

Using composite structural equation modeling to examine high school teachers' acceptance of E-learning after Covid-19

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Abstract

Electronic learning (e-learning) is a broader approach to learning that brings new opportunities for teaching and learning in many fields of education compared to the face-to-face classroom environment. The purpose of this study is to explore high school teachers' acceptance to continue teaching through e-learning platforms after COVID-19. Based on the framework of a unified theory of technology acceptance and use of technology, this study investigates the research questions in the context of Lesotho. The study adopted a quantitative approach, with a total number of 300 questionnaires collected from high school teachers. The result was analyzed using composite structural equation modeling. According to the study, instructors' acceptance of e-learning is influenced by several factors, which in turn has a significant impact on teachers' behavioral intentions in Lesotho. As a result of the study, individual challenges associated with using e-learning platforms were identified.

Keywords: Composite-SEM; educational quality; e-learning; self-efficacy; technology acceptance.

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1. Introduction

Since the world health Organization (WHO) confirmed Covid-19 as the universal public health crisis and then a pandemic at the onset of 2020, teachers all over the world, whether in schools, colleges, or universities had experienced a rapid behavioral change. Almost all educational institutions were forced to adopt online teaching tools and platforms for effective teaching and learning of students (Sum & Oancea, 2022; Uzunboylu et al., 2022). For that reason, it is a must to have digital skill development for digital platforms in a teaching and learning atmosphere (Blayone et al., 2018; Habibi et al., 2022). Numerous scholars have advocated the need to develop helpful digital assessment tools that facilitate learner comfort through e-learning (Clarke & Boud, 2018; Jirgensons & Kapenieks, 2018; Abubakar & Adeshola, 2019; Dawson et al., 2019). On the other hand, the effective implementation of e-learning and integration of it with conventional face-to-face teaching and learning are essential to its success (Tarus et al., 201; 5 Wut & Lee, 2022). Many myths arise concerning the implementation and continuity of e-learning (Mayfield & Valenti, 2022). These misunderstandings are the causes of the difficulties that e-learning communities experience.

Kisanga & Ireson, (2015) assert that teachers' acceptance of e-learning is mostly based on their comprehension, the intrinsic advantages of the e-learning platform, and people's resistance to change, all of which are regarded as individual elements in the adoption of e-learning (Aldowah et al., 2018; Wang, Tigelaar, Zhou & Admiraal, 2022). Aldowah et al., (2019) also emphasized that course, contextual, technological, and individual challenges are pre-existing for the productive use of e-learning by teachers. However, the implementation of online teaching and learning has been depicted to be challenging, especially in Sub-Sahara in Africa such as Lesotho, Zambia, and Zimbabwe, where the Fourth Industrial Revolution (4IR) is still in its early stages due to challenges such as access to the internet, poor connectivity, exorbitant data costs, and frequent power interruptions. For the appropriate implementation of e-learning technology, it is crucial to determine the factors that contribute to teachers' continuous acceptance of e-learning at Lesotho High Schools, as existing studies have shown limited research on the factors responsible for instructors' adoption of e-learning in Lesotho.

1.1. Purpose of study

The Unified Theory of Acceptance and Use of Technology (UTAUT) model has been widely validated and used as a theoretical lens for adoption and diffusion research, looking at user intention and behavior within multiple contexts. The theoretical model of UTAUT suggests that the actual use of technology is determined by behavioral intention. The perceived likelihood of adopting technology is dependent on the direct effect of four key constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of predictors is moderated by age, gender, experience, and voluntariness of use (Venkatesh et al., 2016; Masmali & Alghamdi, 2021). Most of the literature in Lesotho concentrates on online teaching and learning amid Covid-19 (Sepiriti, 2021) and there is no literature, if there is any, there is limited literature about teachers' acceptance to continue using e-learning platforms after Covid-19. Consequently, this functions as a gap that focuses on exploring high school teachers' acceptance of continuing to teach through e-learning platforms after Covid-19 in Lesotho. The principal purpose of this study is to identify the factors that facilitate teachers' motivation to accept e-learning based on a new conceptual framework. The conceptual study model adopts concepts drawn from the UTAUT.

1.2. Literature review

1.2.1. Perceived ease of use (PEOU)

Perceived ease of use describes how easy it is to utilize or learn new technology. In this study, this phrase or word refers to the teachers' ideas about how to use technology to enhance their teaching and learning. According to Bajaj et al., (2021), one's PEOU measures how much one thinks a certain technology would be easy to adopt. It has been shown in numerous research that the user's approval of adopting technology or online learning platforms rises with simplicity (Arif et al., 2022). According to this study, PEOU refers to how simple or effortless a teacher thinks using an e-learning platform is (Bashir & Madhavaiah, 2015). A key construct that drives users' intention to adopt and employ e-learning is said to be the simplicity of use. Arif et al., (2022) have also made the point that perceived ease of use influences the user's intention to use online platforms for teaching and learning. Finally, Idoga et al., (2022) assert that perceived ease of use is a crucial sign of behavioral intentions when utilizing technology.

1.2.2. Educational Quality (EDQ)

Educational quality is regarded as a key construct in this study since it is relevant to the adoption of Information System (IS) technology (Idoga et al., 2022). The amount to which an IS provides a calm environment for users to engage in collective learning is the definition of EDQ given by Kim et al., (2012) cited in (Idoga et al., 2022). EDQ can also be explained in the context of teachers as the demonstration of how they use e-learning platforms to improve the standard of instruction (Ching-Ter et al., 2017). Therefore, EDQ has a significant direct impact on consumers' perceptions of usability. Therefore, this study proposes the hypotheses below:

H1. Educational quality has a significant relationship with perceived ease of use.

1.2.3. Behavioral Intention (BEI)

Behavioral intention (BEI) is the level of a teacher's future intention to use e-learning platforms. Numerous researchers have discovered that BEI greatly affects actual system consumption, as noted by (Bajaj et al., 2021). The likelihood that a person will utilize an e-learning system when one is accessible was defined as the intention to use e-learning (Bajaj et al., 2021), which was presented as a variable in this study. The actual implementation of new technologies depends on how well people use the technology (Gyamfi, 2016). Therefore, this study proposes the hypotheses below:

H2. Perceived ease of use has a significant relationship with behavioral intention.

1.2.4. Self-Efficacy (SEE)

Self-efficacy is the person's capacity to use technology successfully on their own, without help (Arif et al., 2022; Byker et al., 2018). Studies have revealed that behavioral achievements including effectiveness, motivation, and upbeat attitudes can predict self-efficacy (Ching-Ter et al., 2017). Self-efficacy also refers to belief in one's capabilities to organize and execute the course of action required to produce given attainments (Um, 2021). In educational technology's field, computer self-efficacy is explained as people's judgment of their competencies to simply use the information and computer technologies (Jiang et al., 2022). Therefore, this study proposes the hypotheses below:

H3. Self-efficacy has a significant relationship with perceived ease of use

1.2.5. Technology complexity (TEC)

Chin and Lin, (2016) posit that Technology complexity (TEC) is the user's perceptions of the effort to comprehend the system or innovative technology. An important barrier to teachers' adoption of e-learning platforms has been identified as a lack of necessary professional skills, access, and challenges related to understanding contemporary systems and the different interrelated technologies (Chin & Lin, 2016). On the other hand, research has demonstrated that technology, particularly in learning

environments, is having a growing impact on the growth of technological acceptance (Gyamfi, 2016). In previous computer anxiety investigations, the phrase “technological anxiety” was established. Idoga et al., (2022) describe computer anxiety as an emotional reaction to the achievement of a particular behavior. Alismaiel, (2021) argues that computer anxiety is an emotional reaction to the concern of running into issues while using a computer. It is in this regard that e-learning must be adapted in educational settings. Thus, we propose the following hypotheses:

H4. Technology complexity has a significant relationship with perceived ease of use

1.2.6. Gender

Gender has been a significant variable in determining the users’ behavior intention and attitude (Bajaj et al., 2021), for instance in this study, whether to continue using e-learning platforms or not. In the educational part, there is always a controversial debate on the variable of gender and its educational implications (Ramírez-Correa et al., 2015). It has also been found that the satisfaction of the online platform’s study is higher in male rather than female teachers (Bajaj et al., 2021). According to the study performed by (Bajaj et al., 2021), it has been argued that females tended to perform while adopting technologies and innovations. Thus, we propose the following hypotheses:

H5. Gender will significantly moderate self-efficacy and perceived ease of use

H6. Gender has a significant relationship with educational quality and perceived ease of use

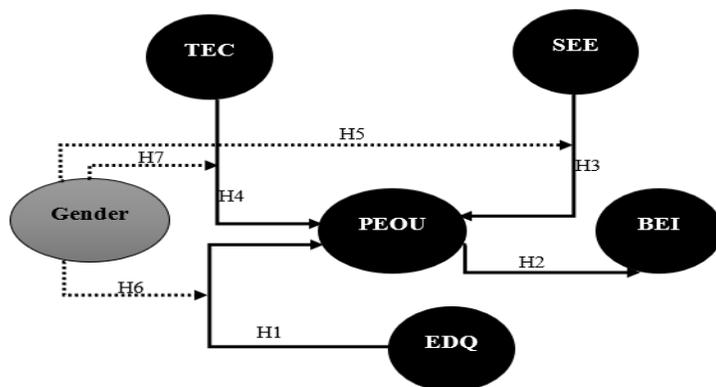
H7. Gender will significantly moderate technological complexity and perceived ease of use.

2. Materials and Methods

This study used a conceptual model illustrated in Figure 1. The unified theory of technology acceptance and use of technology (UTAUT) is one of the most popular theories to explain technology adoption among teachers. Teachers' adoption of e-learning is influenced by factors such as self-efficacy, educational quality, behavioral intentions, and technological complexity. According to previous studies, Figure 1 shows the relationship between self-efficacy, educational quality, and technological complexity. In this study, we examine the factors affecting teachers' adoption of e-learning platforms in Lesotho after Covid-19.

Figure 1

Research conceptual model



2.1. Participants

A total of 300 high school teachers involved in online teaching and learning during the pandemic were surveyed (93 females and 207 males) in Maseru, Lesotho. They were teachers teaching grades nine to eleven, with an average age of 38.50 (SD = 7.04). The average number of years put into service by the teachers was 15.44 (SD = 9.74). Through their association, the researchers invited participants to participate in a voluntary online survey. The participants were instructed to respond to each item by choosing the response that accurately described their level of agreement.

2.2. Data Collection Instruments

This study adapted existing instruments (Liu et al. 2010; Hassanzadeh et al. 2012; Mohammadi, 2015; Mokhtar et al. 2018) to design a questionnaire with five scales to evaluate high school teachers' acceptance of e-learning after Covid-19 in Lesotho. Teacher demographic information included gender, grade level, age, and years of experience in the first part of the questionnaire. The second part assesses teachers' self-efficacy, educational quality, technological complexity, perceived ease of use, and behavioral intention to continue using e-platforms after COVID-19 for teaching and learning. Expert reviews established content validity. On a six-point scale, 1 is strongly disagreed with, and 6 is strongly agreed with.

2.3. Data analysis

The analysis was conducted using Smart PLS 4.0.7. A composite-based structural equation model was used for the analysis. This was chosen because it can handle complex models with numerous indicators, constructs, and relationship models without identification problems (Ayanwale et al., 2022). Partial least square structural equation modeling (PLS-SEM) includes both a measurement model and a structural model analysis. The measurement model ensures that indicators have convergent validity, composite reliability, and discriminant validity, which are then used in structural models. Structural model assessments require evaluating path coefficients and examining their importance.

2.4. Ethics

This study designed a questionnaire with five scales to evaluate high school teachers' acceptance of e-learning after Covid-19 in Lesotho. Before the teachers participated in this study, oral consent was sought from them. The identities of the participants are hidden.

3. Results

Table 1
Construct validity and reliability of the variables

Statements	Item loadings	VIF	α	CR	AVE	Indicator	Reference
Educational Quality			0.772	0.868	0.686		
E-learning platform provides the possibility of evaluation	0.782	1.495				EDQ1	Liu et al. (2010)
The E-learning platform is appropriate for my teaching style	0.865	1.773				EDQ2	
E-learning platform provides a collaborative approach.	0.836	1.578				EDQ3	
Perceived Ease of Use			0.798	0.881	0.712		

I believe using an E-learning platform is easy to use	0.852	1.769				PEOU1	
I believe using an E-learning platform is easy to access	0.864	1.812				PEOU2	Mohammadi (2015)
I believe using an E-learning platform is convenient use	0.815	1.580				PEOU3	
Self-Efficacy			0.792	0.879	0.708		
I feel confident making an e-learning platform as online instruction to assist my teaching	0.833	2.098				SEE1	Hassanzadeh et al. (2012)
I feel confident using the e-learning platform.	0.910	2.455				SEE2	
I am confident about using an e-learning platform even if I have never used such a system before	0.777	1.416				SEE3	
Technological Complexity			0.769	0.771	0.533		
I interact with the e-learning platform without much mental effort	0.774	1.204				TEC1	
E-learning platform does not require much time to learn	0.791	1.124				TEC2	Mokhtar et al. (2018)
E-learning platforms have flexible features	0.807	1.198				TEC3	
Behavioural Intention			0.766	0.864	0.682		
I intend to use the e-learning platform in the future	0.861	1.774				BEI1	Liu et al. (2010)
Based on my experience, I will likely use the e-learning platform	0.710	1.356				BEI2	
I will recommend that other people use the e-learning platform	0.894	1.967				BEI3	

This study examined the model's reliability, convergent validity, and discriminant validity based on Hair et al. (2022), and Henseler et al., (2015) criteria. Consequently, a preliminary test was conducted to determine if multicollinearity existed among the variables, and it determined that there were 1.124 to 2.455 variance inflation factors (VIF), which is less than three (Becker & Ismail, 2016). In essence, convergence validity refers to how strongly measures of a construct are correlated, whereas discriminant validity refers to how statistically distinct two factors are (Henseler et al., 2009; Henseler et al., 2015). Values of Average Variance Extracted (AVE) and Composite Reliability (CR) were used to evaluate the method's convergent validity. In Table 1, all factor loadings exceed 0.70, satisfying Hair et al, (2017)'s recommendation that factor loadings must always exceed 0.70. Additionally, AVE values ranged between 0.533 and 0.712. As such, the AVE value is acceptable, and all items exceeded 0.50, indicating that all items meet AVE requirements (Chin, 1998). According to Hair et al. (2022) & Taber (2018) Cronbach's alpha (α) values must be greater than 0.70; thus, 0.766 to 0.798 is substantial. All items also have good CR, which is the degree to which items are free from arbitrary errors and predict results. It is well above 0.70, the recommended level by Hair et al. (2022) and Henseler et al. (2016) 0.771-0.881.

Table 2
Discriminant validity with Fornell-Lacker Criterion

	BEI	EDQ	PEOU	SEE	TEC
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Behavioral Intention	0.826				
Educational Quality	0.515	0.829			
Perceived Ease of Use	0.569	0.619	0.844		
Self-Efficacy	0.388	0.635	0.476	0.842	
Technological Complexity	0.483	0.645	0.647	0.563	0.73

Reflective measurement models depend heavily on discriminant validity because it ensures each construct is empirically unique and captures phenomena that other constructs do not (Franke & Sarstedt, 2019). AVEs of each construct should be compared to squared inter-construct correlations of all other constructs that were reflectively measured in the model—the shared variance for all constructs must not exceed AVEs (Fornell & Larcker, 1981). In Table 2, the AVE values of each construct are higher than their correlations, indicating discriminant validity. So, a structural model assessment (see Table 3) was performed to determine their relationships.

Table 3
Structural relationship of variables in the model

Hypothesis	Relationship	β	SD	t-statistics	p-values	2.50%	97.50%	Remarks
H1	EDQ -> PEOU	0.350	0.242	4.145	0.000	0.085	0.466	Supported
H2	PEOU -> BEI	0.570	0.037	15.355	0.000	0.228	0.648	Supported
H3	SEE -> PEOU	-0.156	0.305	3.511	0.002	0.131	0.323	Supported
H4	TEC -> PEOU	0.182	0.198	0.918	0.358	0.106	0.263	Not supported
H5	Gender x SEE -> PEU	0.107	0.161	0.667	0.505	-0.146	0.166	Not supported
H6	Gender x EDQ -> PEOU	0.003	0.138	3.020	0.008	0.047	0.211	Supported
H7	Gender x TEC -> PEOU	0.139	0.111	2.247	0.012	0.017	0.227	Supported

*p < 0.05

As seen in Table 3, among the influences of behavioral intentions to use e-learning teaching after COVID-19, EDQ shows a positive relationship on PEU ($\beta = 0.350$, $t = 4.145$, $p = 0.000$); PEU shows a positive impact on BEI ($\beta = 0.570$, $t = 15.355$, $p = 0.000$), and SEE shows a significant negative influence on PEU ($\beta = -0.156$, $t = 3.511$, $p = 0.002$). Thus, H1, H2, and H3 are empirically supported. However, TEC shows an insignificant relationship with PEOU ($\beta = 0.182$, $t = 0.918$, $p > 0.05$); thus, H4 is empirically invalid. As a result, all direct relationships are significant except H4. Gender was also tested to see if it strengthened or dampened the relationship between these constructs. The hypothesized model shows some relationships moderated by gender, with t-statistics surpassing the 1.96 threshold. This led to the gender-moderated paths between EDQ -> PEOU and TEC -> PEU PEOU ($\beta = 0.003$, $t = 3.020$, $p = 0.008$ and $\beta = 0.139$, $t = 2.247$, $p = 0.012$), respectively. However, gender did not significantly moderate the path between SEE -> PEOU ($\beta = 0.107$, $t = 0.667$, $p = 0.0505$).

4. Discussions

This study used structural equation modeling (SEM) to examine the factors affecting teachers' acceptance and adoption of e-learning platforms as new educational technology tools in Lesotho High Schools. The study used UTAUT, perceived ease of use, behavioral intention, technology complexity, and educational quality to use e-learning platforms to reveal factors affecting teachers' continuous acceptance to continue using e-learning platforms. The results showed that the measures of the model's reliability, convergent validity, discriminant validity, and Cronbach's alpha were satisfactory. Again, all items have also shown to have good Composite reliability. A structural model assessment was performed to determine the relationship between variables. As a result, the hypotheses were valid and H1, H2, and

H3's direct relationships are significant, except for H4, thus, TEC shows an insignificant relationship with PEU. Gender, as a moderating factor, was also used and H6 and H7 were significantly moderated, except H5.

This study has examined self-efficacy, educational quality, technological complexity as well as behavioral intention. Educational quality has an important role in supporting perceived ease of use. As a result, the results show that teachers' continuous acceptance of using e-learning platforms shows that educational quality has a significantly positive relationship with teachers' perceived ease of use which is in line with Idoga et al., (2022). Again, perceived ease of use shows a positive impact on teachers' behavioral intention to continue using e-learning platforms. This is supported by Bajaj et al., (2021) that person's behavior to use e-learning will change if the teacher found the application used to be used. Furthermore, self-efficacy shows a significant negative influence on perceived ease of use as maintained by (Ching-Ter et al., 2017). This means that teachers trust that e-learning platforms inspire users to use them for online teaching, thereby helping them in their teaching (Zhang et al., 2021; Jin, Xu, Deifell, & Angus, 2021). However, technological complexity shows an insignificant relationship with perceived ease of use. Chin and Lin, (2016) opine that some of the barriers that can prohibit teachers from continuing to use e-learning platforms are their professional skills or challenges interrelated with technology. This result suggests that Basotho teachers believe that using technology to facilitate effective teaching and learning through e-learning platforms is tricky and hence do not want to continue using e-learning platforms.

5. Conclusion

Lesotho teachers perceived e-learning platforms as complex technologies for teaching and communicating with students. This can negatively impact the educational system as one of its mandates is to provide technical skills to students. If teachers find it difficult to comprehend the content of e-learning platforms, this could impact negatively effective teaching and learning and hence make students fail. As a result, it is recommended that investors and providers consider ways to minimize the complexity of content, collaboration, and communication processes within platforms for effective teaching and learning.

Teachers remark that it is simple to use an e-learning platform that will facilitate effective teaching and learning between instructors and students, thus, influencing behavioral intention. Furthermore, it is recommended that schools plan various ways of improving teachers' self-efficacy through seminars, training workshops, and other ways of improving their competence levels in developing countries which can be recommended for succeeding research. In conclusion, the use of e-learning platforms has become increasingly important after COVID-19.

E-learning platforms and their adoption not only provide ease in getting the curriculum completed but also contribute towards increasing the learning effectiveness, if well implemented. Therefore, for a developing country like Lesotho, the Ministry of Education and Training has to work hand in hand with teachers and provide all necessary equipment and materials to make e-learning effective and easy-to-use platforms for teachers.

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