were purposefully sampled from the specific population of UiTM students because the study sought to explore the definitive patterns shown by UiTM students in an attempt to draw more localised conclusions and interpretations about this group of students. Furthermore, the focus of the study was restricted to this context, without any attempt to discover the patterns shown by students from other tertiary education institutions. Hence, sampling

of students from other contexts was not done as it was not in the interest of the present research.

The research instrument was based on Moore’s (1993) three types of interaction: learner-to-learner, learner-to-instructor, and learner-to-content. The instrument used in this study was adapted from Martin and Bolliger’s (2018) research. The survey consisted of 22 questions with 19 Likert-type items ranging from 1 (strongly disagree) to 5 (strongly agree) and three demographic items. The question items were divided into four sub-sections. Section A covered the demographic items, which included gender, age, and highest academic qualification. Section B consisted of five items relevant to learner-to-learner interaction. Section C focused on learner-to-instructor interaction, consisting of seven items, and section D concerned learner-to-content interaction, which also consists of seven items.

Data collection for this study was conducted through an online survey distributed using Google Forms. The survey was open from April 2021 to May 2021, and participants were informed of the study's objectives before completing the questionnaire. Participants were also assured that their responses would be kept confidential and used solely for the study. The data obtained from the survey was analysed quantitatively using descriptive statistics to describe the data and identify patterns. The Statistical Package for Social Sciences (SPSS) software was used to tabulate means and standard deviations from the collected data, which were used to understand the effectiveness of various online engagement strategies.

RESULTS

This section presents the study's results in addressing the objective and research questions, focusing on peer-to-peer interaction, learner-to-instructor interaction, and learner-to-content instruction.

4.1 Strategies Perceived to Be Effective in Online Learning Environment

The demographic results of the survey revealed that the majority of the participants were female (52%), whereas 38.8% were male. Their ages ranged from 20 to 36 ($M = 29$). Over half of the participants (86%) have Diplomas, and 14% have SPM/ STPM certificates.

Table 1: Peer-to-Peer Interaction

Item	Mean	SD
1 Collaborative learning promotes peer-to-peer understanding	3.60	0.76
2 Ask for help from your peers	3.58	0.67
3 Prefer to be in the same group with chosen peer for online activities	3.82	0.67
4 The sense of community helps engagement in online class	3.74	0.72
5 Support from peers - motivation to finish tasks	3.90	0.84

In general, the respondents considered the engagement strategies included in the survey to be moderately significant. The instrument had 19 Likert-scale items ranging from 1 to 5, which allowed for possible total scores between 19 and 95. The respondents scored between 24 and 95, averaging 71.24 ($SD = 0.63$). Their mean scores for all the items ranged from 1.33 to 5.00, with an average score of 3.76 ($SD = 0.63$).

Analysis of peer-to-peer interaction showed that over 60% of the respondents strongly agreed or agreed with Item 1 “collaborative learning promotes peer-to-peer understanding.” More than 72% of the respondents strongly agreed or agreed (Item 3) that engagement occurred when they were allowed to be in the same group with their chosen peers for online activities. 64% agreed that a sense of community in online classes (Item 4) is valued by most students, and 74% strongly agreed or agreed that support from peers also motivates students to finish tasks.

Table 2: Learner-to-Instructor Interaction

Item	Mean	SD
6 Instructor’s teaching style involves students’ active participation	4.06	0.79
7 Feel encouraged by the instructor to keep engaged in online classroom	3.92	0.67
8 Instructor provides feedback from your previous assessment	3.82	0.83
9 Feel feedback from instructor on performances is clear and positive	3.78	0.77
10 Instructor uses more than two communication tools to stay connected with students	3.94	0.77
11 Online platforms used by instructors for online classes are effective and convenient	3.74	0.78
12 Instructor maintains the ongoing interaction with students after online class	3.92	0.70

Analysis of learner-to-instructor interaction suggests that students generally perceive Item 6, their instructor’s teaching style, to involve active participation ($M = 4.06$, $SD = 0.79$), with 86% marking it as strongly agreed or agreed. Next, the instructors’ use of more than two communication tools to stay connected with students (Item 10), was also perceived positively by the students ($M = 3.94$, $SD = 0.77$). Additionally, for Item 12, students perceived that the instructor maintained ongoing interaction with them after the online class ($M = 3.92$, $SD = 0.70$), with 86% marked as strongly agreeing or agreeing. However, the perception of feedback on performance being clear and positive (Item 9) and effectiveness and convenience of the online platform used in the class (Item 11) had a slighter lower rating ($M = 3.78$, $SD = 0.77$; $M = 3.74$, $SD = 0.78$) with 64% and 68% respectively. Overall, the students were satisfied with their instructor’s teaching style, which involved active participation, communication tools used, ongoing interaction, and feedback provided in the online classroom environment, although the effectiveness and convenience of the online platforms used were perceived as moderate.

Table 3: Learner-to-Content Interaction

Item	Mean	SD
13 Synchronous activities (i.e., online discussion) offer immediate assistance	3.60	0.88
14 Asynchronous activities (i.e., assignments) offer immediate assistance	3.54	0.91
15 Activities improve the understanding of the subject matter	3.66	0.92
16 Activities in online learning could improve critical thinking skills	3.56	0.81
17 Can use relevant knowledge wisely in the learning process	3.70	0.84
18 The ease of online content is important	3.86	0.81
19 It is important to get an overview of the content before the class begins	3.74	0.80

In the learner-to-content section, the findings indicate that students deemed Item 18, the ease of online content, important ($M = 3.86$, $SD = 0.81$), with 70% marked strongly agree or agree and Item 19, getting an overview of the content before the class began ($M = 3.74$, $SD = 0.80$) with 66% was marked strongly agreeing and agreeing. For Items 15 and 16, online activities were generally perceived to improve understanding of the subject matter ($M = 3.66$, $SD = 0.92$) and critical thinking skills ($M = 3.56$, $SD = 0.81$). In addition, students perceived

synchronous activities, such as online discussion, offer immediate assistance ($M = 3.60$, $SD = 0.88$), with 60% of students strongly agreeing or agreeing, compared to asynchronous activities, such as assignments ($M = 3.54$, $SD = 0.91$) with 53%. In summary, students found synchronous activities more immediately helpful than asynchronous activities. In general, they perceived online learning activities as somewhat beneficial for improving their understanding of subject matter and critical thinking skills. Moreover, they drew attention to the importance of the ease of online content and obtaining an overview of course content before classes begin.

4.2 Strategies Identified as Most Valuable and Least Valuable in Engaging Students in the Online Learning Environment

Further analysis of the survey's overall results indicated engagement strategies that students identified as the most and least valuable. For this purpose, the median score is primarily used to determine the central tendency of students' responses to the 5-point Likert-scale questionnaire (1 - strongly disagree, 2 - disagree, 3 - neutral, 4 - agree, and 5 - strongly agree). Because the scale denotes a continuous random variable, it can be interpreted that any value between 3.5 to 4.49 indicates the 'agree' response to a questionnaire item, for instance. Therefore, for the second research question, the median score and the mean score (average) of 1 to 5 are used to show the students' response or agreement for each engagement strategy, indicating their thoughts on the most and least valuable strategies in engaging them in online learning. Table 4 below shows the inferred level of perceived value based on the median scores and supported by the mean scores that pinpoint the specific location on the scale.

The median score for all the items, except for item number 16 (Online activities enhance critical thinking) under the learner-to-content interaction category, centralises on score 4 which shows that overall, the participants tend to agree with all the statements and all strategies appear to be 'valuable'. Therefore, to determine further which strategy is considered the most valuable or the least valuable in engaging students in online learning, the mean (average score) is also examined.

Table 4: Summary of Student-Perceived Effectiveness of Engagement Strategies in Online Learning

Category	Engagement Strategy	Median Score	Mean Score	Perceived Value (Based on Median score)
Peer-to-Peer	1 Collaborative learning promotes understanding	4	3.60	Moderately Valuable
	2 Likelihood to ask for help from peers	4	3.58	Moderately Valuable
	3 Preference to be in the same group as chosen peers for online activities	4	3.82	Valuable
	4 Sense of community aids engagement.	4	3.74	Moderately Valuable
	5 Peer support motivates finishing tasks.	4	3.90	Most Valuable
Learner-to-Instructor	6 The instructor's teaching style involves students' active participation.	4	4.06	Most Valuable
	7 Feel encouraged to keep engaging in online classroom by the instructor	4	3.92	Most Valuable

	8	The instructor provides feedback on the previous assessment.	4	3.82	Valuable
	9	Receive clear and positive feedback from the instructor	4	3.78	Valuable
	10	The instructor uses multiple communication tools to stay connected with students.	4	3.94	Most Valuable
	11	The instructor uses effective and convenient online platforms.	4	3.74	Moderately Valuable
	12	Ongoing interactions are maintained after online classes.	4	3.92	Most Valuable
Learner-to-Content	13	Synchronous activities (online discussions) offer immediate assistance.	4	3.60	Moderately Valuable
	14	Asynchronous activities (assignments) offer immediate assistance.	4	3.54	Moderately Valuable
	15	Online activities improve subject understanding.	4	3.66	Moderately Valuable
	16	Online activities enhance critical thinking.	3.5	3.56	Moderately Valuable
	17	Able to use knowledge wisely in the learning process	4	3.70	Moderately Valuable
	18	Ease of online content is important.	4	3.86	Valuable
	19	An overview of content before class is important.	4	3.74	Moderately Valuable

Based on the highest mean score, the most valuable strategy is when the instructor’s teaching style involves students’ active participation. This is followed by the instructor using multiple communication tools to stay connected with students. Coming in close is being encouraged to keep engaging in online classrooms by the instructor and having ongoing interactions maintained after online classes. Another two engagement strategies that can be deemed as most valuable and important are having peer support to motivate finishing tasks and the ease of online content. In contrast, the least valuable engagement strategies, inferred from the lower mean scores, are the immediate assistance provided by asynchronous activities, having online activities enhance critical thinking, asking for help from peers, the idea that collaborative learning promotes understanding, and synchronous activities such as online discussions offering immediate assistance.

DISCUSSION AND CONCLUSION

The analysis of peer-to-peer interaction indicated that these UiTM students strongly believed in the benefits of collaborative learning for promoting peer-to-peer understanding. They reported greater engagement when allowed to work with their chosen peers for online activities, highlighting the importance of collaboration in promoting active participation in online learning environments. Peer support was also greatly valued, as respondents in general agree that receiving support from peers in completing tasks is motivating. In the aspect of learner-to-instructor interaction, students agreed on a teaching style involving active participation, and they reported that their instructor maintained ongoing interaction with them after their online class sessions. However, these students felt that the feedback on their performance was not always clear and positive, and the effectiveness and convenience of online platforms used during classes were perceived as moderate. Nonetheless, the students generally felt optimistic about their instructors’ use of communication tools to stay connected with them. Next, regarding learner-to-content interactions, students emphasised and agreed with the ease of online content and

obtaining an overview of the course content before learning sessions. Furthermore, these students reasonably agreed and perceived online activities as beneficial for improving their understanding of the subject matter and critical thinking skills. An important takeaway is that synchronous activities, such as online discussions, were perceived as more immediately helpful than asynchronous activities, such as doing assignments.

The outcome of the study is aligned with several previous studies. Firstly, it corroborates the importance of having peer support, group activities, and solving problems faster when together with peers (collaborative learning), as proposed by Sadykova (2014) and Sato & Ballinger (2016). In addition, it upholds the importance of having an instructor who promotes active participation, bringing attention to teaching styles (Moore's Transactional Distance Theory, 1997; Mohammed et al. (2017); Sun et al., 2022). Next, the study substantiates the need for content accessibility, ease of use, being engaged with the content or 'cognitive presence,' and the types of activities found useful (Garrison et al.'s Community of Inquiry model, 2000; Iturbe-LaGrave, 2020; Martin & Bolliger, 2018; Thach, 2018; Chen et al., 2017).

However, the findings on preferred interaction and engagement patterns should not be generalised to students from other universities as they are specific to students from UiTM Selangor. The results of the study suggest that instructors should encourage peer-to-peer interaction and collaboration among students as cooperative learning promotes peer-to-peer understanding and engagement, which occurs when students are allowed to work with peers of their choice. Incorporating synchronous activities, like online discussions, that offer immediate assistance to students and enhance their understanding of the subject matter. Additionally, instructors should focus on their teaching style and communication style with students through multiple communication tools to stay connected. Plus, providing clear and positive feedback on their students' performance encourages the students to complete tasks. Instructors should also ensure that online platforms used in the class are effective and convenient for the students, whereby there are clear instructions on how to navigate the platform, ensuring that the content is easy to access and understand. Lastly, instructors should design activities that challenge students to think critically and engage with the course content. Ultimately, adopting an integrated, student-centred pedagogical model such as The Trifecta of Student Engagement (Leslie, 2020), which emphasises engagement with course content, peers and instructors can significantly enhance the online learning experience at UiTM. By incorporating these strategies into online teaching, instructors can create a positive learning environment that promotes engagement, collaboration, and critical thinking.

SUGGESTIONS FOR FUTURE RESEARCH

Future research should focus on identifying the specific approaches that enhance interaction and engagement for students at UiTM Selangor in their online learning classes. This involves investigating the effectiveness of various synchronous and asynchronous activities in both online and hybrid environments. Comparative analysis could assess the impact of activities like online discussions, group projects, and assignments on student learning outcomes and engagement. Additionally, future research could investigate the role of instructor feedback and support in online and hybrid learning environments, specifically examining the impact of feedback on student performance and motivation. Finally, future research could explore the impact of online learning environments on different types of learners, such as those with different learning styles or from diverse cultural backgrounds, to identify strategies for promoting inclusivity and equity in online education.

ACKNOWLEDGEMENTS

We wish to thank our survey participants, colleagues, and acquaintances who have contributed directly and indirectly to our research project.

REFERENCES

1. Abdul Kadir, Z. (2023). Student Engagement in Online Language Learning: A Study at Universiti Tun Hussein Onn Malaysia. *Journal of Social Transformation and Regional Development*, 5(1), 33-39. <https://publisher.uthm.edu.my/ojs/index.php/jstard/article/view/14538>
2. Acarturk, C., & Ozcelik, E. (2016). Secondary-task effects on learning with multimedia: An investigation through eye-movement analysis. *The Journal of Experimental Education*, 85, 126–141. doi:10.1080/

00220973.2016.1143793

3. Aghaee, N. & Keller, C. (2016). ICT-supported peer interaction among learners in bachelor's and master's thesis courses. *Computer Education*, (94), 276–
<http://dx.doi.org/10.1016/j.compedu.2015.11.006>
4. Ally, M. (2004). Foundations of educational theory for online learning. In Terry (Ed.), *The theory and practice of online learning* (pp. 3–31). (2nd ed). Athabasca University.
5. Aixia, D., & Wang, D. (2011). Factors influencing learner attitudes toward e-learning and development of e-learning environment based on the integrated e-learning platform. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 1(3), 264.
6. Batten, R.A, Clark, F., & Hoque, M.E (2019). Upskilling together: How peer interaction influences speaking skills development online. 8th International Conference on Affective Computing and Intelligent Interaction (ACII). <https://hoques.com/Publications/2019/2019-Upskilling-Baten-et-al-ACII.pdf>
7. Benson, A. (2002). Using online learning to meet workforce demand: A case study of stakeholder influence. *Quarterly Review of Distance Education*, 3(4), 443–452
8. Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research*, 79, 1243–1289. doi:10.3102/0034654309333844
9. Buelow, J.R., Barry, T., & Rich, L.E. (2018). Supporting learning engagement with online students. *Online Learning*, 22(4), 313– doi:10.24059/olj.v22i4.1384
10. Carliner, S. (2004). *An overview of online learning* (2nd ed.) Human Resource Development Press.
11. Chen, J. J., Xu, J. L., Tang, T., & Chen, R. C. (2017). WebIntera-classroom: an interaction-aware virtual learning environment for augmenting learning interactions. *Interactive Learning Environments* 15 (6), 792–807.
12. Chiu, T.K.F. & Hew, T.K.F. (2018). Factors influencing peer learning and performance in MOOC asynchronous online discussion forums. *Australasian Journal of Educational Technology*, 34(4), 16–28. <https://doi.org/10.14742/ajet.3240>
13. Chiu, T. K. (2022). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. *Journal of Research on Technology in Education*, 54 (sup1), S14-S30. <https://doi.org/10.1080/15391523.2021.1891998>
14. Cohen, J., Brown, A. & Redmond, P. (2022). Five key elements that drive student online engagement. <https://www.timeshighereducation.com/campus/five-key-elements-drive-student-online-engagement>
15. Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of online community. *Journal of Distance Education*, 17(1), 1–19
16. Conrad, D. (2006). E-Learning and social change: An apparent contradiction. In Beaudoin (Ed.), *Perspectives on higher education in the digital age* (pp. 21–33). Nova Science Publishers.
17. Delwis, C., Adib Sarkawi, Aiza Johari, Chachil, K., & Affidah Morni. (2024). The online classroom, a place where no virus can enter: UiTM Sarawak undergraduates' engagement during the COVID-19 pandemic. *International Journal of Service Management and Sustainability*, 9(1), 63-76. <https://10.24191/ijsms.v9i1.24197>
18. Dhawan, S. (2020). Online learning: A panacea in the time of Covid-19 Crisis. *Journal of Educational Technology Systems*. 49 (1), 5– <https://journals.sagepub.com/doi/pdf/10.1177/0047239520934018>
19. Faddliza Mohd Zaki, Nurhidayah Nasharudin, Zailani Shafie, Amirah Abu Hassan, Muhammad Noor Hussin, & Noor Azila Mohd Zaid. (2023). Revealing students' emotional engagement in class: An online distance learning (ODL) perspective. *Journal of Academia*, 11, 113-119.
20. Falloon, G. (2011). Making the connection: Moore's Theory of Transactional Distance and its relevance to the use of a virtual classroom in postgraduate online teacher education. *Journal of Research on Technology in Education*. International Society for Technology in Education. 43(3), 187–
21. Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74 (1), 59-109
22. Fraszczyk, A., & Piip, J. (2020). Barriers to eLearning in rail. *Transportation Research Procedia*, 48, 168-186. <https://doi.org/10.1016/j.trpro.2020.08.014>
23. Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, 7(2), 95-10. <https://doi.org/10.1016/j.iheduc.2004.02.001>

24. Garrison, D.R., Anderson, & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The internet and higher education*, 2(2-3), 87-105. https://operations.du.edu/sites/default/files/202005/Garrison_Anderson_Archer_Critical_Inquiry_model.pdf
25. Güllü, F., Kuusik, R., Shogenov, K., Laanpere, M., Oysal, Y., Sözcü, Ö. F., & Parlak, Z. (2016). An analysis and comparison of adoption of e-learning systems in higher education by lecturers at largest universities in Estonia and Turkey. *Baltic Journal of Modern Computing*, 4(3)
26. Guilar, J., & Loring, A. (2008). Dialogue and community in online learning: Lessons from Royal Roads University. *Journal of Distance Education*, 22(3), 19–40
27. Hew, K. F. (2016). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCs? *British Journal of Educational Technology*, 47(2), 320–341
28. Hiltz, S. R., & Turoff, M. (2005). Education goes digital: The evolution of online learning and the revolution in higher education. *Communications of the ACM*, 48(10), 59–64, doi:10.1145/1089107.1089139
29. Hollister, B., Nair, P., Hill-Lindsay, S. & Chukoskie, L. (2022). Engagement in online learning: Student attitudes and behaviour during COVID-19. Sec, digital learning and innovations. *Frontiers Education*, 7. <https://doi.org/10.3389/educ.2022.851019>
30. Iturbe-LaGrave, V. (2020). DU inclusive teaching practices website: The Community of Inquiry Model module. <http://inclusive-teaching.du.edu/community-inquiry-model>
31. Johan @Eddy Luaran et al. (2014). A study on the student's perspective on the effectiveness of using e-learning. *Procedia: Social and Behavioral Sciences*. 123 (2014). 139–144. <https://www.sciencedirect.com/science/article/pii/S1877042814014451/pdf?md5=31dc256a1047b49f273889d12ef96800&pid=1-s2.0-S1877042814014451-main.pdf>
32. King, F., Young, M. F., Drivere-Richmond, K., & Schrader, P.G. (2001). Defining distance learning and distance education. *AACE journal*, 9(1), 1–14
33. Lantolf, J. & Thorne, S. L. (2007). Sociocultural Theory and Second Language Learning. In B. van Patten & J. Williams (eds.), *Theories in Second Language Acquisition* (pp. 201–224). Lawrence Erlbaum.
34. Leslie, H.J. (2020). Trifecta of student engagement: A framework for an online teaching professional development course for faculty in higher education. *Journal of Research in Innovative Teaching & Learning*, 13 (2), 149–173
35. Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, 22(1), 205–222. <http://doi.dx/10.24059/olj.v22i1.1092>
36. Masitah Abu Kassim, Tengku Norbaya Tengku Azhar, Muhamad Rahimi Che Hassan, Nur Syakireen Ishak, Norhafizah Mohd Zazi, & Khaniza Hasliza Abdul Khalil. (2024). Student's engagement on online biology teaching and learning: in the perspective of constructivism theory. *International Journal of e-Learning and Higher Education (IJELHE)*, 19(2), 197-210
37. McLeod, S. A. (2014). Lev Vygotsky. www.simplypsychology.org/vygotsky.html
38. Mohammed Alhih, Ossiannilsson, E., & Muhammet Berigel (2017). Levels of interaction provided by online distance education models. *EURASIA Journal of Mathematics Science and Technology Education*. 13 (6), 2733-2748. <https://www.ejmste.com/download/levels-of-interaction-provided-by-online-distance-education-models-4795.pdf>
39. Moore, M. (1997). Theory of transactional distance. In Keegan, D. (Ed.), *Theoretical principles of distance education* (1997) (pp. 22–38). Routledge.
40. Mukuni, K., Asante, D., & Almunive, W. (2020). Gender differences in student perception of the role of learner-content interactions on their engagement in online courses. *43rd Annual Proceedings Vol 1: Research and Development*. https://members.aect.org/pdf/Proceedings/proceedings20/2020/20_24.pdf
41. Newby, T., Stepich, D., Lehman, J., & Russell, J. (2000). *Instructional technology for teaching and learning: Designing instruction, integrating computers, and using media* (2nd ed.). Prentice-Hall.
42. Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the next generation*. EDUCAUSE. <http://net.educause.edu/ir/library/pdf/pub7101.pdf>
43. Owusu-Agyeman, Y., & Larbi-Siaw, O. (2018). Exploring the factors that enhance student-content interaction in a technology-mediated learning environment. *Cogent Education* 5: 1456780, 1–21
44. Paulsen, J., & McCormick, A. C. (2020). Reassessing disparities in online learner student engagement in

- higher education. Educational researcher, 49(1), 20–
https://doi.org/10.3102/0013189X19898690open_in_new
45. Rodrigues, H., Almeida, F., Figueiredo, V., Lopes, S., L. (2019). Tracking e-learning through published papers: A systematic review. *Computer and Education*, 136, 87–98.
46. Sadeghi, M. (2019). A shift from classroom to distance learning: Advantages and limitations. *The International Journal of Research in English Education*. 4(1), 80– <https://ijreeonline.com/article-1-132-en.html>
47. Sadykova, G. (2014). Mediating knowledge through peer-to-peer interaction in a multicultural online learning environment: A case study of international students in the US. *International Review of Research in Open and Distributed Learning*, 15(3), 24– <https://doi.org/10.19173/irrodl.v15i3.1629>
48. Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student engagement in online learning in Latin American higher education during the COVID-19 pandemic: A systematic review. *British Journal of Educational Technology*, 53(3), 593-619. <https://doi.org/10.1111/bjet.13190>
49. Sangrà, A., Vlachopoulos, D., Cabrera, N. (2012). Building an inclusive definition of e-learning: An approach to the conceptual framework. *International Review of Research in Open Distributed Learning*, 13 (2), 145–159.
50. Sato, M., & Ballinger, S. (Eds.). (2016). *Peer interaction and second language learning: Pedagogical potential and research agenda*. John Benjamins Publishing Company. <https://doi.org/10.1075/llt.45>
51. Sediqi, S. (2022). Re: What does higher mean indicate in SPSS? https://www.researchgate.net/post/what_does_higher_mean_indicate_in_SPSS/6308619712ba5fc8a905d1f0/citation/download
52. Soon, C. T., Kim, L. C., Lian, L. Y., Abd Rahim, S. and Ramli, S. A. (2022) “Language Learning Engagement Among Malaysian Undergraduates During MCO 1.0”, *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(7), p. e001619. doi: 10.47405/mjssh.v7i7.1619.
53. Spitzer, M. W. H., Gutsfeld, R., Wirzberger, M., & Moeller, K. (2021). Evaluating students’ engagement with an online learning environment during and after COVID-19 related school closures: A survival analysis approach. *Trends in Neuroscience and Education*, 25, 100168. <https://doi.org/10.1016/j.tine.2021.100168>
54. Sun H-L, Sun T, Sha F-Y, Gu X-Y, Hou X-R, Zhu F-Y and Fang P-T (2022) The Influence of Teacher-Student Interaction on the Effects of Online Learning: Based on a Serial Mediating Model. *Frontiers in Psychology*. 13:779217. doi: 10.3389/fpsyg.2022.779217
55. Thach, P. N. (2018). Learner-content interaction in an online English learning course at a Vietnamese university. *VNU Journal of Foreign Studies* 34(5), 137–148
56. Volery, T., & Lord, D. (2000). Critical success factors in online education. *International Journal of Educational Management*, 14(5), 216–223
57. Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Harvard University Press.
58. Wang, M. (2007). Designing online courses that effectively engage learners from diverse cultural backgrounds. *British Journal of Educational Technology*, 38(2), 294–311
59. Xia, J., Fielder, J., & Siragusa, L. (2013). Achieving better peer interaction in online discussion forums: A reflective practitioner case study. *Issues in Educational Research*, 23(1), 97–113. <http://www.iier.org.au/iier23/xia.html>
60. Xiao, J. H. (2017). Learner-content interaction in distance education: The weakest link in interaction research. *Distance Education*, 38(1), 123–135
61. Zimmerman, T.D. (2012). Exploring Learner to Content Interaction as a Success Factor in Online Courses. *The International Review of Research in Open and Distance Learning* 13(4), 152–165