

## Instructional Support, Peer Support, Technical Support, and E-learning Experience: The Mediating Effect of Learning Motivation

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### ABSTRACT

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A series of total lockdowns due to the latest pandemic has changed the entire landscape of the education system worldwide. Online learning became the lifeline to ensure the continuity of teaching and learning amid and beyond the pandemic. It plays a vital role in addition to the existing educational setting. This study aims to investigate the relationship between instructional support, peer support, technical support, and e-learning experience. The mediating effect of learning motivation on instructional, peer, and technical support was also examined. The data was collected from 191 respondents using an online survey. A mediation analysis was conducted to examine the mediating effects of learning motivation on instructional support, peer support, technical support, and e-learning. It was found that peer support has a stronger relationship with e-learning experience, followed by instructional support and technical support. The results also found learning motivation as an important element for a meaningful e-learning experience among students. Therefore, instructors, education institutions, and students should work together for a more engaging and meaningful e-learning experience. The incorporation of necessary technologies, course design, strategies, appropriate attitude, and learning motivation are crucial for the success of e-learning.

**Contribution/Originality:** This study contributes to the existing literature by examining the role of different types of support in the e-learning experience. It was found that peer support has a prominent role in the e-learning experience by encouraging active social connection, creating a sense of belonging, and meaningful achievement among e-learners.

### 1. Introduction

Online learning or e-learning has become significantly important for the survival of the education system. Due to the pandemic and a series of total lockdowns imposed in 2020, e-learning has become a staple of the education system (Han & Geng, 2023; Mumin,

2022). Education institutions, instructors, and students were forced to embrace online and distance learning without proper preparation. Knowledge acquired through lectures, readings, and e-learning activities facilitated by instructors is the basis for individual and team-based learning (Schmid, Borokhovski, Bernard, Pickup & Abrami, 2023). Therefore, independent learning and active online interactions between instructors and fellow students are the key to successful e-learning (Means, Toyama, Murphy & Bakia, 2013).

Higher education institutions invest millions in Learning Management Systems (LMS) and e-learning technologies. The combination of LMS, e-learning, and traditional learning can strengthen the education system through the implementation of blended learning (Sulong & Mumin, 2023). Nevertheless, student service centers that provide a wide range of technical support are eminent in creating a conducive digital learning environment (Azila-Gbettor, Abiemo & Glate, 2023). Continuous assessment of the quality of technical support provided by the education system is also crucial to ensure the utilization of online courses, engagement, and satisfaction among online learners (Azila-Gbettor, Abiemo & Glate, 2023; Johnson, 2017; Joo, So & Kim, 2018). Moreover, time devoted to improving the necessary platform for delivering and sharing teaching materials can lead to a better experience and positive attitude towards e-learning.

E-learning relies a lot on instructional support to develop higher-order thinking and encourage persistence among students (Fryer & Bovee, 2018; Johnson, 2017). Instructional support consists of informational support and process guidance (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). Informational support reflects a teacher-driven approach while process guidance emphasizes more on open self-directed learning (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). Informational support reduces social participation due to the instructor's directive presence, while process guidance that encourages an open, supportive, and interactive learning process increases participation (Ifinedo, Pyke & Anwar, 2018). Instructor facilitation of relevant tasks will encourage learning and be perceived as socially beneficial among learners. Due to the contradictory findings from previous research (Ginns & Ellis, 2009; Han & Geng, 2023; Ifinedo, Pyke & Anwar, 2018), further investigation is needed to assess the influence of instructional support on e-learning experience among students in the higher education institutions.

Socio-constructivist emphasize the importance of peer support through authentic and active interaction in the learning environment (Porcaro, 2011). Active interaction and peer support can increase the feeling of connectedness in e-learning (Joksimović et al., 2018). Peer support is an important external motivator in the acceptance of technologies and e-learning among students (McGill & Klobas, 2009; Lai, Wang & Lei, 2012). However, a study on the effectiveness of e-learning from students' perspective found no significant effect of peer support (Ifinedo, Pyke & Anwar, 2018). The results could be caused by inadequate perceived level of peer support among participants involved in that study.

Although a variety of forms of support have a significant effect on the e-learning experience, the relationship can be mediated by the student's learning motivation. Motivation is a crucial force that guides student's learning process (Chen & Jang, 2010). Learning motivation influences self-determination and self-efficacy among students involved in e-learning (Deci & Ryan, 2012; Lynch, 2006). Emotional states such as enjoyment are related to students' perceived usefulness of technologies (Stephan, Markus & Gl'aser-Zikuda, 2019), while anxiety can be linked to frustrating experiences

with technologies (Crocker & Mazer, 2019). Previous research also suggested that self-efficacy can enhance positive perceptions of support among online learners (Wang, Han, Liu & Xu, 2021; Zalazar-Jaime, Moretti, García-Batista & Medrano, 2021). Student's emotional state and self-efficacy which are important predictors of learning motivation were reported to have a significant influence on e-learning performance (Han & Geng, 2023). Therefore, this study aims to investigate the relationship between technical support, instructional support, peer support, and e-learning experience. The mediating effect of learning motivation on technical, instructional, peer support, and e-learning will also be examined in this study.

## 2. Literature Review

E-learning is not a novel approach to education. However, it started gaining popularity due to the total lockdowns imposed to curb the spread of the pandemic (Mumin, 2022; Sulong & Mumin, 2023). Students, instructors, and education institutions had to embark on the uncharted territories of distance learning and e-learning. The acceptance of e-learning depends on access to technologies and computer abilities (Ibrahim, Al Raddadi, AlDarmasi, Al Ghamdi, Gaddoury, AlBar & Ramadan, 2021). It was reported that instructional support and technical support are equally important in ensuring the effectiveness of e-learning (Sharif-Nia, Allen, Arslan, Reardon, She, Ghahrani, Rahmatpour & Fomani, 2023).

E-learning is a complex process that relies heavily on active online interaction among those involved in obtaining and creating creative and meaningful knowledge (Alt, 2015; Eryilmaz, Ryan, van der Pol, Kasemvilas & Mary, 2013). The Social Constructivists assess the e-learning process using six elements consists of information relevance, communication with the system, reflective thinking, instructor support, peer support, and interpretation of messages (Taylor & Maor, 2000). Student's acceptance and attitude toward e-learning can also be shaped by various individual, social, and institutional factors (Cheng, 2011). Computer accessibility and competency, learning motivation, social supports, course content, and instructor's attitude significantly influence the e-learning experience (Ibrahim, Al Raddadi, AlDarmasi, Al Ghamdi, Gaddoury, AlBar & Ramadan, 2021; Ramírez-Correa, Arenas-Gaitan & Rond an-Cataluna, 2015; Zalat, Hamed & Bolbol, 2021).

According to Luo et al. (2019), active involvement in e-learning relies more on the interaction between students compared to the system used. However, a positive attitude among students can be cultivated through a properly defined mechanism that enhances information flow in responding to e-learning challenging tasks (Luo, Zhang & Zhang, 2019). In other words, active interaction between students and supporting systems is interdependent in determining the success of e-learning. The interactions between students in group discussions, projects, and coursework increase engagement and knowledge sharing (Qureshi, Khaskheli, Qureshi, Raza & Yousufi, 2021) which leads to better learning outcomes (Tsai, Ku & Campbell, 2021). Nevertheless, Molinillo et al. (2018) argued that there is very little impact of learner-learner interaction on their engagement and e-learning.

### 2.1. Supports and E-learning Experience

Previous research on e-learning found support from different parties has a significant influence on student's learning outcomes (Gao, Ou, Zhang, Ni, Zhou & Liao, 2021; Wilson,

Summers & Wright, 2020). Perceived learning support comprises of four components: course design, interaction with instructors, interaction with peers, and learning autonomy (Paechter, Maier & Macher, 2010). Support either among learners or from instructors is necessary for achieving meaningful e-learning experiences (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). The absence of peer support was reported to have a negative effect on online engagement among students of higher education institutions (Azila-Gbettor, Abiemo & Glate, 2023). Interactive technologies and well-planned instructional strategies can serve as a medium to encourage interaction at a higher cognitive level in e-learning (Mebane, Porcelli, Iannone, Attanasio & Francescato, 2008). Course design is strongly related to the e-learning experience (Joo, So & Kim, 2018), as well as the flexibility of selecting a learning pace and learning strategies (Wei, Saab & Admiraal, 2023).

## 2.2. Instructional Support and E-learning Experience

Instructional support is one of the prominent predictors of online and technology-supported learning environments (Chang et al., 2015). Pianta and Hamre (2009) define instructional support as a process of facilitating students in understanding course contents and providing responsive and constructive feedback. Instructional support involves discussion and well-structured course structures that motivate students to master learning materials and achieve learning objectives (Lee, Srinivasan, Trail, Lewis & Lopez, 2011). Learning engagement can be deepened through meaningful course content (Hmelo-Silver, Duncan & Chinn, 2007; Schenke, Lam, Conley & Karabenick, 2015). Whereas clear learning goals and cognitively challenging tasks can increase the level of confidence in intellectual abilities among students (Scherer, Nilsen & Jansen, 2016; Wagner, Göllner, Werth, Voss, Schmitz & Trautwein, 2016).

Kang and Im (2013) found a positive significant influence of instructional support on e-learning experience and learning satisfaction. Besides, instructional support is useful in developing high order thinking skills (Johnson, 2017) through a self-directed learning approach (Kim, Olfman, Ryan & Eryilmaz, 2014). It encourages persistence as well as enhancing learning in the game-based environment (Wouters & Van Oostendorp, 2013) and the ability to solve information-based problems (Brand-Gruwel & Gerjets, 2008). Effective course design should also motivate students' willingness to use the e-learning system (Martin, Ritzhaupt, Kumar & Budhrani, 2019) that requires experienced instructors (Ruzek, Aldrup & Ludtke, 2022). A selection of appropriate teaching strategies, technologies, and digital activities by instructors can increase the likelihood of student's satisfaction with e-learning (Angeli, 2005; Sharif-Nia, Allen, Arslan, Reardon, She, Ghahrani, Rahmatpour & Fomani, 2023).

Hypothesis 1: There is a significant relationship between instructional support and e-learning experience.

## 2.3. Peer Support and E-learning Experience

Group projects and peer-review tasks can be beneficial in developing communication and social connections among students. Mutual interactions among peers in discussion forums, exchanging information, offering feedback, and group cooperation significantly affect learning performance (Huisman, Admiraal, Pilli, van de Ven & Saab, 2018). Despite the positive result of learning from peers, some research believes it does not promote learning outcomes, but the collaboration only enhances students' performance and

competency (Day, Boatman, Kowollik, Espejo, McEntire & Sherwin, 2007). However, it could be difficult to achieve when the learning process is online.

Peer support may occur in the form of instruction related to course material and emotional encouragement (Chu & Chu, 2010). According to Chang et al. (2015), peer support originates from learner-learner interaction that involves support, collaboration, cohesiveness, affiliation, and relationships among fellow students (Lee, Srinivasan, Trail, Lewis & Lopez, 2011; Chang et al., 2015). It covers academic and non-academic assistance (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). Online peer support was found beneficial for the quality of the thesis among university students (Aghaee & Keller, 2016). Peer support was found to enhance the sense of belonging that established strong social ties among online learners in addition to academic gains (Rovai & Jordan, 2004). Therefore, peer support is essential to ensure the quality of the e-learning experience.

Hypothesis 2: There is a significant relationship between peer support and e-learning experience.

#### **2.4. Technical Support and E-learning Experience**

The higher educational institutions' support in facilitating the effectiveness of e-learning often comes in the form of technological infrastructure and digital resources (Azila-Gbettor, Abiemo & Glate, 2023). Previous studies found support from the institutions is vital for a successful online teaching and learning process (Johnson, 2017; Kibaru, 2018; Pedro & Kumar, 2020). Accessing e-learning material requires learners' ability to use online technologies and cope with technical problems (Song, Singleton, Hill & Koh, 2004). Therefore, technical support is crucial in creating supportive learning environments and facilitating the interaction between learners and content (Johnson, 2017).

Technical support can come from various sources such as instructors, peers, technical support staff, or the learning management system (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). Any educational institution needs to provide an efficient e-learning system that is equipped with the necessary learning resources and support. Technical support is extremely crucial in reducing the digital divide due to technology anxiety among learners (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019). Moreover, the quality of technology and technical support was found to have a significant influence on engagement in e-learning between learners and instructors (Zhang, Cao, Shu & Liu, 2020). Poor technology with frequent technical problems and slow response time was found to dampen students' participation in online courses (Sun, Tsai, Finger, Chen & Yeh, 2008).

Hypothesis 3: There is a significant relationship between technical support and e-learning experience.

#### **2.5. Learning Motivation and E-learning**

One of the enablers of a successful e-learning experience is learning motivation among students (Law, Lee & Yu, 2010). Despite attention to course design and learning context, learners' state of mind that motivates their learning process requires equal attention too (Law, Sandnes, Jian & Huang, 2009; Yin, Law & Chuah, 2007). Learning motivation is a persistent effort of a learner influenced either by internal or external factors due to environmental or situational variables (Amabile, Hill, Hennessey & Tighe, 1994; Law, Lee



& Yu, 2010; Ryan & Deci, 2010). Attitude, expectation, clear direction, rewards, and recognition were found to have significant motivating effects on learning (Law, Lee & Yu, 2010). Therefore, e-learning activities should be crafted to reinforce students' motivation and enhance the learning experience.

Hypothesis 4: Learning motivation mediates the relationship between instructional support, peer support, technical, and the e-learning experience.

### 3. Research Methods

Quantitative research was conducted to examine the two main objectives of this study. It allowed this study to generalize findings of empirical data for the hypotheses formulated based on the previous literature. Respondents were selected using purposive sampling. Three criteria of inclusion are full-time students, studying in higher education institutions, and having current or previous experience in e-learning. The criteria were established to ensure the findings of this study encapsulate the e-learning experience of students in higher education institutions.

The sample size of this study was determined using an a-priori sample size calculator for the structural equation model by Soper (2023). The minimum sample size recommended to detect the effect is 87 with an effect size of 0.1, desired statistical power level of 0.8, and probability level of 0.05. Data was collected from 191 respondents using an online questionnaire. The questionnaire consists of six sections that collect respondent's personal information, perceived instructional support, peer support, technical support, learning motivation, and e-learning experience. Respondents were assured that their personal information and responses would be treated with confidentiality and used strictly for this study.

Descriptive analysis was conducted using Statistical Package for Social Sciences (SPSS) version 28 to examine the background of the respondents involved. As for model estimation which involved assessment of the measurements model, structural model, and mediation analysis, SmartPLS version 4 was employed. The measurements construct reliability and validity, path coefficient, and bootstrapping results can be found in Table 2, Table 3, Table 4, and Table 5.

#### 3.1. Respondent

The respondents involved in this study were year one and two students. According to Table 1, most of the respondents are female representing 76.3 percent of respondents involved. Of 190 respondents, most of them are the Indigenous ethnic of Borneo with 32.6 percent followed by Malay (30 percent), Indians (21.1 percent), and Chinese (15.8 percent).

Table 1: Respondents' demographics

		Frequency	Percentage
Gender	Male	45	23.7
	Female	145	76.3
Ethnicity	Malay	57	30
	Chinese	30	15.8
	Indians	40	21.1
	Indigenous ethnic of Borneo	62	32.6

### 3.2. Measures

Students Support Scale (SSC) by [Han and Geng \(2023\)](#) was employed to assess instructional support, peer support, and technical support. Six (6) items were used to measure instructional support whereas peer support and technical support were measured with 5 items and 3 items respectively. Learning motivation was assessed with Learning Motivation Questionnaire consists of 8 items introduced by [Han and Geng \(2023\)](#). While E-Learning Scale (e-LS) was used to assess e-learning experience among respondents involved. e-LS is a 5-item measure introduced by Ginns and Ellis in 2009. A 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5) was employed to indicate the level of agreement for each item involved in this study.

All measures involved are reflective constructs. Therefore, Cronbach's alpha will be used to examine the reliability of the construct. Composite reliability was used to evaluate internal consistency while indicator reliability was assessed using average variance extracted (AVE). Referring to [Table 2](#), Cronbach's alpha of measures involved ranges from 0.862 to 0.936. The lowest composite reliability and AVE are 0.900 and 0.627 respectively. Hence, the values indicate there is no issue with the measures involved in this study.

Table 1: Measurement construct reliability and validity

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Instructional support	0.936	0.949	0.757
Learning motivation	0.914	0.931	0.627
Peer support	0.870	0.906	0.659
Technical support	0.893	0.934	0.824
E-learning	0.862	0.900	0.643

### 4. Results

[Figure 1](#) shows the structural model of this study. The variance inflation factor (VIF) value ranges from 1.699 to 4.389 which is lower than 5. It indicates there is no multicollinearity issue with the structural model of this study. Based on [Table 3](#), there are significant positive relationships between instructional support, peer support, technical support, and learning motivation. Peer support has a higher influence on learning motivation with a path coefficient of 0.329, followed by instructional support and technical support with a path coefficient of 0.248 and 0.198 respectively. However, all the relationships can be considered weak. [Table 3](#) also indicates a significant moderate relationship between learning motivation and e-learning with a path coefficient of 0.587.

Figure 1: The Structural model

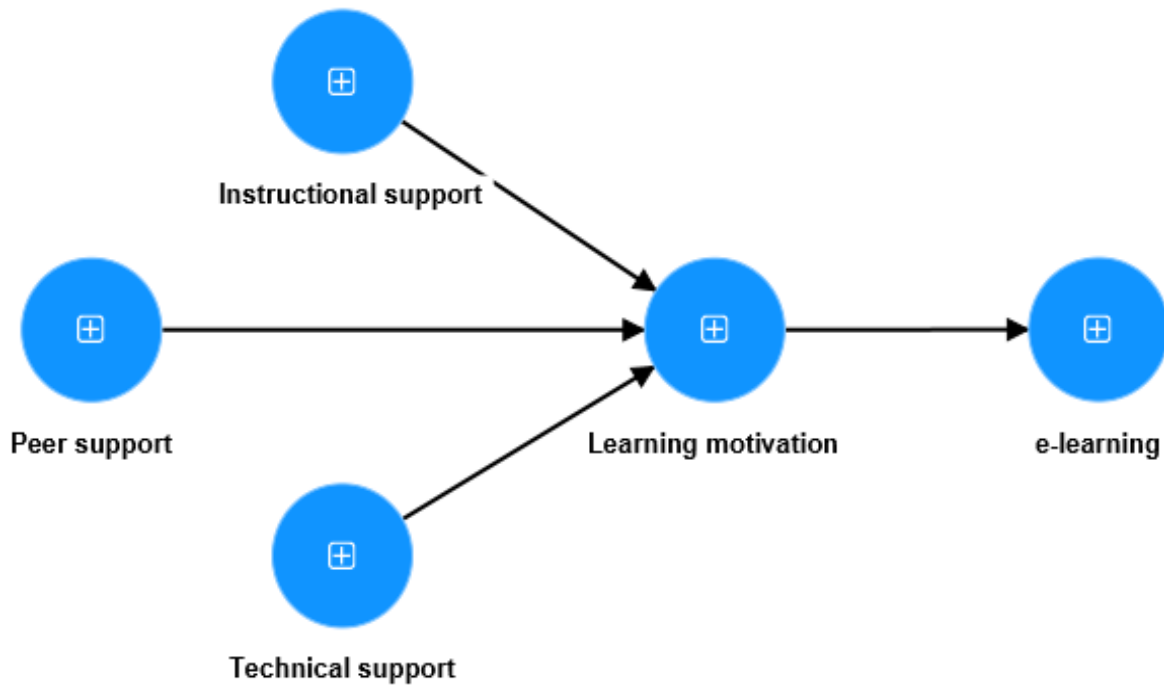


Table 3: Path coefficients, standard deviation, t-value, and p-value

	Path coefficient	Standard deviation (STDEV)	T statistics ( O/STDEV )	p-values
Instructional support -> Learning motivation	0.248	0.086	2.900	0.004
Learning motivation -> e-learning	0.587	0.057	10.233	0.000
Peer support -> Learning motivation	0.329	0.094	3.382	0.001
Technical support -> Learning motivation	0.198	0.081	2.526	0.012

#### 4.1. The mediating effect of learning motivation

A mediation analysis was conducted to examine the mediating effect of learning motivation on instructional support, peer support, technical support, and e-learning. There is a significant direct effect of instructional support, peer support, technical support, and e-learning with a path coefficient of 0.146, 0.193, and 0.118 respectively (Table 4). Based on Table 5, a statistically significant indirect effect was also found. These results suggest learning motivation mediates the relationship between instructional support, peer support, technical support, and e-learning experience. The results shown in Table 4 and Table 5 supported all four hypotheses proposed in this study. The summary can be found in Table 6.



Table 4: Bootstrapping results of the direct effects

	Path coefficient	Standard deviation (STDEV)	T statistics ( O/STDEV )	p-values
Instructional support -> e-learning	0.146	0.053	2.735	0.006
Peer support -> e-learning	0.193	0.058	3.221	0.001
Technical support -> e-learning	0.118	0.051	2.323	0.020

Table 5: Bootstrapping results of the indirect effects

	Path coefficient	Standard deviation (STDEV)	T statistics ( O/STDEV )	p-values
Instructional support -> Learning motivation -> e-learning	0.146	0.053	2.735	0.006
Peer support -> Learning motivation -> e-learning	0.193	0.058	3.221	0.001
Technical support -> Learning motivation -> e-learning	0.118	0.051	2.323	0.020

Table 6: Hypotheses testing

Hypothesis	
H1 There is a significant relationship between instructional support and e-learning experience.	Supported
H2 There is a significant relationship between peer support and e-learning experience.	Supported
H3 There is a significant relationship between technical support and e-learning experience	Supported
H4 Learning motivation mediates the relationship between instructional support, peer support, technical support, and e-learning.	Supported

## 5. Discussion

This study found a significant association between instructional support, peer support, technical support, and e-learning. The results indicate that the e-learning experience will increase with more instructional support, peer support, and technical support. However, the strength of the relationships is small. Peer support has a stronger relationship with e-learning experience, followed by instructional support and technical support. The findings are in line with several researchers conducted in the past on the association between perceived support and e-learning (Cocquyt, Zhu, Diep, De Greef & Vanwing, 2019; Schenke, Lam, Conley & Karabenick, 2015; Zhang, Cao, Shu & Liu, 2020).

Peer support seems to increase experience among students in e-learning. According to Rovai and Jordan (2004), peers provide social connections crucial in instigating motivation, a sense of belonging, and meaningful achievement in e-learning. Moreover, active interactions among learners through group tasks, forums, and assignments can cultivate social connectivity in online learning (Joksimović et al., 2018). However, it relies

on the technical support provided by the learning management system and education institutions. Social media and other communication technologies can also encourage interactions either formal or informal among e-learners. Frequent interactions can increase the sense of support and sense of belonging among students of the same course. Additionally, the sharing of information and exchanges of opinion among learners enhance their analytical thinking which heightens the e-learning experience.

Based on the current study, instructional support has a significant association in increasing the e-learning experience. Effective course design and teaching strategies can provide clear goals and learning outcomes to online learners which is in line with previous research by [Scherer, Nilsen, and Jansen \(2016\)](#). Moreover, well-structured instruction and constructive feedback create meaningful course content that leads to a perceived sense of support among the students involved ([Wei, Saab & Admiraal, 2023](#)). Instructional support motivates the engagement, confidence, and intellectual abilities of online learners which is important better experience of the e-learning process.

This study also found the positive role of technical support on the benefit of e-learning experience which was supported by previous studies. The serious lack of in-person interactions tends to be the most common challenge in e-learning. Therefore, technical support in the form of quality technological assistance and learning management systems. It requires full monetary and time commitment from the educational institutions. Technical support can ease the usage of online platforms which is crucial in determining total embracement of e-learning by instructors and learners. Accessible learning materials, interactive discussions among learners, and constructive feedback can increase participation that leads to more effective e-learning activities ([Ramírez-Correa, Arenas-Gaitan & Rond an-Cataluna, 2015](#); [Zalat, Hamed & Bolbol, 2021](#)). Therefore, education institutions should willingly invest in learning technologies to ensure higher engagement in online learning.

Another important objective of this study is to examine the mediating effect of learning motivation of e-learning. It was found that learning motivation has a significant mediating effect on the relationship between instructional support, peer support, technical support, and e-learning. The results indicate learning motivation is an important element for a meaningful e-learning experience among students. Despite the presence of different forms of support, a good e-learning experience will not occur without learning motivation. Learning motivation is the key to persistence that shapes attitudes towards the e-learning process. Self-motivation is extremely important to ensure learning occurs without interaction with peers and instructors in person. e-learning is a tricky path to maneuver without self-discipline and motivation.

## 6. Conclusion

In conclusion, support in the form of instructional or technical, as well as from fellow students plays an important role in the e-learning experience. Therefore, instructors, education institutions, and students should work together for a more engaging and meaningful e-learning experience. The incorporation of necessary technologies, course design, strategies, appropriate attitude, and learning motivation are crucial for the success of e-learning. Students need to acquire the right state of mind to develop self-discipline and persistence in e-learning. Peer support and instructional support will be extremely helpful in creating a more engaging learning environment and a sense of

belonging among e-learners. Therefore, further research is needed to investigate indicators of excellent e-learning experience among students.

Future research should focus on individual attributes that influence acceptance of e-learning among students. Despite being embraced by most of the learning community due to the latest pandemic outbreak, a minority still believe in-person interaction is a superior learning strategy to e-learning. Moreover, different level of education requires different strategies that can dampen the implementation of e-learning in the education system. Instructors' readiness, access to technologies, and available resources in different parts of the world should also be considered for future research on e-learning.

### **Ethics Approval and Consent to Participate**

Data for this study was obtained using an online survey that requires voluntary participation from respondents involved. Respondents were assured that this study does not entail any risks and all data will be kept strictly confidential. This study adheres to guidelines set by *Dasar Penyelidikan dan Inovasi Universiti Malaysia Sabah* and all applicable laws and regulation related to human research subjects were followed.

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### **Conflict of Interest**

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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