International Journal of Learning, Teaching and Educational Research
Vol. 24, No. 7, pp.776-797, July 2025
https://doi.org/10.26803/ijlter.24.7.38
Received Apr 19, 2025; Revised Jun 12, 2025; Accepted Jul 11, 2025

Teachers' Perspectives on the Implementation of E-Learning in Secondary Schools of Gauteng Province, South Africa

Eultage Tshegofatsho Leshabane, **Patricia Namayammu Mokgosi*** and **Simeon Maile**
Tshwane University of Technology,
South Africa

Abstract. The incorporation of electronic technologies in educational institutions has demonstrated enhancements within the South African setting. This facilitated the transition from traditional pedagogical approaches to online and mixed formats. A comprehensive examination into the issues affecting the implementation of e-learning in secondary schools within the Gauteng North District has not yet been conducted. Research on educators' viewpoints regarding the determinants affecting the execution of e-learning in secondary school is scarce. This study aimed to investigate educators' views on the implementation of e-learning in secondary schools across the Gauteng Province, specifically in the Johannesburg North area. The study utilised the Technology Acceptance Model (TAM) as its theoretical foundation. A quantitative methodology was employed, involving 220 participants from 44 secondary schools in the Johannesburg North district who completed a questionnaire. The study employed a frequency distribution model to classify variables for respondent profiling. The questionnaire utilised a five-point Likert scale, ranging from "agree" to "strongly disagree." Data were analysed with the Statistical Package for Social Sciences (SPSS). The research hypothesis was examined using Structural Equation Modelling (SEM). Confirmatory Factor Analysis (CFA) was performed for each research item. The results demonstrate that perceived ease of use (PEU) and computer experience are critical determinants influencing the uptake of e-learning in secondary education. The research identified that the primary determinants affecting teachers' acceptance of e-learning in secondary schools within the Johannesburg North District are perceived ease of use and computer proficiency, therefore enhancing the current body of knowledge. This study illustrates that the perceived ease of use of technological systems substantially impacts the intention to adopt e-learning in South Africa, more so than perceived usefulness, as delineated by the TAM framework.

*Corresponding author: Patricia Namayammu Mokgosi; *MokgosiPN@tut.ac.za*

Keywords: Implementation; e-learning; technology; computer experience; perceived ease of use

1. Introduction

E-learning refers to the utilisation of digital devices in education using computers and the Internet (Mapande et al., 2018). Mohammed et al. (2017) define e-learning is education facilitated and augmented by information and communication technologies. E-learning provides numerous advantages compared to conventional teaching methods, such as enhanced access to educational materials, expedited communication, and collaborative intellectual engagement. Its use in various educational settings is designed to expand learning outcomes and ease teaching workload in primary and secondary schools as well as in institutions of higher learning (Al-Adwan & Smedly, 2012; Kour, 2017). Even while e-learning is widely used in contemporary private schools and higher education, South African and foreign schools have not implemented or adopt it to a great degree or at all, especially in conventional learning settings.

The government of Gauteng Province has made significant financial investments in e-learning, overseen its implementation, and trained and developed teachers to equip them with the requisite skills (Masipa et al., 2023). In the 2017–2018 fiscal year, the Gauteng Province Department of Education (GDE) allocated R724 million to initiate the province's e-learning plan. The GDE sought to implement what they referred to as "classrooms of the future" in alignment with the global e-learning trend. Both educators and students can benefit from e-learning in various ways. E-learning is an auxiliary resource that educational institutions can employ to augment their pedagogical and instructional effectiveness. E-learning has been praised for enhancing the accessibility of education and information and communication technology (Msiza et al., 2020).

Furthermore, the GDE programmes were developed to improve e-learning's effectiveness. Learners become more interested and engaged in knowledge building, collaboration, and reflection through various e-learning methods (Msiza et al., 2020). In secondary schools, e-learning is essential for improving learners' memory of material. Hošková-Mayerová and Rosická (2015) assert that learners who study online share a dynamic learning environment, are positively inspired, and prefer to acquire knowledge and skills quickly and in a way that works best for them.

Irrespective of the initiatives mentioned above, the successful implementation of e-learning by secondary schools in Gauteng Province was not fully realised. However, the COVID-19 outbreak highlighted critical issues within the education sector, particularly affecting primary and secondary schools in the Johannesburg North District and the broader Gauteng Province. In this regard, online learning and other media platforms such as television and radio for ‘'catch-up” and revision classes were introduced (Mhlanga & Moloi, 2020). Several organisations joined forces with private institutions and the South African Government to develop e-learning technology platforms to mitigate time loss and the overall

impact of the COVID-19 pandemic in the education sector (Mhlanga & Moloi, 2020).

The abrupt transition to adapt to the challenges of the pandemic does not guarantee the successful implementation of e-learning by secondary teachers in the Johannesburg North District. This can aggravate advocates of traditional educational systems (Abdekhoda et al., 2016). Moreover, Abdekhoda et al. (2016) affirm that teachers believe that e-learning fails to address all facets of teaching or maintain all essential components, leading to a gradual implementation of e-learning practices. Unfamiliarity with e-learning principles and theoretical foundations, technophobia, and technical issues associated with e-learning platforms and systems constitute potential challenges that reluctant educators may face during the implementation of e-learning. This study investigated teachers' perspectives regarding the implementation of e-learning in secondary schools within Gauteng Province.

Similar to the South African context, international countries such as Nigeria, Uganda, Saudi Arabia, and Zimbabwe are still facing problems in adopting or implementing e-learning at secondary and primary school levels (Oroma et al., 2015; Mirzajan et al., 2016). Although substantial advantages can be gained from existing e-learning platforms, their effectiveness has not been achieved in Nigeria, Uganda, Saudi Arabia, and Zimbabwe (Oroma et al., 2015). The implementation of e-learning in education, particularly in secondary schools, has been inconsistent, ranging from minimal progress to complete absence.

Despite the availability of several e-learning platforms in Nigeria, not many Nigerian schools have embraced e-learning (Aboderin, 2015). Most secondary schools are unable to take advantage of available e-learning opportunities. As a result, teachers' willingness to use and adopt advanced teaching technologies when presenting lessons has remarkably decreased. Some factors contributing to Nigerian secondary schools not embracing e-learning include poor budget allocation, corruption, and unpreparedness. In addition, Onovo and Okorie (2017) identified several factors that delay the adoption and practice of e-learning: high costs, lack of infrastructure, skills, relevant software, and Internet access.

Saudi Arabia and Zimbabwe encounter numerous obstacles in their implementation and utilisation of e-learning. The utilisation of e-learning remains in a nascent stage, primarily attributable to its adoption and implementation challenges. The challenges presented encompass academic, digital, and administrative dimensions (Ja'ashan, 2020; Flynn, 2013, also referenced by Abdullah Alsmari, 2020). Kim (2008) identifies the technological barriers that impede the implementation of e-learning in secondary and higher education institutions. Nonetheless, various investigations have pinpointed numerous factors that influence the quality of e-learning adoption and implementation. These include the accessibility of necessary technologies and proficient educators, as well as meaningful engagement between learners and instructors, as well as the calibre of the learners themselves (Dube & Scott, 2014). For technology to be

utilised effectively in the classroom, educators must adopt constructive methodologies regarding its application.

In South Africa, the integration of e-learning within secondary schools has advanced at a notably languid rate, with instances of both sluggish implementation and total absence in certain contexts (Ja'Ashan, 2020). The emergence of the COVID-19 pandemic, both nationally and globally, has undeniably expedited the integration of technology within the educational sphere, underscoring the necessity of embracing e-learning methodologies in both secondary and primary educational institutions (Bubb & Jones, 2020).

Successful implementation of an e-learning system requires analysis, clarification, and anticipation of users' perceptions and behaviours. Analysis of users' behaviours and perceptions regarding e-learning has not been thoroughly conducted to establish the factors that influence the implementation of e-learning in Gauteng North District secondary schools. Very few studies have investigated teachers' perspectives on the determinants affecting the implementation of e-learning in secondary education institutions and few utiised the structural equation model. This research presents a theoretical framework for analysing educators' perceptions regarding the elements affecting the implementation of e-learning in secondary schools within the Gauteng North District. Thus, contributing to the body of knowledge on the implementation of e-learning in secondary schools.

This study aimed to assess teachers' beliefs regarding the impact of technology's use and ease of use, computer experience, normative pressure, and computer anxiety on their readiness to embrace or integrate technology into their teaching practices. A need exists to understand the perspectives of secondary school teachers on the main determinants that affect the implementation of e-learning in this context, to propose implementation guidelines relevant to Gauteng North district secondary schools.

2. Development of a Research Model and Hypotheses

In 1989, Davis put forth the Technology Acceptance Model (TAM), which employs two key factors—perceived usefulness (PU) and perceived ease of use (PEU)—to forecast an operator's endorsement of any information technology system and to pinpoint potential issues prior to the operator's engagement with it (Aggarwal, 2018; Rugube, 2019). Perceived usefulness (PU) refers to the degree to which an individual believes that interacting with a certain system can enhance their performance, as stated by Soomro (2018), Heng (2021), and Saleem & Saleem (2021). This suggests that educators are increasingly predisposed to integrate online teaching and learning into their pedagogical practices, as they believe it will enhance their ability to fulfil their responsibilities effectively (Soomro, 2018; Heng et al., 2021; Saleem & Saleem, 2021).

The degree to which people feel that utilising a specific gadget would be a relief is known as perceived ease of use (PEU). PEU elucidates the consumer's perception of the energy required to operate the system or the extent to which

they believe a particular technology will be user-friendly (Heng et al., 2021).PEU, as used in the present study, relates to teachers' opinions of the amount of work required to teach online. This has a big impact on how people behave and intend to use a new technology. The degree to which students or teachers think utilising a particular system would be simple is known as perceived ease of use (Rachmi, et al., 2023; Venkatesh & Morris, 2000; Chen et al., 2012).

TAM's basic tenet is that consumers should accept technology based on their behavioural intention, which is based on their PU and PEU (Basuki et al., 2022; Wu, 2006). The time at which an educator consciously decides whether to use online teaching-related activities is known as behavioural intention (BI) (Thoti, 2024; Ramayah & Ignatius, 2005). BI is closely linked to an individual's actual behaviour; that is, if someone wants to do something, they are likely to do it. This relates to the perception of whether several educators support or oppose the behaviour.

TAM proposes that when people believe that technology is practical and simple to use, they develop a progressive attitude toward it (Marikyan & Papagiannidis, 2024; Lee et al., 2003). According to TAM, positive approaches are predicted by high levels of PU and PEU, which in turn indicate users' intentions to use. An individual's behavioural objectives, attitude, perceived utility, and perceived ease of use all affect how they use the technology system (Asian Association of Open Universities (AAOU), 2017).

The Technology Acceptance Model (TAM) illustrates the process by which individuals embrace and employ a technology. The Technology Acceptance Model posits that application utilisation is affected by perceived usefulness and ease of use.

The Technology Acceptance Model (TAM) posits that external stimuli, comprising actual system attributes and functionalities, directly influence system usage, a response that can be elucidated or predicted by user motivation (Kabanda, 2015). Perceived ease of use denotes the extent to which an individual views the use of technology as uncomplicated. Perceived usefulness denotes the degree to which a teacher believes that technology will improve their performance.

According to several studies, e-learning is not just a technical fix but rather the result of several factors, including behavioural and social contexts (Ouyang & Stanley, 2014). The attitudes and opinions of educators and learners, as well as their proficiency with digital tools, will determine how well e-learning and real-time online learning are implemented. It has been demonstrated that several factors influence users' first acceptance of digital devices (Van Dijk, 2017). TAMs have been widely utilised to understand learners' adoption and usage of technology in a variety of contexts, including e-learning. In this study, the researchers believe that secondary teachers in the Johannesburg North District will adopt and implement e-learning if they find it beneficial and user-friendly for teaching their subjects.

This study posits the following hypothesis:
H1: Perceived usefulness (PU) has a positive effect on users' implementation or adoption of e-learning.

H2: The perceived ease of use positively influences the implementation or adoption of e-learning by users.

Alongside the Technology Acceptance Model (TAM), other factors, including experience, normative pressure, computer anxiety, and knowledge, were incorporated to comprehensively understand the elements influencing e-learning implementation in Johannesburg North District 10.

2.1 Computer Experience
Computer experience was frequently gauged by asking participants how many hours they spent using the computer each week (George Saadé & Kira, 2009). Computer experience, according to Batane and Ngwako (2017), is the habit of utilising technical tools as well as the acquisition of new skills and abilities through their use. Several significant factors, including computer ownership, computer training, years of use, and frequency of computer technology use, can be used to gauge a teacher's experience. Laabidi (2016) postulates that one of the most important elements influencing computer usage is computer experience.

More positive views regarding the usage of computer technologies and less computer anxiety are associated with higher levels of computer experience. As a result, computer anxiety is significantly predicted by prior computer experience. Practically speaking, having sufficient computer knowledge entails having more favourable views regarding computers and less computer phobia. Teachers' computer anxiety diminishes as they have sufficient computer-related experience.

Integration of new technology is facilitated when it aligns with users' prior experiences, working strategy, and established professional practice. Programming, word processing, spreadsheets, databases, games, computer-assisted learning, computer language proficiency, software package usage, and the creation of computerised information systems are all examined by diversity of experience (Batane & Ngwako, 2017; Igbaria & Chakrabarti, 1990; Jones & Clark, 1995).

The average weekly programming hours and application package usage (measured in hours per week) were used to gauge the diversity of experience (Wang & Wu, 2015; Gilroy & Desai, 1986). The frequency of program usage and computer programming has been questioned by other researchers. According to earlier research, this metric has a strong correlation with system-based usage indicators, including the quantity of logins and online time (Davis, Bagozzi, & Warshaw, 1989).

In light of the assertions presented, this study proposes the following hypotheses:
H3: The experience with computers significantly enhances the user's ability to engage with e-learning platforms.

2.2 Normative pressure

Normative pressure refers to the pressure exerted by other people, which leads us to conform to their demands (Gupta, 2016). In line with the above notion, the adoption or implementation of e-learning is one of the popular demands in educational settings because of COVID-19. Due to the Disaster Management Act and COVID-19 regulations, transitioning from traditional to e-learning causes pressure on teachers.

However, the pressure to adopt e-learning in public schools in the education sector has shrunk in comparison to those in Model C and independent schools (Gupta, 2016). Normative pressure is also defined as the belief that most of the individuals who are significant to an individual believe that they should or should not engage in the behaviour in question. Normative pressure, pertinent to this investigation, denotes the degree to which individuals within a cultural or educational framework (such as the influence of a teacher on a student or between teachers) shape the actions of others to adopt particular behaviours (Latif et al., 2020; Fishbein and Ajzen, 1975; Kleijnen et al., 2004; Hung et al., 2002; Chang and Cheung, 2001).

Based on the above assertions, this study hypothesises that:
H4: The influence of normative pressure on the implementation of e-learning by users is positive.

2.3 Computer Anxiety

Achim and Kassim (2015) characterised computer anxiety as a sensation of fear or apprehension associated with the use or contemplation of using a computer. Adverse side effects of technology usage may encompass profound unfavourable emotional states that arise not just during engagement but also prior to the contemplation of utilising a computer. In addition to the contact itself, general well-being, learning, social relationships, and production can be influenced by frustrations, confusions, and other associated emotional states. It is hypothesized that computer anxiety may be induced by factors such as the user's beliefs about themselves and their attitudes toward computer usage (Achim & Kassim, 2015).

According to Howard (1986), computer anxiety is widely characterised as the emotional fear, apprehension, and phobia that people experience when they engage with computers or when they consider utilising them. One definition of computer anxiety is the level of uneasiness or even terror that a person feels when confronted with the possibility or task of utilising a computer. Users who experience anxiety when using computers may develop unfavourable views regarding their goal to acquire the technology (Venkatesh and Bala, 2008; Siron et al., 2020; Heckel & Ringeisen, 2019).
Learning satisfaction is negatively correlated with higher degrees of computer anxiety. Previous research revealed that computer anxiety affects how valuable

and easy an information system is regarded to be (Saade & Kira, 2009).

In light of the assertions, this study posits the following hypothesis:
H5: There exists a negative correlation between computer anxiety and the implementation of e-learning by users.

In accordance with the hypotheses articulated in the earlier sections, the theoretical model proposed for this study is illustrated in Figure 1.

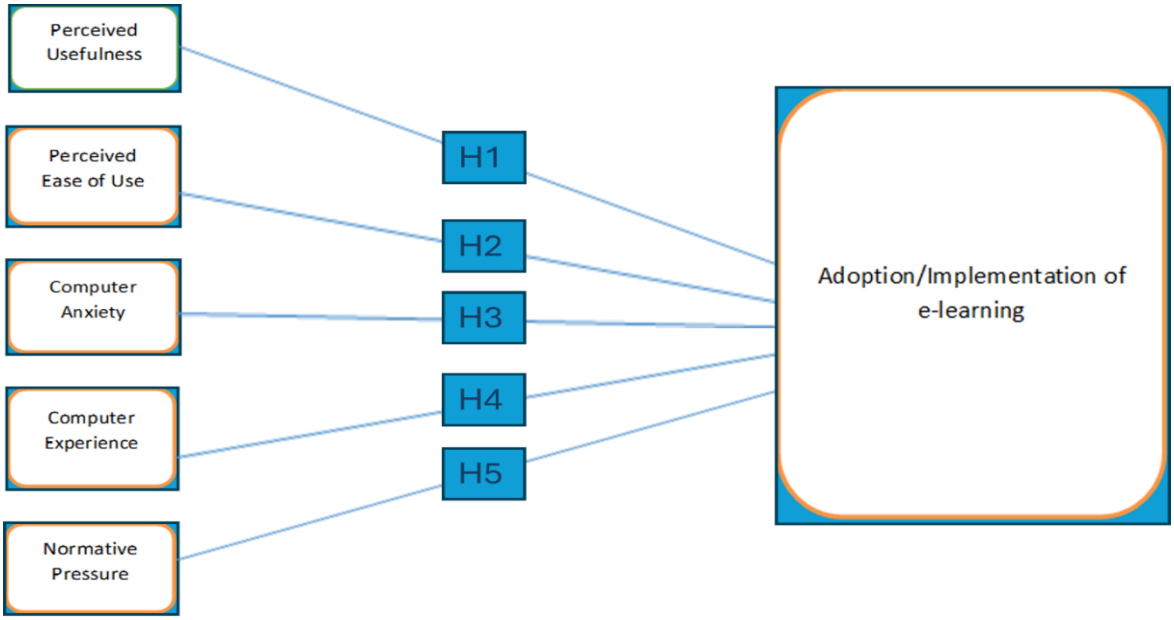

Figure 1: Proposed model

3. Methodology

The study employed a quantitative research approach, which involves the use of experiments and surveys as methods of inquiry. It uses predefined methods, closed-ended questions, and numerical data collection. In scientific research, the researcher tests or validates hypotheses, chooses variables to examine, connects variables in the question or hypothesis, and applies validity and reliability standards. The researcher uses objective methods to observe, quantify, and apply statistical techniques to information. The ability to regulate variables in quantitative research makes it possible to compress data more rapidly and clearly (McMillan & Schumacher, 2014).

3.1 Research Design and Sample

The study was a quantitative case study design based on the positivist paradigm. This study used a simple random sampling method to select a sample of 220 teachers from the Johannesburg North district. This 220-sample comprised 44 school principals who are also teachers, 44 School Management Team (SMT) members who are also teachers, and 132 teachers from 44 secondary schools. A total of 220 questionnaires were handed out to the sampled participants. Before the collection of data, permission was sought from the relevant university ethics

committee and the district where the data was collected. Participants signed informed consent forms, and the aspects of anonymity and confidentiality were explained by the researchers.

3.2 Data Collection and Procedures

The questionnaire created for this study utilised a five-point Likert scale, spanning from "agree" to "strongly disagree and neutral." The initial section of the questionnaire gathers biographical details about the participants, including their gender, age, race, and the schools they are affiliated with. The subsequent section of the questionnaire items delineates the constructs as guided by the theoretical framework of the study.

The first part, Section A, of the questionnaire clarifies the idea of perceived usefulness (PU) along with related items. The survey evaluated educators' perspectives on the capacity of e-learning to enhance the implementation of curriculum delivery. Section B proceeds to explore the concept of perceived ease of use (PEOU) along with associated elements. The questionnaire assessed educators' perceptions regarding their engagement with e-learning, emphasizing its minimal cognitive demand and user-friendliness. The third section, Section C, delves into the concept of normative pressure (NP).

The Likert scale assessed the perceptions of respondents regarding the significant individuals who influence, support, and motivate them to engage with e-learning. The fourth section, designated as Section D, examines the domain of Computer Experience (CE). The Likert scale assessed educators' perceptions of their experiences with computers, promoting the utilisation of e-learning as a means to enhance their professional performance. The fifth section, Section E, delves into the phenomenon of computer anxiety (CA). The survey assessed educators' views regarding their apprehensions concerning the integration of technology. The last section, Section F, examines computer knowledge with all related items. The Likert scale measured teachers' perceptions of the computer knowledge they have to use e-learning.

For reliability the researchers measured internal consistency using Cronbach's alpha. Internal consistency is reflected by similar scores in similar items of a question and can be measured using Cronbrach's alpha, which should ideally be above 0.7 (DeVellis, 2012; Nunnally, 1994). Cronbach's Alpha in this research was 0.73.

Questionnaires were distributed to participants through multiple methods, including email, and both personal and self-administration. Every way of delivery possesses its own restrictions and advantages. This study employed self-administered questionnaires due to its unobtrusive nature and the flexibility they offer respondents in terms of completion timing. Questionnaires were distributed to educators in the secondary schools in the Johannesburg North District. The answer rate for the surveys was 150 out of 220, indicating a return percentage of 68.18%.

3.3 Data Analysis

The questionnaire data was analysed using statistical analysis tools. The researcher employed the Statistical Package for the Social Sciences (SPSS) to analyse the data and generate frequency tables and charts. A confirmatory factor analysis (CFA) was performed on each research item. The researcher performed Structural Equation Modelling (SEM) using Analysis of Moment Structures (AMOS 28) to evaluate the research hypotheses. The statistical analysis software was utilised to analyse the questionnaire data. The researcher analysed the data utilising the Statistical Package for the Social Sciences (SPSS) to produce frequency tables and visual representations.

Furthermore, every research item underwent a confirmatory factor analysis (CFA). The investigator employed Structural Equation Modelling (SEM) within Analysis of Moment Structures (AMOS 28) to evaluate the research hypotheses. AMOS is used to build connections among variables, estimate latent variables, and discern direct and indirect effects. Implementing tests to determine the correlations among the routes, as specified in the study's framework, is the most efficient method for analysing structural modelling data.

4. Results

4.1 Respondents' demographic characteristics

Profile questions in this study's research instrument were designed to gather data about the respondents' demographics. The principal variables employed in the research to characterise the respondents included gender, age, and race within the cohort of secondary school teachers in the Johannesburg North District. In pursuit of this objective, the current investigation employed frequency distribution analysis.

Table 1. -Demographic Characteristics of the Respondents

No	Demographic Characteristics	Teachers	
		Total	%
	Gender		
1.	Male	62	49
	Female	88	51
	Age		
	22-30	67	44.7
2.	31-40	45	30
	41-50	15	1.0
	51-65	23	15.3
	Race		
	Black	147	98
3.	Coloured	2	1.3
	Asian	1	0.7

The results illustrated in Table 1 reveal that most respondents were female, with 59% (n = 88) of the total, while male respondents accounted for 41% (n = 62) of the group. This gender representation demonstrates that among the cohort of teachers in South Africa, female teachers tend to participate more in studies than male teachers. The same findings were reflected in a study by Mwapwele et.al. (2019),

who conducted a study in South Africa on schoolteachers and found that there were more female teachers than male teachers.

Following the precedence of Mwapwele et al. (2019), this study sought to understand the age groups of the respondents. Statistics South Africa (2020) groups individuals in South Africa within the ages of 15 to 34 years as youth and those aged 35 years and above as adults. Therefore, the age distribution of the teachers' cohort in secondary schools within the Johannesburg North District is presented in Table 1.

The age distribution illustrated in Table 1 indicates that around 55.3% of the participants in the study were adults aged between 31 and 65 years. Interestingly, young people in the age range of 22 to 30 years represented only 44.7% of the study. This might be reflective of Mwapwele et al. (2019) observation that adult teachers in South Africa tend to participate more in survey research.

From Table 1, it can be noted that most of the respondents, 98 per cent (n = 147), were black, 1.3 per cent (n = 2) were coloured, and 0.7% (n = 1) were Asian. These results indicate that black teachers dominated the teachers' cohort in the Johannesburg North District.

4.2 Evaluation of the Measurement Model

The assessment of the measuring instruments' validity and reliability was conducted using factor analysis prior to the estimation of the structural models. The factor analysis confirmed that the observable variables measured the pertinent latent variables. The constructs' factor structures were successfully determined according to recognised theoretical linkages between the observable and latent variables.

This study verified the reliability of the final measurement scales by adhering to a standard guideline stating that higher item loadings, approaching 1, indicate a stronger ability to describe a component. If item loadings are weak, they can be removed to enhance the model (Götz et al., 2010). Hair *et al*. (2020) suggested item loadings of 0.708 with t-statistics ± 1.96 for item reliability, whereas Hulland (1999) supported considering items greater than 0.4 or 0.5 for item reliability due to the difficulty of obtaining high factor loadings. One measuring item for computer anxiety (E2) was removed due to a factor loading of 0.103, which is in line with the authors' suggestions. The final measurement model established by the factor analysis is displayed in Figure 1.

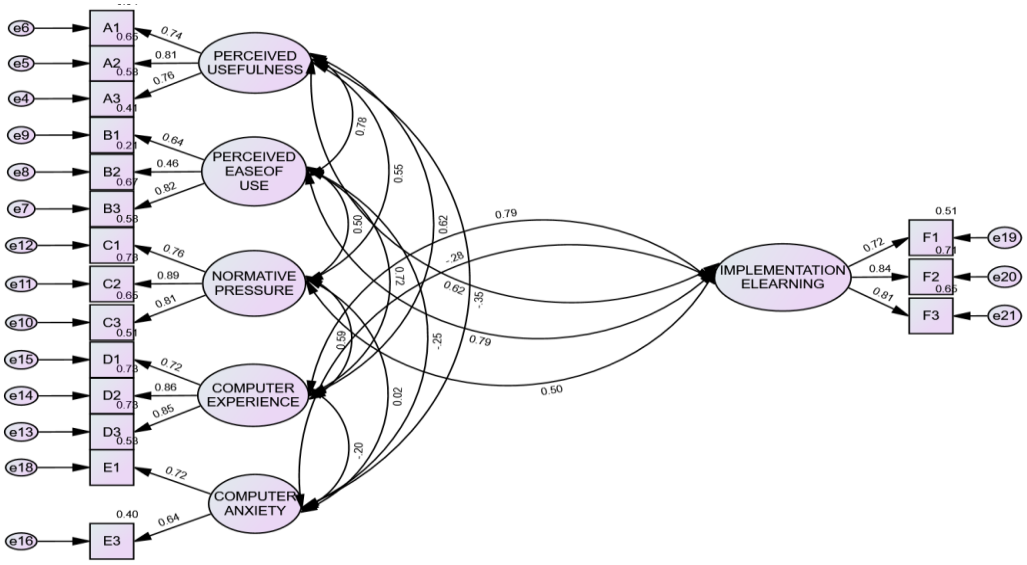

Figure 2: E-Learning Adoption Measurement Model

From **Figure 1,** it can be noted that the factor loadings for PU, PEU, NP, CE, CA, and Implementation of E-learning (IoE) ranged from 0.460 to 0.890. These results imply that the factor loadings of the study constructs included a mixture of low to high item loadings. Determining the logical connection between the elements to be evaluated and the observed variables, as well as evaluating the uniqueness of these components, were the objectives of the measurement model evaluation. Furthermore, for PU, PEU, NP, CE, CA, and IoE, internal consistency reliability, convergent validity, and discriminant validity were investigated and are covered in the sections that follow.

4.3 Reliability and Validity Assessment Results

Reliability refers to the scale's capacity to consistently and dependably provide the same conclusion. A scale is deemed credible in research when its measurement can be replicated under consistent conditions and yields comparable results (Taherdoost, 2016). This study focused on internal consistency as a measure of reliability, although reliability can manifest in several forms depending on the context. The concept of reliability pertains to the internal consistency of a measurement tool; thus, a scale's consistency reflects its reliability. Internal consistency reliability is a sign of homogeneity, indicating how well a measure aligns with a shared meaning.

The coefficient alpha is frequently employed to evaluate the reliability of multi-item scales. The coefficient alpha (α) runs from 0 to 1, indicating the level of consistency. Measurements with coefficient α values of 0.40 and below are considered to have poor reliability, whereas those ranging from 0.41 to 0.60 are considered moderately reliable. Values between 0.61 and 0.74 indicate acceptable reliability, and values of 0.74 and above are considered to indicate outstanding reliability (Koelman et al., 2019). The reliability results of the current investigation are presented in Table 2.

Table 2 demonstrates that the structured questionnaire used in this study achieved a high level of internal consistency reliability, reflected by a Cronbach's alpha value of 0.827. The reliability scores for the factors influencing e-learning implementation in the Johannesburg North District secondary schools ranged from good to excellent, with the exception of computer anxiety, which exhibited a poor reliability score of 0.323.

Table 2: Internal Consistency Reliability Results

Construct	Questionnaire Item	Cronbach's Alpha	Level of Reliability
Perceived Usefulness	A1; A2; A3	0.809	Excellent
Perceived Ease of Use	B1; B2; B3	0.688	Good
Normative Pressure	C1; C2; C3	0.853	Excellent
Computer Experience	D1; D2; D3	0.840	Excellent
Computer Anxiety	E1; E2; E3	0.323	Poor
Implementation of E-learning	F1; F2; F3	0.831	Excellent
Overall	All items	0.827	Excellent

4.4 Convergent validity assessment

Avkiran and Ringle (2018) illustrated that average variance extracted (AVE) is commonly utilised as an indicator of convergent validity, with a standard threshold set at 0.5. Convergent validity indicates that items of a particular construct should show strong correlations with related items (Henseler et al., 2015). In this context, convergent validity pertains to the degree of correlation observed among latent components. Table 3 presents the findings related to convergent validity.

Table 3: Convergent Validity Results

Latent Variable	Rhoc	AVE	Decision
Computer anxiety	0.103	0.414	The latent components are not significantly correlated
Computer Experience	0.906	0.763	Relatedness exists among the latent components
Normative Pressure	0.911	0.774	The underlying components are interconnected
Perceived Ease of Use	0.830	0.621	The underlying components are interconnected
Perceived Usefulness	0.889	0.727	The underlying components are interconnected
Implementation of E-learning	0.899	0.748	The underlying components are interconnected

The convergent validity results presented in Table 3 indicate that all latent variables had AVE values greater than the 0.5 threshold, except for computer anxiety (CA), which had an AVE of 0.414. The CA construct was not dropped because it had high indicator reliability scores, and the AVE was relatively close to the threshold of 0.5. The findings suggest a relationship among the latent components, indicating that the construct indicators effectively measured their intended constructs.

4.5 Discriminant validity assessment

Discriminant validity verifies that a measurement of one variable (IoE) is distinct from the content of a measurement for another variable (such as PU, PEU). The distinctiveness of the study constructs was evaluated using the HTMT ratio, following a threshold of 0.85 (Henseler et al., 2015), with the results elaborated. In Table 4.

Table 4: Discriminant Validity Results

	CA	CE	IoE	NP	PEU	PU
CA						
CE	0.521					
IoE	0.673	0.807				
NP	0.306	0.645	0.515			
PEU	0.560	0.666	0.780	0.467		
PU	0.669	0.627	0.622	0.575	0.729	

As indicated in Table 4, the study constructs had HTMT ratios below 0.85, signifying that discriminant validity was attained in the current study; hence, all the constructs were utilised in structural modelling.

4.6 Structural Equation Model Results

To examine the direct relationships between the exogenous PEU, PU, CA, CE, NP, and endogenous IoE variables in the current study, the SEM statistical technique was used. The use of SEM made it possible to analyse the proposed associations and identify those that are and are not statistically supported. According to Maiti and Saikia (2019), a p-value, which represents probability and gauges the possibility that any observed difference between groups is due to chance, is the basis for determining statistical significance. According to Darling (2021), a p-value of less than 0.05 is typically accepted as a trustworthy universal indicator of statistical significance. The present study employed a significance level of 0.05 to assess the statistical significance of the results obtained.

Furthermore, according to Seok et al. (2016), a good fitting model is approved if the Confirmatory Fit Index (CFI), Tucker Lewis Index (TLI), GFI indices, and CMIN/df value are all above 0.90 and below 5. Additionally, the root means square error approximation (RMSEA) and the standardised root mean square residual (SRMR) are regarded as acceptable indices of fit if they are less than 0.08 and 0.08, respectively (Kumar et al., 2021:4). Consequently, Figure 3 displays the path analysis model for the current investigation.

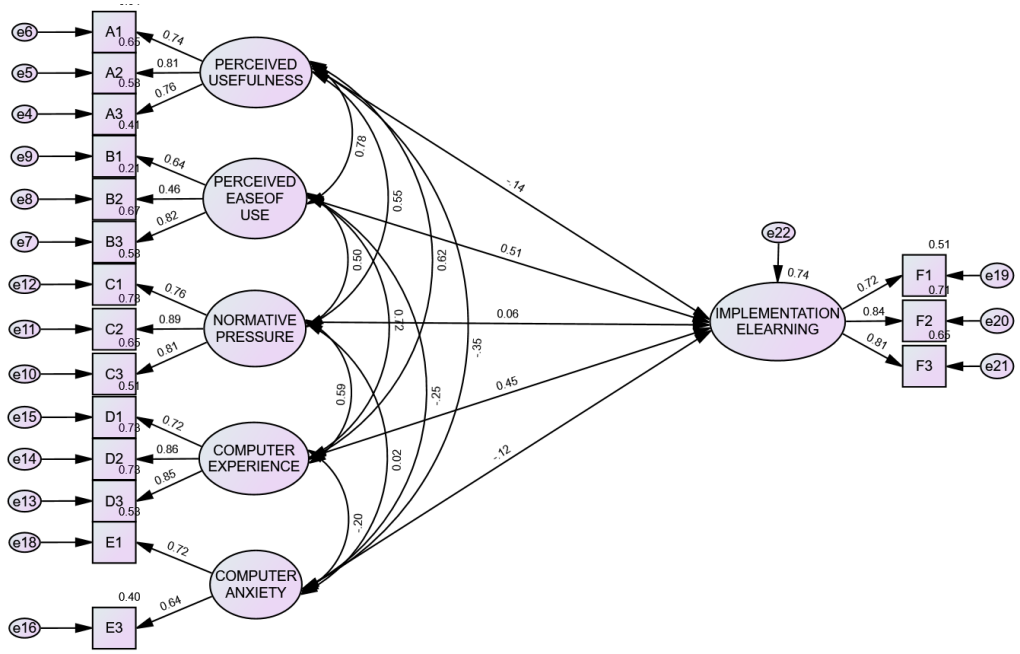

Figure 3: Structural Model Path Analysis Results

The fit indices of the model (Figure 2) were found to be within the acceptable range: CMIN/df = 1.603, GFI = 0.887, AGFI = 0.834, NFI = 0.875, TLI = 0.932, CFI = 0.948, RMSEA = 0.064, and SRMR = 0.050. Table 5 displays the path coefficients for the proposed relationships along with their respective statistical significance levels.

Table 5: Results of the Structural Model

Hypotheses	Structural Path	B	t-value		p-value	Decision
H_1	PU ⇾ IoE	-0.138	-0.781		0.435	Not Supported
H_2	PEU ⇾ IoE	0.507	2.404		0.016	Supported
H_3	CA ⇾ IoE	-0.118	-1.227		0.220	Not Supported
H_4	CE ⇾ IoE	0.454	3.273		0.001	Supported
H_5	NP ⇾ IoE	0.060	0.588		0.556	Not Supported
R^2 for IoE predictive power		0.739				

The study findings outlined in Table 5 indicated that the structural model had an R^2 of 0.739, implying that 73.9% of the variance in IoE is explained by PU, PEU, CA, CE, and NP for the cohort of teachers in the Johannesburg North District secondary schools. The association between PU and the IoE was found to be negative and statistically insignificant (β = -0.138, t = -0.781, p = 0.435); thus, the hypothesis that perceived usefulness positively impacts the implementation of e-learning was not upheld. The findings suggest that within the framework of

Johannesburg North secondary schools, educators' views on the effectiveness of e-learning do not impact their willingness to adopt or implement e-learning practices in these institutions.

Table 5 indicates a positive and significant relationship between PEU and IoE, as demonstrated by a coefficient of $\beta = 0.507$, a t-value of 2.404, and a p-value of 0.016. As a result, H2 was confirmed, and the findings indicated that educators' views on the usability of the e-learning system significantly affect their willingness to adopt the system in secondary schools within the Johannesburg North District.

The results of the study revealed that CA demonstrated a negative, albeit statistically insignificant, correlation with IoE ($\beta = -0.118$, $t = -1.227$, $p = 0.220$). As a result, H3, which suggested that CA has a detrimental effect on the IoE, was not supported by the evidence. The research findings revealed that computer anxiety did not affect teachers' decisions concerning the adoption of e-learning in secondary schools within the Johannesburg North District.

The study explored the relationship between CE and IoE in relation to educators in the secondary schools of the Johannesburg North District. The findings revealed a significant and noteworthy correlation between CE and IoE ($\beta = 0.454$, $t = 3.273$, $p = 0.001$). As a result, H4, which suggested that computer experience positively influences the implementation of e-learning, was supported. The study's findings indicate that educators' familiarity with computers plays a significant role in their readiness to embrace e-learning methodologies in secondary schools in Johannesburg.

The influence of NP on IoE was also examined, and the results presented in Table 5 indicated that NP had a positive, insignificant effect on IoE ($\beta = 0.060$, $t = 0.588$, $p = 0.556$). Accordingly, H_5 was not supported. The study concludes that normative pressure does not influence teachers' intent to implement e-learning in secondary schools for a cohort of teachers in the Johannesburg North District secondary schools.

5. Discussion

The structural equation results ($\beta = -0.138$, $t = -0.781$, $p = 0.43$) found that perceived usefulness had a negative and statistically insignificant impact on implementing e-learning; thus, H1 was not statistically supported. The findings indicate that secondary school teachers in the Johannesburg North region do not view e-learning as advantageous for improving their performance. Thoti (2024) suggests that educators who are sceptical about the efficacy of online teaching systems in enhancing their performance are less inclined to use online teaching and learning in their pedagogical practices. These findings contradict Siron et al.'s (2020) assertion that the perceived usefulness of technology has a beneficial effect on its adoption.

According to the structural equation model results, computer anxiety was determined to have a negligible impact on the implementation of e-learning

among teachers (β = -0.118, t = -1.227, p = 0.220), indicating that their unease or apprehension about using computers did not significantly influence their decision to integrate e-learning technologies into their teaching practices. The study's results contradict Heckel and Ringeisen's (2019) assertion that computer fear leads to people forming negative attitudes towards adopting the technology. H3 was not statistically supported.

Normative pressure had a favourable but statistically negligible effect on teachers' implementation of e-learning (β = 0.060, t = 0.588, p = 0.556)., so H5 was not statistically validated as revealed by structural equation model results. Normative pressure does not influence teachers' intention to adopt e-learning. Social influences or expectations from peers, administrators, or the broader educational community do not significantly affect teachers' decisions about e-learning adoption. Personal rewards, attitudes, and experiences impact teachers' e-learning usage more than social expectations, as the results indicate. The study findings oppose Latif et al.'s (2020) assertion that peers, society, and the community impact an individual's behaviour. Conversely, the perceived ease of use showed a positive and statistically significant impact on the acceptance of e-learning among secondary school teachers in the Johannesburg North District.

The hypothesis H2, demonstrated by a coefficient of β = 0.507, a t-value of 2.404, and a p-value of 0.016, suggests that perceived ease of use has a positive impact on the implementation of e-learning, was statistically validated. The research indicated that educators in the Johannesburg North District secondary schools are more inclined to adopt the e-learning system, driven by their perception of its usability. The findings of this study support the conclusions of Heng et al. (2021), which indicate that the perception of e-learning as user-friendly enhances the likelihood of its utilisation. The perception of technology's simplicity influences the decision to adopt it.

The findings indicate that computer experience or familiarity with computers positively influences the implementation of e-learning (β = 0.454, t = 3.273, p = 0.001) among secondary school teachers in the Johannesburg North District, confirming H4. The findings suggest that teachers' computer proficiency significantly influences the implementation of e-learning in secondary schools in Johannesburg. This study's results are consistent with Laabidi's (2016) findings, emphasising the substantial influence of computing experience on technology implementation. Instructors with advanced computer skills more frequently integrate e-learning resources into their teaching methods.

6. Conclusion

The study presents a theoretical model that explains the complex relationships among the variables examined in this study. The study's contributions are outlined in numerous theoretical areas. The theoretical contribution enhances the comprehension of the conceptual frameworks that govern the uptake of e-learning in secondary schools. The findings have practical implications for both academic research and the evolving norms of education and offer valuable insights for decision-making. The Department of Education should prioritise

professional development programmes that improve teachers 'digital and computer skills. Investment in modern technology infrastructure is crucial. Providing teachers with up-to-date computers and reliable Internet access enhances their continuous growth and efficient use of e-learning resources.

This study openly acknowledges its limitations and reflects on the limits and boundaries that have influenced its scope. This study recommends areas for further study, such as longitudinal analysis or teacher-student comparative perspectives as well as the use of other theoretical models such as confirmatory expectancy model. This study enhances understanding of the factors affecting the adoption and implementation of e-learning in the Johannesburg North area and South Africa as a whole.

7. Contribution and implications to the study

This research offers a profound examination of the validity of the Technology Acceptance Model (TAM) within the educational landscape of South Africa. Combining elements of the technological acceptance model with variables like computer experience, normative pressure, and computer anxiety, the study created a theoretical framework to examine the factors influencing the adoption of e-learning. This allowed for a better understanding of the main factors that promote the use of e-learning. This study examined the TAM from a theoretical standpoint, considering its application and testing it in the context of e-learning consumers.

8. References

Abdekhoda, M., Ahmadi, M., Dehnad, A., Noruzi, A., & Gohari, M. (2016). Applying Electronic Medical Records in Health Care: Physicians' Perspective. *Applied clinical informatics*, *7*(2), 341–354. https://doi.org/10.4338/ACI-2015-11-RA-0165

Abdullah Alsmari, N. (2020). A Video-driven Approach to Promoting Pragmatic Development in the Context of English as a Foreign Language. *Arab World EnglishJournal*,*6*,3–23. https://awej.org/images/SpecialissueonCALLJuly2020/FullissueCALLJULY2020.pdf

Abodering, O.S. (2015). Challenges and prospects of e-learning at the National Open University of Nigeria. *Journal of Education and Learning,* 9(3), 207-216. https://doi.org/10.11591/edulearn. v9i3.1728.

Achim, N. & Kassim, A.A. (2015). Computer usage; the impact of computer anxiety and computer self-efficacy. Procedia-*Social and Behavioural Sciences. 172,* 701-708. Global Conference & Social Sciences – 2014, GCBSS-2014, 15th % 16th December, Kuala Lampur. January 2015. https://doi.org/10.1016/j.sbspro.2015.01.422

Aggarwal, D. (2018). Using the Technology Acceptance Model to Understand the Use of Bring Your Own Device (BYOD) to Classroom. *Journal on Today's Ideas - Tomorrow's Technologies*, 6(2), 83–91. https://doi.org/10.15415/jotitt.2018.62007

Al-Adwan, A. & Smedley, J.K. (2012). "Implementing e-learning in the Jordanian Higher Education Systems: Factors affecting impact". *International Journal of Education and Development using Information Technology, 8(*1), 121-135.

Aykirian, N. K & Ringle, C.M. (2018). *Partial Least Squares Structural Equation Modeling: Recent Advances in Banking and Finance*. Springer. https://doi.org/10.1007/978-3-319-71691-6

Basuki, R., Tarigan, Z.J.H., Siagian, H., Limantan, L.S., Setiawan, D. & Mochtar, J. (2022). The effects of perceived ease of use, usefulness, enjoyment and intention to use

online platforms on behavioral intention in online movie watching during the pandemic era. *International Journal of Data and Networks Science,* (6), 253-262. https://doi.org/10.5267/j.ijdns.2021.9.003

Batane, T., & Ngwako, A. (2017). Technology use by pre-service teachers during teaching practice: Are new teachers embracing technology right away in their first teaching experience? *Australasian Journal of Educational Technology*, *33*(1), 48-61. https://doi.org/10.14742/ajet.2299

Bubb, S & Jones, M. (2020). Learning from the COVID-19 home-schooling experience: Listening to pupils, parents/carers and teachers. *Improving Schools*. *23(*3), 209-222 https://doi.org/10.1177/1365480220958797

Chang, M. K., & Cheung, W. (2001). Determinants of the Intention to Use Internet/WWW at Work: A Confirmatory Study. *Information and Management*, *39*(1),1–14 https://doi.org/10.1016/S0378-7206(01)00075-1

Chen, S.H., Li. S.H. & Li, C.Y. (2011). Recent related research in technology acceptance model: a literature review. *Australian Journal of Business and Management Research, 1* (9), 124-127. DOI: 10.52283/NSWRCA.AJBMR.20110109A14

Darling, S.J., Goods, M., Ryan, N.P., Chisholm, A.K., Haebich, K. & Payne, J.M. (2021).Behavioral Intervention for Social Challenges in Children and Adolescents: A Systematic Review and Meta-analysis. *JAMA Pediatr. 175(*12): e213982. https://doi.org/10.1001/jamapediatrics.2021.3982

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of the information technology. *MIS Quarterly, 13* (3) 318-339. https://doi.org/10.2307/249008

Dube, S. & Scott, E. (2014). An empirical study on the use of the Sakai learning management system (LMS): Case of NUST, Zimbabwe. *In Proceedings of the E-Skills for Knowledge Production and Innovation Conference 2014, Cape Town, South Africa*. 101-107). https://doi.org/10.13140/RG.2.1.2589.1048

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. Reading*, MA, Addison-Wesley.

Götz, O., Liehr-Gobbers, K., & Krafft, M. (2010). *Evaluation of Structural Equation Models Using the Partial Least Squares (PLS) Approach.* In Handbook of Partial Least Squares (pp.691-711). Springer. https://doi.org/10.1007/978-3-540-32827-8_30

Gupta, P.K., Singh, S. and Bhaskar, P. (2016) Citizen Adoption of E-Government: A Literature Review and Conceptual Framework. *Electronic Government, an International Journal, 12,* 160-181. https://www.inderscienceonline.com/doi/abs/10.1504/EG.2016.076134

Hair, J.F., Howard, M.C. & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109,*101 110. https://doi.org/10.1016/j.jbusres.2019.11.069

Heckel, C., & Ringeisen, T. (2019). Pride and anxiety in online learning environments: Achievement emotions as mediators between learners' characteristics and learning outcomes. *Journal Of Computer Assisted Learning*, *35*(5), 667–677. https://doi.org/10.1111/jcal.12367

Heng, H. K., Md. Izwan, H., Chun, K. Y. & Pei, Y. L (2021). Identification Factors Influencing E-Learning Satisfaction During Covid-19 Pandemic Period Among Students at a Malaysia Private Institution. *Social and Management Research Journal, 18*(2), 153–171. DOI:10.24191/smrj. v18i2.14906

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of MarketingScience,43,*115-135. https://doi.org/10.1007/s11747-014-0403-8

Hošková- Mayerová, S. & Rosicka, Z. (2015). E-learning pros and cons: active learning culture? *Social and Behavioural Sciences, 19(*1), 958-962. https://doi.org/10.1016/j.sbspro.2015.04.702

Howard, G. R. & Smith, R. D. J. (1986). Computer anxiety in management: myth or reality? *Communications of the ACM (29)* 7,611 –615. https://doi.org/10.1145/6138.61

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *JSTOR Strategic Management Journal*, *20* (2), 195-204. https://www.org/stable/i355641

Ja'ashan, M.M.N.H. (2020). The Challenges and Prospects of Using E-learning among EFL Students in Bisha University. *Arab World English Journal, 11*(1), 124-137. https://dx.doi.org/10.24093/awej/vol11no1.11

Kabanda, **G.** (2015*).* Pedagogic possibilities of ICTs and Technology Affordances in an increasingly networked environment in support of sustainable development. *Journal of African Studies and Development, 7,* 126-136. DOI: 10.5897/JASD2014.0319

Kleijnen, M., Wetzels, M., & de Ruyter, K. (2004). Consumer acceptance of wireless finance. *Journal of Financial Services Marketing, 8,* 206–217. https://doi.org/10.1057/palgrave.fsm.4770120

Kour, S. (2017). Exploring adolescent students' attitude towards the effectiveness of e-learning in their academic life. *Indian Journal of Applied Research*, *7*(7), 1–3.

Laabidi, H. (2016). The effect of Age on English Professors' Integration of New Technologies in Teaching. *IJELTAL-Indonesian Journal of English Language Teaching and Applied Linguistics, 1*(1). https://doi.org/10.21093/ijeltal.v1i1.11

Latif, B., Mahmood, Z., San, O.T., Said, R. & Bakhsh, A. (2020). Coercive, Normative and Mimetic Pressure as Drivers of Environmental Management Accounting Adoption. *Sustainability*, *12* (11):4506, 1-14. https://doi.org/10.3390/su12114506

Jae-Lee, J.S., Cho, H., Gay, G., Davidson, B., & Ingraffea., A. (2003). Technology Acceptance and Social Networking in Distance Learning. *Journal of Educational Technology & Society*, *6*(2), 50–61. http://www.jstor.org/stable/jeductechsoci.6.2.50

Maiti, S. I., & Saikia, S. K. (2019). P< 0.05 is not Enough. *Advances in Zoology and Botany*, *7*(2), 24-27. https://doi.org/10.13189/azb.2019.070202.

Mapande, F.V., Zuva, T., & Appiah, M. (2018). Users' Perceptions on Security of Mobile Computing for Adoption of e-Applications in South Africa. *2018 International Conference on Advances in Big Data, Computing and Data Communication Systems (icABCD),* 1-8. https://doi.org/10.1109/ICABCD.2018.8465127

Marikyan, D.& Papagiannidis, S. (2024) *Technology Acceptance Model: A review*. In S. Papagiannidis (Ed), TheoryHub Book. https://open.ncl.ac.uk / ISBN: 9781739604400

Masipa, R., Chauke, Z., & Rasivhetshele, R. (2023*). E-Learning Expenditure in Gauteng: Delivering education in the world of digital technologies and assessing value for money* (Report).

McMillan, J. H. & Schumacher, S. (2014*). Research in education: Evidence-based inquiry*. : Pearson Education.

Mhlanga, D. & Moloi, T. (2020). COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa. *Journal of Educational Science, 10.* 180, https://doi.org/10.3390/educsci10070180

Mirzajani, H., Mahmud, R., Fauzi Mohd Ayub, A., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education*, *24*(1), 26–40. https://www.emerald.com/insight/content/doi/10.1108/QAE-06-2014-0025/full/html.

Mohammed, A., Kumar, S., Saleh, B. M., & Shuaibu, A. (2017). E-learning: A tool for enhancing teaching and learning in educational institutes. *International Journal of Computer Science and Information Technologies*, *8*(2), 217-221.

Msiza, G. M., Malatji, K. S. & Mphahlele, L. k. (2020). Implementation of an e-learning Project in Tshwane South District: Towards a Paperless Classroom in South African Secondary Schools. *The Electronic Journal of e-Learning*, *18* (4), 300-310. https://doi.org/10.34190/EJEL.20.18.4.003

Mwapwele, S. D., Marais, M., Dlamini, S., & Van Biljon, J. (2019). Teachers' ICT adoption in South African rural schools: A study of technology readiness and implications for the South Africa Connect broadband policy. The *African Journal of Information and Communication (AJIC), 24*, 1-21. https://doi.org/10.23962/10539/28658

Onovo, J.S. & Okorie, M.N. (2017). Adoption of E-Learning as Instructional Media in Secondary Schools: Challenges and Prospects. *Journal of Education and Practice*, 8, (35), 92-103.

Oroma, J.O., Wanga, H. & Fredrick, N. (2012). *Challenges of e-learning in developing countries: The Ugandan Experience*. Barcelona conference (EDULEARN-2012) https://doi.org/10.13140/2.1.4754.1448

Ouyang, J. R., & Stanley, N. (2014). Theories and Research in Educational Technology and Distance Learning Instruction through Blackboard. *Universal Journal of Educational Research*, 2(2): 161–172. https://doi.org/ 10.13189/ujer.2014.020208

Rachmi, I.F., Asta, F.R. & Kartiko, N.D. (2023). The Effects of Perceived Ease of Use, Perceived Usefulness and Computer Self–Efficacy on eNofa Application User Satisfaction. E3S Web of Conferences 388, 04017. *ICOBAR*. https://doi.org/10.1051/e3sconf/202338804017

Rugube, T. T. (2019). Design Model for Integrating Learning Management Systems and Massive Open Online Courses on a Digital E-Learning Platform: Implications for Zimbabwean Universities. (PhD Thesis) University of KwaZulu-Natal, South Africa) https://researchspace.ukzn.ac.za/handle/10413/19014

Saade, R.G. Nebebe, F. & Tan, W. (2007). Viability of the technology acceptance model in multimedia learning environment: a combative study. Interdisciplinary. Journal of Knowledge and Learning Objects, 3, (1), 175-184. https://doi.org/10.28945/392

Saadé, R. & Kira, D. (2009). Computer Anxiety in E-Learning: The Effect of Computer Self-Efficacy. *Journal of Information Technology Education: Research*, *8*(1), 177–191. https://doi.org/10.28945/166

Saleem, T., & Saleem, A. (2021). Examining the Student's Behavior towards e-Learning in COVID-19. *International Journal of Innovative Science, Engineering & Technology*, 8(2).

Siron, Y., Wibowo, A., & Narmaditya, B. S. (2020). Factors affecting the adoption of e-learning in Indonesia: Lesson from Covid-19. JOTSE: *Journal of Technology and Science Education*, *10(*2), 282-295. https://doi.org/10.3926/jotse.1025

Thoti, K.K. (2024). Exploring the employees' behavioral intention towards descriptive technologies: A study in Malaysia. *Human Resource Management and Service*, 6 (1), 3399, 1-16. https://doi.org/10.18282/hrms.v6i1.3399

Van Dijk, J.A, 2017. Digital Divide: Impact of Access. *The International Encyclopedia of Media Effects*: 1–11. https://doi.org/10.1002/9781118783764.wbieme0043

Venkatesh, V. & Davis, F.D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science, 46* (2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, *39* (2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Wu, Y. T. & Wang, L. TJ (2015). The exploration of elementary school teachers' Internet self-efficacy and information commitments: A study in Taiwan. *Educational Technology & Society*, *18*(1), 211–222.

Wu Y-T. &Tsai, C.C. (2006). University students' attitudes and internet self-efficacy: A study at three universities in Taiwan. *CyberPsychology & Behaviour, 9* (4). https://doi.org/10.1089/cpb.2006.9.441