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Online Learning During COVID-19 Pandemic: The Mediating Role of Self-Efficacy in the Relationship Between Digital Literacy and Academic Performance

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Abstract

The widespread COVID-19 outbreak in 2020 has forced various organisations to transform their operations from traditional to more advanced approaches through digital technologies. Likewise, fast-changing technologies have also influenced the education system in higher learning institutions (HLI) on the importance of online learning and digital literacy. Earlier studies found several issues related to online learning. Although digital literacy was recognised as a fundamental component to improve students' performance, the extent to which it improves academic performance remains speculative. This study proposes a relationship between digital literacy and academic performance and highlights the influence of self-efficacy in the relationship. Using a survey method, data were gathered from accounting students studying at one of Malaysia's public universities. The SEMPLS results indicate a significant positive relationship between digital literacy and academic performance. There is also evidence of the indirect relationship between digital literacy and academic performance, which is influenced by self-efficacy.

Keywords: COVID-19, Digital literacy, Higher learning institution (HLI), Self-efficacy, Online learning

1. Introduction

Every now and then, the improvement of mixed media and data innovation has moved the teaching methodology to attract Gen-Alfa students in the digital age. Despite the students' inquisitiveness about its authenticity and isolated content, students also tend to integrate learning in a non-traditional way through product developments and are more creative in their own way of learning with less retention time. In colleges, online learning has advanced the options for classroom learning where students can gain better learning encounters and adaptability. Nevertheless, students' online learning performance can be significantly influenced by their digital literacy (Mohammadyari & Singh, 2015; Tang & Chaw, 2015), which refers to the ability to effectively plan and monitor the efficacy of searching and managing information as well as to retrieve and integrate information (Greene et al., 2014).

Although digital literacy essentially upgrades self-efficacy (Greene et al., 2014; Abbas, Hussain & Rasool, 2019) and enhances knowledge, the extent to which it influences

academic performance is still vague. According to Abbas et al. (2019) in their study, digital literacy has a significant effect on the communication skills, research skills, and confidence of students; however, it has an immaterial impact on student academic performance measured by Cumulative Grade Point Average (CGPA). Therefore, this calls for a study on the influence of digital literacy on students' academic performance. While digital technology has brought incredible benefits to current society, there are also indications that humanity, in some respects, is undermined by the way humans use technology (Yamamoto & Ananou, 2015). Hence, to gain benefits from technological development, technology must be used in a way that supports human cognition, social interaction, emotion, and ethics so as not to exploit the use of digital devices for something hostile. Accordingly, education can aid learners in positively utilizing innovative technology while minimizing its negative potential (Yamamoto & Ananou, 2015).

In distance learning, self-efficacy is crucial for motivating students to succeed and complete all tasks with minimal monitoring or guidance. As such, self-efficacy has been extensively discussed by previous researchers. According to Cicha et al. (2021), self-efficacy is among the most important factors influencing students' expectations in online distance learning, other than a sense of pleasure. Besides overcoming the influence of isolation or being alone in online distance learning, self-efficacy encourages a better learning experience through self-directed motivations, leading to excellent performance (Chu & Chu, 2010). Therefore, high self-efficacy has been associated with high self-motivation (Zimmerman, 2000), in addition to increased satisfaction and work perceptions (Machmud, 2018). According to Bandura (1993), people with high self-efficacy would succeed in their future undertakings owing to their high commitment to the task assigned with high aspirations. Students' self-efficacy is also enhanced through digital literacy, for instance, when choosing the appropriate e-learning tools while being isolated or connected (Yong, 2020).

While education within the digital age allows for the accessibility of information in any case of geological and social constraints, online learning also appears to be an excellent alternative to conventional classroom learning. Thus, through digital literacy, the open arrangement of academic materials empowers information sharing anywhere, anytime, and the digital age has indeed made a noteworthy commitment to education. The primary objective of this research is to examine the factor that influences students' academic performance during the COVID-19 pandemic whereby additional requirement of digital knowledge should be acquired to survive during the trying period. Thus, specifically, the research examines the influence of digital literacy on students' academic performance. Additionally, the research will also examine if there is any evidence of the mediating role of self-efficacy in the relationship between digital literacy and students' academic performance.

The paper is organised in the following order, beginning with the discussion of the literature review to gauge the overview of the prior findings on the learning methods align with the technological advancements in learning and the demand from the external environment. The discussion is integrated with the current research focusing on students' motivation and performance. The section is then followed by the development of hypotheses with reference to the current and prior literature and research framework. This is followed by the research

methodology, analysis of the data, and results. Finally, there are sections on the discussion of findings, conclusions, limitations of the study, and suggestions for future research.

2. Literature Review and Hypothesis Development

2.1 Online Learning

A form of learning that takes place in a web-based environment and includes all forms of electronic-assisted teaching and learning (Nagarajan & Jiji, 2010) is commonly referred to as online learning, distance learning, computer-based learning, computer-mediated learning, web-based learning, networked learning, or e-learning. Generally, online learning involves situations in which students are in a different geographical location, away from their institutions or other students. In the context of higher learning institutions (HLI), students are presumed to use online learning the most and have access to an online learning management system (LMS), which allows students to participate in online sessions, hold discussions, read instructors' posts, and access digital materials and resources.

Since the last decade, the use of web-based instruction in higher education has received growing attention owing to its significant impact on education. Universities, for instance, have effectively used online learning to enhance traditional forms of teaching and learning (Laurillard, 2004). Online learning is generally contingent on synchronous and asynchronous delivery methods. First, synchronous delivery refers to the ability to communicate at the same time, or specifically "two or more people in the same real or virtual space at the same time" (Chow, 2013, p 127). With the rapid technological advancement, the technology used for synchronous online learning has also evolved and produced numerous synchronous tools such as Blackboard CollaborateTM, (Blackboard Inc., 2016), Adobe ConnectTM, formerly Macromedia Breeze (Adobe Systems Inc., 2016), and WebEx Collaboration Suite (Cisco Systems Inc., 2016) (Butz & Stupnisky, 2016), which allow for simultaneous communication and collaboration in real-time where people from various geographical locations can be engaged at the same time. In the same vein, the synchronous environment gives students the impression of being in a more traditional classroom setting but through a web-based system where all students must be online at the same time and the class should be planned (Lynch, 2004).

On the other hand, asynchronous delivery in online learning allows for a more flexible schedule as learners can participate at times and places that are convenient for them. Besides, asynchronous delivery provides the learners with more time to think and reflect, as well as the ability to save and archive entire courses and conversations (Rudestam & Schoenholtz-Read, 2010). Among examples of asynchronous delivery that benefit its users, including students are e-mail, discussion boards, blogs, and wikis.

2.2 Digital Literacy and Academic Performance

The term "digital literacy" was first quoted and explained in the book of Gilster (1997) on Digital Literacy, which highlights that the idea of digital literacy is not only contingent on computer operation but also the concepts that people are good at. According to Martin and Madigan (2006), digital literacy involves discovering a mixture of digital learning ideas and

how these ideas are utilised and continued in different populations. While Jacobson and Mackey (2013) associated digital literacy with reasoning, ALA (2011), on the other hand, expressed digital literacy as a person's abilities (i.e., intellectual and technical talents) to discover, assess, make, communicate, and obtain information. Students' personal and professional goals advancement are associated with information skills such as their abilities to find information using digital tools, appraise information critically, and utilize information responsibly (Gui, 2007).

With the increased importance of the internet and the use of other digital environments as educational tools, research on digital literacy among learners has become increasingly essential (Greene, Seung, & Copeland, 2014). In view of digital literacy, Amiri (2009) concluded that digital literacy has a positive effect on students' academic performance and this finding was also supported by Brown (2009) in their study on the relationship between digital literacy and students' achievement. Meanwhile, Mohammadyari and Singh (2015) examined digital literacy relating to e-learning and performance and evidenced the significant impacts of digital literacy on users' performance and effort expectations, performance expectations on users' intentions to continue using Web 2.0 tools, and continuance intention on performance. These findings suggest that digital literacy facilitates the use of e-learning and, hence, should be considered when measuring performance.

Moreover, Abbas, Hussain, and Rasool (2019) examined the effects of digital literacy on the academic performance of students at the higher education level. Based on their results, digital literacy was found to significantly affect the students' communication skills, research skills, and confidence, but not the student's CGPA. Overall, the study concluded that students' CGPA is solely linked to the syllabus of the program and that CGPA could be improved upon the completion of assignments and other academic work. Therefore, Abbas, Hussain, and Rasool (2019) recommended that general universities incorporate various types of training, workshops, and seminars into learning to enhance students' interest in digital literacy to minimize the various barriers to digital literacy acquisition and practice.

In general, the two (2) essential aspects of digital literacy include (i) the ability to effectively plan and monitor the efficacy of strategies to search and manage information online, and (ii) the knowledge to appropriately retrieve and integrate information online. In this regard, advances in digital technology allow universities to promote online learning as an alternative to classroom learning, thereby providing students with a better learning experience and learning flexibility. Evidently, for online learning to be successful, students must first be digitally literate (Tang & Chaw, 2015) to enhance their academic performance. In view of the above arguments, the following hypothesis is predicted:

H1: Digital literacy has a positive relationship with academic performance.

2.3 Digital Literacy and Self Efficacy

Martin (2008) defined digital literacy as "awareness, attitude, and ability to use digital tools so as to identify, access, manage, integrate, and create new information through metacognitive skills." In this regard, digital literacy requires the ability to access, produce,

and share accurate information, including the use of technology in the learning-teaching process along with different technologies (Hamutoğlu, Canan-Güngören, Kaya-Uyanık, & Gür-Erdoğan, 2017). Digital literate individuals are typically creative and innovative; they can also cooperate and communicate efficiently, think critically, and solve problems through effective decision-making skills as they have an understanding of the technological concepts and use these concepts in fulfilling what they need as digital citizens (Ocak & Karakuş, 2018a).

Self-efficacy, on the other hand, refers to an individual's judgment and belief about how successful they can be in overcoming possible difficult situations in the future (Senemoğlu, 2018: 234). Bandura (1993) defined self-efficacy as "an individual's belief in his/her capacity to execute the activities necessary to do a particular job successfully." Thus, in the current context, self-efficacy denotes the belief in the learner's ability to successfully manage situations that may contain new and unpredictable elements (Gredler, 2017). In addition, individuals with a high self-efficacy level do not only put a lot of effort into accomplishing a task but they are also more persistent and perseverant to achieve the goal.

According to Aslan Serkan (2021), digital literacy self-efficacy can be defined as individuals' belief in choosing technological tools in accordance with their goals, in addition to knowing the features of these tools as well as organizing, developing, and using these tools. Accordingly, those with high digital literacy self-efficacy know which technological tools to use for a certain purpose. Besides attempting to recognize and solve these technological tools, they would also try to cope with the possible problems while using these tools and develop different solutions to these problems. Today, in line with the increasing significance of technology in educational platforms, various technological tools have been used in the teaching and learning process.

Therefore, it is imperative that students have high digital literacy and self-efficacy so that they can effectively use technological tools in the learning environment. Prior et al. (2016) in their study on attitude, digital literacy, and self-efficacy with online learning behaviour found that attitude and digital literacy have a significant positive effect on self-efficacy. While self-efficacy supports peer engagement, learning management system interaction, and course convener interaction, a positive attitude and digital literacy will enhance self-efficacy and, thus, enhances online learning behaviour. In view of the above arguments, the following hypothesis is predicted:

H2: Digital literacy has a positive relationship with self-efficacy.

2.4 Self-Efficacy and Academic Performance

As discussed earlier, self-efficacy plays a crucial role in facilitating an online learning environment. Self-efficacy, which refers to the trust level of an individual in their ability to complete a task, operation, action, or challenge (Alqurashi, 2016), is typically a personal variable that is considered a central factor in the sense of learning and student satisfaction in psychology disciplines (Alqurashi, 2018). Specifically, in the sense of learning, self-efficacy

helps to assess a student's level of trust in their ability to succeed in the learning process. Meanwhile, students who have a high degree of self-efficacy would see a challenging task as a mere challenge to develop their abilities rather than an obstacle to escape (Alqurashi, 2018), thus resulting in students' improvement and increased satisfaction.

Since high self-efficacy is generally associated with high self-motivation (Bandura, 1993; Zimmerman, 2000; Chu & Chu, 2010), those with a high self-efficacy level tend to achieve their goals successfully and have a powerless commitment to the assigned task. In view of the Learning Management System (LMS), Martin et al. (2010) developed the Learning Management System Self-Efficacy Survey (LMSES) to measure students' confidence in the LMS and explore the relationship between LMS self-efficacy and course performance for e-learners. Evidently, as expected, their findings indicated that students with higher LMS self-efficacy were more likely to have better course performance.

Landrum (2020) measured self-efficacy based on LMS efficacy and online learning self-efficacy, particularly in terms of student confidence as a predictor of satisfaction and perceived usefulness of online classes. Based on their results, the students were found to have greater confidence in online learning. As such, the students perceived online classes to be highly useful and this further results in students' satisfaction with the online LMS platform for the adoption of online learning strategies for academic performance. In view of the above arguments, the following hypothesis is predicted:

H3: Self-efficacy has a positive relationship with academic performance.

2.4 Mediating Role of Self-Efficacy in Digital Literacy and Academic Performance

Past studies have demonstrated the role of self-efficiency as a moderator. For instance, Appelbaum et al. (1996) examined the influence of self-efficacy on the personal goals of individuals and found that the congruency between personal goals and organizational goals, matched with strong self-efficacy beliefs will lead to high motivation and performance levels. Thus, strengthening self-efficacy beliefs through various external factors (e.g., information content and quality of task experience) and careful management of organizational goals may lead to higher motivation and organizational performance. Meanwhile, Maciejewski et al. (2000) examined whether self-efficacy mediates the effect of stressful life events on symptoms of depression and found that, for a person with prior depression, self-efficacy mediates 40% of the effect of dependent stressful life events on symptoms of depression.

In addition, Nauta (2004) examined self-efficacy as a mediator of five personality and career interest relationships, namely openness-investigative, openness-artistic, agreeableness-social, extraversion-social, and extraversion-enterprising. As evidenced in the study, all personality-interest relationships were significant, except for the extraversion social relationship in which no mediation occurred. Finally, Strobel et al. (2011) examined the mediating role of self-efficacy in linking personality factors and two components of subject well-being, namely life satisfaction and subjective happiness, and found that all personality factors (neuroticism, extraversion, openness, and conscientiousness) influence life satisfaction as mediated by self-efficacy. Furthermore, self-efficacy also mediates the

openness and conscientiousness factors, but not those of neuroticism and extraversion, on subjective happiness.

In view of the possibility that self-efficacy is a strong predictor of both motivation and performance, the current study predicts the role of self-efficacy in mediating the relationship between digital literacy and academic performance based on the following hypothesis:

H4: Self-efficacy mediates the relationship between digital literacy and academic performance.

2.5 Research Framework

The following conceptual model depicts the connections among the independent variable (digital literacy), dependent variable (academic performance), and mediating variable (self-efficacy) in this study. Specifically, the study proposes that self-efficacy serves as a mediator in the relationship between digital literacy and academic performance. The conceptual model is drawn from the literature related to digital literacy, self-efficacy, and academic performance as discussed above.

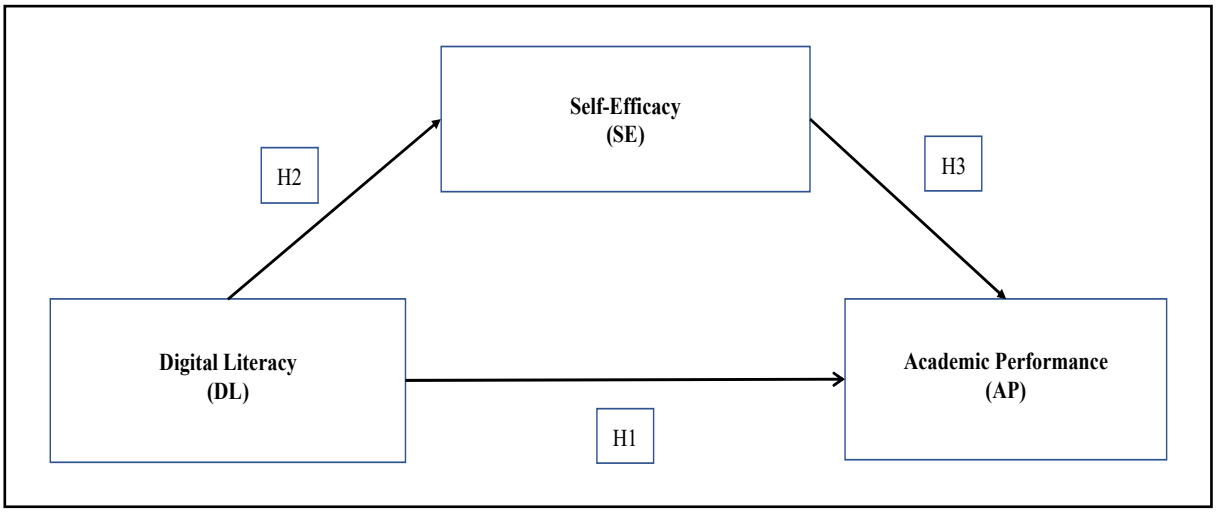

Figure 1. Research Framework

3. Research Methodology

3.1 Sample Selection and Data Collection

Students from a public university in Malaysia who are pursuing a Diploma and bachelor's degree in accounting were chosen as the sample. The public university has the biggest number of accounting degree program in the country. Thus, this research would provide empirical evidence significant for specific field of study that is the accounting field. Data were collected using an online survey that was randomly sent to potential respondents and a total of 115 responses were received. After the data screening process, a total of 106 responses were used for further analysis using Statistical Package for the Social Sciences (SPSS) Version 28 for the preliminary analysis, followed by Partial Least Square (PLS), which is a type of Structural Equation Modelling for the hypothesis testing using SmartPLS Version 3.0.

3.2 Measurement of Variables

In this study, a survey instrument was used, and the survey was structured into four (4) sections: Sections A, B, C, and D. First, Section A measures the dependent variable of students' academic performance, which consists of 2 items related to the respondents' opinions on whether online learning has helped them improve their academic performance or otherwise. Subsequently, Section B measures the independent variable of digital literacy. According to Tang and Chaw (2016), digital literacy is a prerequisite for students to be effective in the online learning process; hence, 11 items adapted from Ng (2012) were used to measure digital literacy. Next, Section C measures the mediating variable of self-efficacy using 24 items adapted from Muris (2001) and, finally, Section D requires the respondents' demographic information such as gender, age, work experience, academic integrity pledge awareness, current program, and mode of study. Table 1 provides a summary of the measurement of variables. Prior to the actual data collection, a pilot study was conducted to determine whether the items outlined in the survey are useful to eliminate any ambiguity about the instrument. Besides ensuring the validity and quality of a research instrument (Al-Khamaiseh et al., 2019), a pilot test is also important to ensure that the items can be easily understood by the respondents (Sekaran & Bougie, 2016).

Table 1. Summary of Measurement of Variables

Variables	No. of Items	Measurement	References
Dependent Variable:			
Students' Academic Performance	2	5-point Likert Scale	Students' opinions on their academic performance
Independent Variable:			
Digital Literacy	11	5-point Likert Scale	Ng, W. (2012)
Mediating Variable:			
Self-efficacy	24	5-point Likert Scale	Muris (2001)
Total	37		

5. Results and Discussion

5.1 Descriptive Statistics

Table 2 shows the students' demographic information such as gender, age, work experience, academic integrity pledge awareness, current program, and mode of study. Based on the table, the study has more female (n = 74, 69.8%) than male respondents (n = 32, 30.2%). In terms of the age range, 85 (80.2%) students are 20 to 30 years old, and 15 (14.2%) students are 31 to 40 years old. Subsequently, 43.4% (n = 46) of the students have 1 to 5 years of work experience, and 9 students (8.5%) have 6 to 10 years and 11 to 15 years of work experience, respectively. In terms of academic integrity pledge awareness, 96.2% (n = 102) of the students indicated "Yes" and the rest indicated "No" (n = 4, 3.8%). Besides, 92.5% (n = 98) of the students are pursuing their bachelor's degree and 7.5% (n = 8) are pursuing their diploma, while 63 (59.4%) students are studying part-time and 43 (40.6%) are studying full-time.

Table 2. Students' Demographic Information (n = 106)

Variable	Category	Respondents	Percentage (%)
Gender	Male	32	30.2
	Female	74	69.8
Age (Years Old)	20 - 30	85	80.2
	31 - 40	15	14.2
	40 - 50	6	4.7
Work Experience (Years)	0	35	33.0
	1 - 5	46	43.4
	6 - 10	9	8.5
	11 - 15	9	8.5
	> 15	7	6.6
Academic Integrity Pledge Awareness	No	4	3.8
	Yes	102	96.2
Current Program	Degree	98	92.5
	Diploma	8	7.50
Mode of Study	Full-time	43	40.6
	Part-time	63	59.4

Table 3 shows the descriptive statistics of the main variables, which were measured on an interval scale from 1 (strongly disagree) to 5 (strongly agree). To understand the data distribution, the standard deviation was calculated, and skewness and kurtosis values were used to measure the normality of the data, which should fall between − 1 and + 1 (Hair et al., 2017). Since both skewness and kurtosis values are within the acceptable range, the pattern of responses in this study entails a normal distribution.

Table 3. Descriptive Statistics of Main Variables

Variable	Min	Max	Mean	Standard Deviation	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
Digital Literacy	2.29	5.00	4.024	0.639	-0.342	0.235	-0.273	0.465
Self-Efficacy	2.09	5.00	3.774	0.647	0.074	0.235	-0.427	0.465
Academic Performance	1.00	5.00	3.467	1.130	-0.335	0.235	-0.688	0.465

5.2 Measurement Model Evaluation

To determine the reliability and validity of each variable in the research framework, i.e., digital literacy, self-efficacy, and academic performance, the measurement model was first evaluated. The adequacy of the measurement model is based on the assessment of reliability, convergent validity, and discriminant validity, including the indicator loadings, composite reliability, and average variance extracted.

Table 4. Evaluation of Measurement Model

Variable	Items	Loadings	Cronbach's Alpha	CR	AVE
DL	DL1	0.742	0.929	0.940	0.589
	DL2	0.782			
	DL3	0.776			
	DL4	0.815			
	DL5	0.792			
	DL6	0.755			
	DL7	0.775			
	DL8	0.825			
	DL9	0.767			
	DL10	0.790			
	DL11	0.602			
SE	SE2	0.659	0.929	0.937	0.438
	SE3	0.647			

	SE5	0.659			
	SE6	0.669			
	SE7	0.717			
	SE8	0.632			
	SE9	0.708			
	SE10	0.704			
	SE11	0.619			
	SE12	0.701			
	SE15	0.639			
	SE16	0.623			
	SE18	0.661			
	SE19	0.639			
	SE20	0.642			
	SE21	0.692			
	SE22	0.627			
	SE23	0.674			
	SE24	0.651			
AP	AP1	0.960	0.924	0.963	0.930
	AP2	0.968			

DL = Digital Literacy; SE = Self-efficacy and AP = Academic Performance

Based on the reliability and validity test results in Table 4, the values of Cronbach's alpha and composite reliability (CR) have met the requirement for evaluating the measurement model. A reliability score of 0.70 is accepted as a minimum value (Hair et al., 2017); thus, a higher indicator value implies higher reliability in the measurement model. Evidently, all variables of students' academic performance, digital literacy, and self-efficacy have a Cronbach's alpha value of more than 0.7 and a CR value exceeding the 0.70 thresholds, thus indicating that the variables are reliable (Hair et al., 1998; Henseler et al., 2009). Therefore, the analysis results presented in Table 4 above are accepted in this study.

Meanwhile, the AVE values of all variables are at least 0.40, which meets the convergent validity requirement. The requirement for discriminant validity has also been met since most loadings are above the threshold of 0.60 (Chin, 2013). However, of all items used for the

measurement of variables, Items SE1, SE4, SE13, SE14, and SE 17 were removed as the loadings are less than 0.60. Table 5 below shows the assessment results for discriminant validity. In discriminant validity, the extent to which the items are strongly loaded on their own variables than on other variables in the model is assessed. Discriminant validity is achieved when the square root of AVE is higher than its correlations, or the value of AVE for each variable is higher than its highest squared correlation with any other variable (Fornell & Larcker, 1981). Following the first condition, as presented in Table 5, the square roots of AVEs (as represented by the shaded numbers on the leading diagonals) exceed the correlations of the latent variable (off-diagonal), thus indicating that discriminant validity has been achieved.

Table 5. Mean, Standard Deviation, and Discriminant Validity of Variables

Variable	Mean	SD	Correlations		
			DL	SE	AP
DL	4.024	0.6396	0.767		
SE	3.774	0.6474	0.603	0.662	
AP	3.467	1.1302	0.333	0.419	0.964

DL = Digital Literacy; SE = Self-efficacy and AP = Academic Performance

5.3 Structural Model Evaluation

In this study, four hypotheses comprising three direct relationships and one indirect relationship between variables were developed. Based on the evaluation of path coefficients in Table 6, all three direct relationships are significant. Specifically, the path from digital literacy to academic performance (DL -> AP) recorded a t-value of 9.111> 82.58 ($p < 0.01$), while the path from self-efficacy to academic performance (SE -> AP) recorded a t-value of 7.113 > 2.58 (p-value < 0.01), and the path from digital literacy to self-efficacy (DL -> SE) recorded a t-value of 18.589 > 2.58 ($p < 0.01$). Digital literacy, which explained 18.5% of the variance in academic performance, is positively related to academic performance ($\beta = 0.333$, p-value < 0.01, $R^2 = 0.185$). Similar to the relationship between digital literacy and self-efficacy ($\beta = 0.603$, $p > 0.01$, $R^2 = 0.364$), the relationship between self-efficacy and academic performance is also significant ($\beta = 0.342$, $p < 0.01$); thus, H1, H2, and H3 are supported.

Table 6. Hypothesis Testing on Main Path Model

Hypothesis	Relationship	Std. Beta	Std. Error	t-value	Result
H1	DL -> AP	0.333	0.037	9.111	Supported
H2	DL -> SE	0.603	0.032	18.589	Supported
H3	SE -> AP	0.342	0.048	7.113	Supported

DL = Digital Literacy; SE = Self-efficacy and AP = Academic Performance

The mediating effect of self-efficacy in the relationship between digital literacy and academic performance was tested according to the procedure recommended by Baron and Kenney (1986). Generally, evidence of full mediation is present when certain conditions are fulfilled, such as when the path from the independent variable (digital literacy) to the dependent variable (academic performance) is not significant. However, the paths are significant for two relationships, i.e., from the independent variable (digital literacy) to the mediating variable (self-efficacy), and from the mediating variable (self-efficacy) to the dependent variable (academic performance) (Bass et al., 2001; Wold, 1985). Conversely, the mediator has partial mediation if all three (3) relationships mentioned earlier are significant. Table 7 below presents the mediation analysis results. The bootstrapping of mediation analysis shows that the indirect effect (Digital Literacy -> Self-efficacy -> Academic Performance) is significant with a t-value of 9.156 > 2.58 ($p < 0.01$), indicating the partial mediation of self-efficacy in the relationship between digital literacy and academic performance; therefore, H4 is supported. Table 8 summarizes the analysis results in achieving the objectives of the study.

Table 7. Hypothesis Testing on Mediation

Path	Hypothesis	Relationship	Std. Beta	Std. Error	t-value	Result
Direct	H1	DL -> AP	0.345	0.035	9.946	Supported
Indirect	H4	DL -> SE -> AP	0.333	0.036	9.156	Supported

DL = Digital Literacy; SE = Self-efficacy and AP = Academic Performance

Table 8. Summary of the Direct and Indirect Effects of Digital Literacy on Academic Performance

Hypothesis		Result
H1	Digital literacy has a positive relationship with academic performance.	Supported
H2	Digital literacy has a positive relationship with self-efficacy.	Supported
H3	Self-efficacy has a positive relationship with academic performance.	Supported
H4	Self-efficacy mediates the relationship between digital literacy and academic performance.	Supported

6. Discussion

This study aims to explore the mediating role of self-efficacy in the relationship between digital literacy and academic performance. In essence, self-efficacy is a crucial moderator of the relationship between students' digital literacy and academic performance. Hence, apart from having sufficient knowledge and skills in information and communications technology (ICT), students must also have high self-efficacy to help them perform academically. As supported by the literature, students' high motivation and belief in their abilities will encourage them to achieve better academic performance (Alias & Mohd Hafir, 2009). In the same vein, the self-efficacy of educators also plays an important role in helping students achieve good grades. According to Gibson and Dembo (1984) and Enochs and Riggs (1990), educators with high self-efficacy will focus more on the needs of their students compared to educators with low self-efficacy. For instance, instead of praising students who successfully completed their assignments and allocating some time to help the students, these educators seem impatient and often give negative comments to students who failed to perform academically or obtained unsatisfactory grades. Therefore, based on the findings of this study, students will achieve excellent academic performance if the self-efficacy of both students and educators is well-stimulated.

The theoretical implication of this study lies in the use of SmartPLS for data analysis and hypothesis testing as opposed to other similar studies, which have mostly used the SPSS software. Since SmartPLS provides attractive graphical outputs, the software could better assist the researchers in interpreting the data to draw reliable and cohesive conclusions. In addition, SmartPLS allows for the assessment of convergent and discriminant validity, which can be performed directly to analyse the relevant data. Thus, the findings generated using SmartPLS in this study contribute to the existing literature and provide new, different perspectives to other researchers in the same area of study.

Given the significant positive relationship between digital literacy and academic performance evidenced in this study, the findings implicate that students should increase their knowledge and skills in the use of computers and software since it helps them boost their academic performance. Likewise, educators also need to play their role in encouraging students to use ICT, for instance, by instructing the students to complete their assignments using references from the Internet or electronic textbooks. As a result, the students will be compelled to learn through ICT. Figuratively, mastering ICT is like mastering a new language, where a person must be in the country where the language is spoken or be among those who use that language to master it easily. Here, in the process of encouraging students to use ICT, educators need to consider two key challenges. First, although students tend to feel that they can easily use ICT for all purposes, this may not be the case for online learning (Ng, 2012). Second, senior students who are not exposed to ICT may also be reluctant to engage and use this platform in their learning process, despite the various benefits that they can gain from it (Chu & Chu, 2010).

Subsequently, as evidenced in the current study, digital literacy has a significant impact on self-efficacy. This finding further highlights the importance of having ICT knowledge to boost the self-efficacy of individuals and help them succeed in many things in life, including academic performance. In this regard, educators need to find the right approach and provide many opportunities for students' talent to grow. For example, educators can assist in the development of student ability by employing guidelines, precise instructions, and commonly asked questions (Ng, 2012; Ting, 2015).

Next, considering the significant and positive impact of self-efficacy on academic performance per the findings of this study, self-efficacy is likely to encourage students to believe that they can complete a course of study successfully. Accordingly, this suggests that students with high self-efficacy are more confident when dealing with and interacting with educators and peers for academic purposes. Educators, through appropriate course content and lesson plan, should provide opportunities for the growth of self-efficacy among students. In fact, as validated in prior literature including the current study, self-efficacy indeed contributes to good academic performance among students (Mooi, 2006).

Finally, self-efficacy was found to significantly mediate the relationship between digital literacy and academic performance. The type of mediation here is known as "partial mediation" since the direct effect of digital literacy on academic performance is significant before self-efficacy entered the model, while the indirect effect is significant. Thus, digital literacy has a direct and indirect effect on academic performance through self-efficacy as a mediator. Overall, it can be deduced that in addition to ICT knowledge, self-efficacy also helps students to achieve better academic performance.

7. Limitations and Suggestions for Future Research

Notwithstanding the implications of the study, there are also several limitations that future research should take into consideration. First, since the current study has only examined specific variables, the conclusion drawn from the findings may only be limited to the variables included in the proposed research framework. Thus, it is recommended that future

research includes other factors not examined in the study to see how they influence the relationships among variables. Additionally, the data for this study are only based on the feedback of students from a public university in Malaysia; hence, the findings may not be generalizable to the entire student population. Accordingly, future research should widen the scope of the population in order to enrich the findings and improve the aspects of generalizability by gathering feedback from not only other public universities but also private universities with different facilities and, hence, different levels of students' digital literacy.

Given the significant influence of technological changes on digital literacy, perhaps more comprehensive and recent measurements of digital literacy should be employed in future research to ensure that relevant measurements are used, especially in the current digital edge where the effectiveness of online learning may be influenced by fast-changing technology. In addition, the quantitative method employed in this study may also not be sufficient to capture the relationships among variables. Therefore, to gain further insights into the research findings, future research may also adopt qualitative research methods such as interviews and case studies in order to provide further justifications for the findings obtained from the quantitative data analysis.

In light of the current findings, several suggestions can be made for higher education policymakers to enhance students' digital literacy, self-efficacy, and academic performance. Other than increasing ICT-related training programs in the courses or syllabus, more assignments using ICT tools should also be given to students so that they can enhance their digital literacy, self-efficacy, and ultimately academic performance in the subject matter. Finally, to further assess digital literacy and self-efficacy in ensuring excellent academic performance, especially through online learning, the current study should also be expanded to the contexts of universities and educators around the globe.

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