International Review of Research in Open and Distributed Learning

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Volume 22, numéro 4, novembre 2021

URI : https://id.erudit.org/iderudit/1084922ar
DOI : https://doi.org/10.19173/irrodl.v23i1.5758

Aller au sommaire du numéro

Éditeur(s)

Athabasca University Press (AU Press)

ISSN

1492-3831 (numérique)

Découvrir la revue

Citer cet article

Rudhumbu, N. (2021). University Students' Persistence With Technology-Mediated Distance Education: A Response to COVID-19 and Beyond in Zimbabwe. *International Review of Research in Open and Distributed Learning*, *22*(4), 89–108. https://doi.org/10.19173/irrodl.v23i1.5758

Résumé de l'article

Technology-mediated distance education (TDE) has become part of the new normal in the range of teaching strategies used in universities in Zimbabwe. Contemporary literature abounds with studies that highlight challenges associated with access to education in universities, yet very little is highlighted about how TDE can be used to enhance access to education in Zimbabwean universities during the COVID-19 era and beyond. The purpose of this study was therefore to investigate determinants of students' behavioural intentions to persist with TDE in universities in Zimbabwe during COVID-19 and beyond. The study employed a quantitative approach that used a self-constructed structured questionnaire for data collection from a sample of 1,300 distance learning students selected from five universities using a stratified random sampling strategy. Structural equation modelling using IBM SPSS Amos 22 was used for data analysis. Results of the study show that cultural and norms issues ($\beta = .325$; $p < .001$) and characteristics of the students ($\beta = .329$; $p < .001$), the lecturer ($\beta = .362$; $p < .001$), the institution ($\beta = .427$; $p < .001$), and external stakeholders ($\beta = .279$; $p < .001$) were all significantly associated with the behavioural intentions of university students to persist with TDE. Results of this study have implications for both policy and practice with regard to implementing TDE in universities.

International **R**eview of **R**esearch in **O**pen and **D**istributed **L**earning
Volume 22, Number 4

November – 2021

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Abstract

Technology-mediated distance education (TDE) has become part of the new normal in the range of teaching strategies used in universities in Zimbabwe. Contemporary literature abounds with studies that highlight challenges associated with access to education in universities, yet very little is highlighted about how TDE can be used to enhance access to education in Zimbabwean universities during the COVID-19 era and beyond. The purpose of this study was therefore to investigate determinants of students' behavioural intentions to persist with TDE in universities in Zimbabwe during COVID-19 and beyond. The study employed a quantitative approach that used a self-constructed structured questionnaire for data collection from a sample of 1,300 distance learning students selected from five universities using a stratified random sampling strategy. Structural equation modelling using IBM SPSS Amos 22 was used for data analysis. Results of the study show that cultural and norms issues ($\beta = .325$; $p < .001$) and characteristics of the students ($\beta = .329$; $p < .001$), the lecturer ($\beta = .362$; $p < .001$), the institution ($\beta = .427$; $p < .001$), and external stakeholders ($\beta = .279$; $p < .001$) were all significantly associated with the behavioural intentions of university students to persist with TDE. Results of this study have implications for both policy and practice with regard to implementing TDE in universities.

Keywords: flexible learning, information and communication technologies, online education, technology advances, technology-mediated distance education

Introduction

The purpose of this study was to establish determinants of students' behavioural intentions to persist with technology-mediated distance education (TDE) in universities during the COVID-19 period and beyond. The advent of the COVID-19 pandemic outbreak has given a fresh impetus for the use of information and communication technologies (ICT) as pedagogical tools for e-learning in teaching and learning environments. In the context of Zimbabwe, the history of distance education dates to the 1930s, when distance education (DE) was introduced as an experiment for primary education and supported by the 1999 National Policy of Distance Education (SAIDE, 1999). DE became such a popular mode of learning for the working class that it was expanded to secondary and tertiary levels and later morphed into TDE, owing to the introduction of technology for learning and teaching and supported by the national ICT policy of 2005 (Maphosa, 2021). Various studies show that universities are now expected to act as linking points that bridge the gap between university theory and the digitized world of work by employing widely adopted technologies, leveraging on the diffused practice of bringing your own device (BYOD) (Caporarello et al., 2016). Despite universities promoting technology-mediated learning, it has been found that academics in universities do not necessarily engage with innovative teaching and learning technologies due to issues of technology self-efficacy (Liu et al., 2020). Rudhumbu (2020) found that no more than 30% of lecturers demonstrate behavioural intentions to adopt technology for teaching in universities in Zimbabwe. This is indeed quite worrying at a time when technology use is viewed as the new normal in universities (UNESCO, 2020).

Education is one of the most disrupted spaces caused by COVID-19, and according to Tam and El-Azar (2020), these disruptions allow us glimpse at how education could change for better—or for worse—in the long term. The pandemic has changed how millions of learners around the globe are educated. There are new solutions for education that could bring much needed innovation and new shifts in approaches that could widen equality gaps. According to UNESCO (2020), some African countries are currently among the 188 countries currently implementing nationwide closures that impact a total of 1.5 billion enrolled learners (89% of student population) across all levels of education and 135,575 tertiary-level students. Interruptions to education can have far-reaching consequences beyond the spread of the disease itself and efforts to contain it. The digital divide continues to widen, especially affecting groups of students in socioeconomic distress who are more likely to have poor or no Internet access because they cannot afford the cost of a laptop, desktop computer, or handheld gadget, or Internet connectivity, or because they live in regions or neighbourhoods with limited connectivity (OECD, 2020; Ouma, 2019).

Contextual Framework: Distance Education and Its Growth on a Global Level

TDE is a learning mode that provides students with an open, flexible, and highly interactive learning experience that allows them to explore connections online between what they would have learned and other sources of knowledge and experience, thus enriching their learning experiences (Houlden & Veletsianos, 2019). As a flexible teaching and learning approach, TDE allows lecturers to provide students with scalable, personalized, and contextualized e-learning support for effective learning (Bolliger & Halupa, 2018). TDE

can be categorized as either synchronous or asynchronous (Sharma, 2018). Synchronous TDE allows for "live" interactions between the students and the lecturers through technology-mediated interventions such as videoconferencing, audioconferencing, Zoom, Webchats, and others, while asynchronous TDE allows students to interact with the lecturer through technologies such as learning management systems (LMS), e-mails, video recordings, and discussion forums; hence, some delays in interactions occur (Sharma, 2018).

TDE has been a subject of debate and contestation in many countries, including Russia, Brazil, Portugal, the United Arab Emirates, Turkey, Uganda, and Zimbabwe. In these and other countries, the history and development of TDE has been characterized by suspicions of poor quality at initial stages while in other countries, tight controls of Internet connectivity have been a serious setback to the growth of TDE. Despite these challenges, TDE has continued to grow the world over (UNESCO, 2020). In Zimbabwe, there has been a general belief that universities offering distance and open education provide inferior education to their students (Kaputa, 2013; Musingafi et al., 2015; UNESCO, 2018), with some referring to DE as education for "old" people who have failed to compete for access to university education in conventional universities (Rupande & Nyenya, 2014). Despite this initial negative belief, online DE in Zimbabwe continues to grow and gain in popularity due to its flexibility, accessibility, and affordability, with some universities preferring to use blended learning.

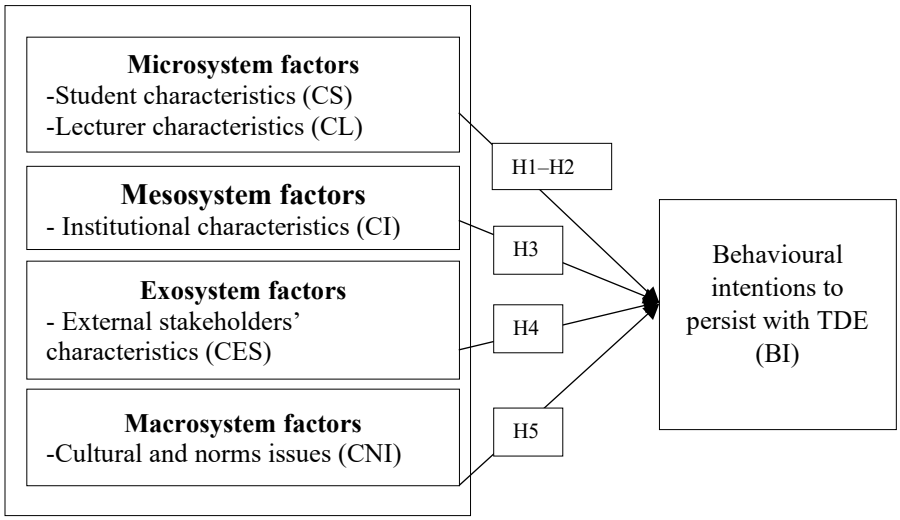
Theoretical and Conceptual Framework Informing Hypotheses Formulation

This study is informed by the ecological systems theory (EST), also called the bioecological systems theory, developed by Bronfenbrenner (1979). EST argues that the environment in which a person lives affects every facet of that person's life, from how the person thinks and acts to his or her attitudes and emotions, that is, how a person behaves (Exploring Your Mind, 2020). EST further argues that education is a complex system influenced by an interactive system of multiple layers, including the microsystem, mesosystem, exosystem, and macrosystem (Guy-Evans, 2020). Ettekal and Mahoney (2017) find that human behaviour is a result of a complex process involving a system of interactions within and between individuals, as well as between individuals and the environments in which they live.

Human behaviour, therefore, and according to Krebs (2009), is a joint product of contextual factors that relate to how each of the four layers—namely, the microsystem (activities and interactions of individuals and groups, e.g., students and teachers, with their immediate environment, e.g., a classroom); the mesosystem (institutional or organizational factors that affect how a person behaves); the exosystem (wider social settings that include industry, government, and their policies and how they affect people's behaviour); and the macrosystem (cultural values, customs, and resources that affect how people behave) (Ettekal et al., 2017; Krebs, 2009;). Based on a literature review and the theoretical framework, a research model (Figure 1) was designed and used for formulating research hypotheses.

Figure 1

Research Model



Note. CS = characteristics of students; CL = characteristics of lecturer; CI = characteristics of institution; CES = characteristics of external stakeholders; CNI = cultural and norms issues; H = hypothesis; TDE = technology-mediated distance education; BI = behavioural intention. (Source: Designed by the researcher)

Characteristics of the Student

Characteristics of the students, one of the microsystem factors, relates to the behaviours and actions of students that promote positive attitudes towards an object or idea or, in the context of the current study, towards TDE during the COVD- 19 era and beyond. Separately, McGhie (2017) and Yang et al. (2017) have found that characteristics of students such as the ability to set realistic expectations as well as levels of motivation both extrinsically and intrinsically contribute to their behavioural intentions and positive attitudes towards TDE. Yang et al. (2017), Rosenberg and Ramellucci (2017), and Fidalgo et al. (2020) all find that time management, technology self-efficacy, social presence, and interest are critical student characteristics that contribute to the development of positive attitudes towards and behavioural intentions to persist with TDE.

> H1: A significant relationship exists between the characteristics of the students and their behavioural intentions to persist with TDE during the COVID-19 era and beyond.

Characteristics of the Lecturer

Another microsystem factor that affects the students' attitudes towards and behavioural intentions to persist with TDE is lecturer characteristics. In separate studies, Au et al. (2019) and Tait (2018) have found that adequately trained and experienced lecturers who are able to provide what is called *teaching presence* in TDE is important for the development of positive attitudes towards TDE by university students, also contributing to the development of behavioural intentions to persist with TDE during COVID-19 and

beyond. Tait (2018) also finds that the lecturers' competences, attitudes, perceptions, and pedagogic attributes, in terms of teaching facilitation and presence, are important for students' development of positive attitudes towards and behavioural intentions to persist with TDE. This suggests that a lecturer's ability to use technology to facilitate the program, as well as the effectiveness of the lecturer's general teaching approaches, may be critical to students' development of positive attitudes towards TDE and their positive behavioural intentions to persist with it.

> H2: There is a significant relationship between the characteristics of the instructor and students' behavioural intentions to persist with TDE during the COVID-19 era and beyond.

Characteristics of the Institution

Institutional factors are mesosystem factors that relate to conditions in universities that have an influence on how students perceive and persevere with TDE during the COVID-19 era and beyond. Li and Wong (2019) find that the support given to TDE students by universities through human and material resources, time, and leadership style is very important for students' development of positive attitudes towards TDE, as well as for their development of positive behavioural intentions to persist with the TDE. In their study, Bhuasiri et al. (2012) find that an effective leadership style that is consultative and supportive, the provision of an adequate budget for securing adequate ICT resources, and the presence of appropriate ICT equipment are important for the students' development of positive attitudes towards TDE and their behavioural intentions to persist with it. In similar studies, Tait (2018) and Vanides (2018) also indicate that the creation of a conducive learning environment—where students can easily access online learning resources and use online systems; where they are able to interact with each other, with instructors, and with materials synchronously and asynchronously; and where learning happens in a flexible and relaxing environment—is critical for developing positive attitudes and willingness to persist in students. For the successful facilitation of a TDE program during the COVID-19 era and beyond, one that contributes to students developing behavioural intentions to keep using it, universities need to be well equipped in terms of materials and human resources to support TDE.

> H3: There is a significant relationship between the characteristics of an institution and students' behavioural intentions to persist with TDE during the COVID-19 era and beyond.

Characteristics of External Stakeholders

External stakeholders are part of the exosystem and relate to industry and its requirements, government, government policies, government agencies, and how they contribute to policy formulation and implementation regarding TDE in universities (Exploring Your Mind, 2020). Characteristics of external stakeholders include their actions towards, demands of, and requirements for education in general and TDE in particular in universities (Guy-Evans, 2020). External stakeholders' characteristics therefore refer to social settings that affect a person's or a group's experiences, attitudes, and actions (Ettekal & Mahoney, 2017). Ettekal and Mahoney (2017) have found that the policies promulgated by government and its agencies, as well as quality demands by both the government and labour on the nature of TDE graduates, have both direct and indirect influences on students' attitudes towards TDE and, in most cases, help to define whether or not students will persist with TDE.

H4: There is a significant relationship between the characteristics of the external stakeholders and students' behavioural intentions to persist with TDE during the COVID-19 era and beyond.

Cultural and Norms Issues

Cultural and social norms are critical aspects of social beings that shape how they behave in a particular way and in a particular setting. These norms have a pervasive influence in shaping how students in universities view TDE and whether they will want to persist with it (Fenske, 2007). Cultural and social norms refer to the rules or expectations of behaviour within a specific cultural or social group, which are often unspoken and are used as standards of what is considered as either acceptable or unacceptable behaviour (WHO, 2009). Norms therefore relate to values, laws, customs, and resources that influence how a person thinks and acts in a particular setting (Fenske, 2007). An Exploring Your Mind (2020) study found that cultural and social norms have a significant influence on people's attitudes towards objects and ideas. In the same study, the use of technology in the teaching and learning process in universities was found to be part and parcel of the teaching and learning culture and norms; hence, these have a significant influence on the attitudes of university students towards TDE.

H5: There is a significant relationship between the cultural and norm issues and students' behavioural intentions to persist with TDE during the COVID-19 era and beyond.

Research Methodology

Research and Questionnaire Design

A quantitative approach was used for this study. A structured questionnaire was developed that had 5 dimensions and 28 items, as follows: characteristics of the student—5 items; characteristics of the instructor—6 items; characteristics of the institution—7 items; characteristics of the external environment—6 items; and cultural and norms issues—4 items. A 5-point Likert scale, from strongly disagree to strongly agree, was employed for data collection. The General Internet Attitudes Scale, developed by Joyce and Kirakowski (2015), and the Computer Attitudes Scale, developed Selwyn (1997), were used in the design of some questionnaire items. For the purpose of administering the questionnaires, the researcher sent soft copies of the questionnaire to academic faculties of the five randomly chosen universities in Zimbabwe for distribution to a selected 1,300 students over e-mails. An allowance of two weeks was given for students to complete and return the questionnaires; this is in line with the average number of days (12.21 days) it takes to complete an e-mail survey (Ilieva et al., 2002). One week was given as allowance for follow-ups. A total of 440 completed questionnaires were received from the following universities: X1 = 84; X2 = 101; X3 = 86; X4 = 81; and X5 = 88. The return rate was 33.8%, which is acceptable against a minimum benchmark of 33% for e-mail surveys (QuestionPro, 2020; Sinclare et al., 2012).

Population and Sampling

A quantitative approach located in a case study design was employed in this study. A case study is a systematic study of a single entity, individual, group, or unit, which researchers investigate in greater detail

and depth in relation to a number of variables (Creswell, 2015). Zimbabwe has 22 universities offering online TDE. Of these, five were randomly selected as cases to participate in the study. A sample of 1,300 students from a population of 74,000 students was selected from the five universities using a stratified random sampling strategy to ensure a proportionate number of students were selected from each university (Creswell, 2015). The sample size was determined using the Research Advisors' (2006) sample size table using a 95% confidence limit and a 2.5% margin of error. Distribution of students in the study sample from the five universities (X_i) was as follows: X1 = 244; X2 = 291; X3 = 396; X4 = 221; and X5 = 148. The sample profile is presented in Table 1.

Table 1 shows more students aged 25 years and under (58.6%) in the universities than in any other age category—this is a normal trend, owing to the fact that undergraduate enrolments always represent the largest group in universities. Universities are now recruiting more female students (53.9%) than male students (46.1%). Most university students are undergraduates (66%), which again is a normal trend, as there are more undergraduate students in universities than in any other programmes.

Table 1

Respondents' Biographic Factors

Factor	Item	%
Age (years)	≤ 25	58.6
	26–30	35
	≥ 30	6.4
Gender	Male	46.1
	Female	53.9
Program pursued	Bachelor's degree	66
	Master's degree	30.4
	Doctoral degree	1.7
	Other	1.9

Results

The Software Package for Social Sciences (SPSS) version 24 was used for data analysis. Structural equation modelling using Amos version 22 was eployed to establish the nature of the relationship between the five independent variables—characteristics of students (CS), characteristics of lecturer (CL), characteristics of institution (CI), characteristics of external stakeholders (CES), and cultural and norms issues (CNI)—and the dependent variable, behavioural intentions (BI).

Data Validation

The researcher validated the data collected using the following tests: data normality, nonresponse bias, common method bias, composite reliability, convergent validity, and discriminant validity.

Normality Test

It is important for quantitative data that involves testing relationships between variables to be assessed for data normality. SPSS 24 was used in the study to test for data normality: the researcher used histograms, box plots, and visual observations of normal quantile–quantile (Q–Q) plots SPSS 24 to demonstrate the normality of the data collected. Further confirmation of the data's normality was done using the *Z* score, where for all data entries, the *Z* score ($n = 440$) was in the range of −2.326 to 2.326 at the 1% level of significance (Base, 2018; McLeod, 2019).

Common Method Bias Test

Common method bias (CMB), also called common method variations, relates to variations that occur as a result of the instrument used rather than the respondents' actual characteristics (Rodríguez-Ardura & Meseguer-Artola, 2020). To detect the presence of CMB in the study, the CMB assessment tool developed by Bagozzi et al. (1984) was used. In the current study, the researcher detected the presence of CMB by examining the correlation matrix between all research constructs. It was found that the correlation matrix between each pair of constructs was less than .9, which demonstrated that there was no threat of CMB in the study data (Rodríguez-Ardura & Meseguer-Artola, 2020).

Nonresponse Bias Test

The test for nonresponse bias (NRB), as articulated by Armstrong and Overtone (1977), where research should compare the means of each item of the first n respondents and of each item of the last n respondents, was used in the study. From the 440 respondents, the researcher compared the means of each item of the first 100 respondents and of each item of the last 100 respondents and found no significant differences; hence, it was concluded that the current study was not affected by nonresponse bias.

Convergent Validity Measurement

The results in Table 2 show the application of Amos 25, which was used to estimate the measurement model fit in the study. The indices used in estimating model fit include the following: the CMIN/Degrees of freedom ($\chi 2/df$), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the normed fit index (NFI), the Tucker–Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Table 2 shows that at the initial stage, the measurement model fit analysis had fit indices that affected data clarity as they were less than .7 (Hair et al., 2014). For data clarity (Hair et al., 2017), therefore, all items for λ and $I\alpha$ that were less than .7 were removed from the overall data and the measurement model.

Table 2

Measurement Model Fit Indices

Model fit indices	Initial measurement model	Final measurement model	Recommended values
χ^2/df	1.553	1.565	≤ 3.000
GFI	0.958	0.967	≥ 0.950
AGFI	0.902	0.970	≥ 0.900
NFI	0.925	0.964	≥ 0.950
TLI	0.951	0.961	≥ 0.950
CFI	0.926	0.938	≥ 0.900
RMSEA	0.051	0.055	< 0.080

Note. Assessment of model fit was done for the second time, giving an improved model fit. The following data items were therefore removed: CS4, CL2, CL6, CS1, CS2, CS7, CES2, CES4, and CNI2. GFI = goodness of fit index; AGFI = adjusted goodness of fit index; NFI = normed fit index; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation (Hooper et al., 2008; Kline, 2005).

Table 3 shows the model fit indices—namely, composite reliability (CRα), standardized factor loadings (λ), average variance extracted (AVE), Cronbach's alpha reliability (α), individual dual item reliabilities (squared multiple correlations) (Iα), and critical rations (CR), which were used to confirm convergent validity of the data. All the indices were above the minimum benchmarks for confirming the convergent validity of the data as shown by all λ > .6 (Bagozzi & Yi, 1988); all Iα > .5 (Kwan & Chan, 2014); all CR > 2 and significant at $p < .01$ (Gao et al., 2008); all α > .7 (Hair et al., 2017); and also CRα > .0 (Hair et al., 2014). Additionally, all AVE values were > .5 (Fornell & Lacker, 1981).

Table 3

Convergent Validity Measurement

Model constructs	Items	λ	Iα	CR	α	CRα	AVE
CS	CS1	.751	.783	-	.830	.833	.715
	CS2	.803	.649	28.117*	-	-	-
	CS3	.815	.704	26.019*	-	-	-
	CS5	.749	.744	23.572*	-	-	-
CL	CL1	.810	.791	-	.800	.821	.648
	CL3	.833	.801	21.361*	-	-	-
	CL4	.761	.825	19.447*	-	-	-
	CL5	.819	.759	15.401*	-	-	-
CI	CI3	.845	.748	-	.761	.766	.734
	CI4	.861	.801	27.563*	-	-	-
	CI5	.773	.759	24.248*	-	-	-
	CI6	.826	.801	21.647*	-	-	-
CES	CES1	.805	.739	-	.788	.791	.662

	CES3	.793	.754	25.613*	-	-	-
	CES5	.759	.801	23.80	-	-	-
	CES6	.827	.763	20.391*	-	-	-
CNI	CNI1	.847	.794	-	.803	.816	.719
	CNI3	.796	.802	18.447*	-	-	-
	CNI4	.851	.783	14.269*	-	-	-

Note. Λ = standardized factor loadings; Iα = individual dual item reliabilities (squared multiple correlations); CR = critical rations; α = Cronbach's alpha reliability; CRα = composite reliability; AVE = average variance extracted; CS = characteristics of students; CL = characteristics of lecturer; CI = characteristics of institution; CES = characteristics of external stakeholders; CNI = cultural and norms issues. CR is fixed.

* $p < .001$.

To confirm discriminant validity of scale items, the relationship between the square roots of AVE (bold diagonal values) for each construct were compared with the vertical correlations of the constructs (Hair et al., 2014). The results in Table 4 show that diagonal loadings are greater than their corresponding vertical loadings of each construct, demonstrating the scale items' discriminant validity. Table 4 also shows that all constructs were positively associated with each other, which means that a change in any one of the constructs positively impacted the others.

Table 4

Discriminant Validity Measurement

Variables	AVE	*M*	*SD*	CS	CL	CI	CES	CNI
CS	.715	3.84	0.71	**.846**	-	-	-	-
CL	.648	3.81	0.67	.315**	**.805**	-	-	-
CI	.734	3.95	0.59	.629**	.721**	**.857**	-	-
CES	.662	3.79	0.68	.401**	.604**	.755**	**.814**	-
CNI	.719	3.61	0.69	.522**	.613*	.643*	.381*	**.847**

Note. AVE = average variance extracted; *M* = mean; *SD* = standard deviation; CS = characteristics of student; CI = characteristics of institution; CES = characteristics of external stakeholders; CNI = cultural and norms issue; CL = characteristics of lecturer.

* $p < .01$. ** $p < .001$; Bold diagonal values in the table represent the square roots of AVE values for each variable.

Hypotheses Testing Using the Structural Modelling Approach

In the results of the structural modelling, shown in Table 5, behavioural intentions to persist with TDE (BI) is taken as the dependent or exogenous variable, while characteristics of the student (CS), characteristics of the instructor (CL), characteristics of the institution (CI), characteristics of the external stakeholders (CES), and cultural norms and issues (CNI) are taken as independent or endogenous variables. The five hypotheses (H1–H5) were tested using the structural equation modelling in Amos 25. Assessment of the model fit showed that all the model fit indices were within the acceptable range: $\chi 2/df = 1.638$; GFI = .947; AGFI = .923; NFI = .971; TLI = .981; CFI = .969; and RMSEA = .551 (Hooper et al., 2008; Kline, 2005).

Table 5

Test of Hypotheses

Hypotheses	Hypothesized relationships	SRW	CR	*p*	Decision
H1	BI CS	.329	3.149	0.0007	Accepted
H2	BI CL	.362	3.394	0.0001	Accepted
H3	BI CI	.427	7.211	0.0004	Accepted
H4	BI CES	.279	5.271	0.0000	Accepted
H5	BI CNI	.325	7.371	0.0004	Accepted

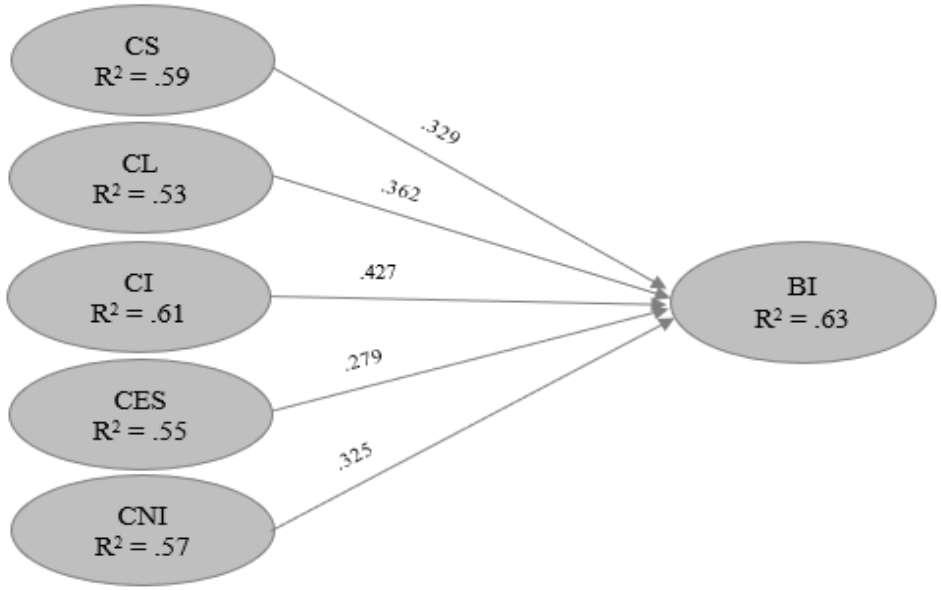
Note. SRW = standardized regression weight; CR = critical ratio; H = hypothesis; BI = behavioural intentions; CS = characteristics of students; CL = characteristics of lecturer; CI = characteristics of institution; CES = characteristics of external stakeholders; CNI = cultural and norms issues. CS(R^2 = .59); CL(R^2 = .53); CI(R^2 = .61); CES(R^2 = .55); CNI(R^2 = .57); BI (R^2 = .63).

* $p < .001$.

The results of the hypotheses testing in Table 5 show mixed results, with some variables significantly influencing BI and others not. Demonstrating that all five hypotheses were supported, the model's path analysis shows that the following factors significantly influence BI: CS (β = .329; $p < .001$), CL (β = .362; $p < .001$), CI (β = .427; $p < .001$), CES (β = .279; $p < .001$), and CNI (β = .325; $p < .001$). These results further show that CI had the highest influence on BI, followed by CL and CS. CES had the least influence on BI. The results in Table 5 as well as in Figure 2 show the explanatory power of the latent variables as follows: CS (59%), CL (53%), CI (61%), CES (55%), and CNI (57%); CI explained the highest and CNI explained the lowest variance on the BI of students to pursue TDE. This shows that the five latent variables were strongly supported by the model. The model as a whole explains 63% of the variation in university students' behavioural intentions to persist with TDE.

Figure 2

Path Coefficient of the Study



Note. CS = characteristics of student; CL = characteristics of lecturer; CI = characteristics of institution; CES = characteristics of external stakeholders; CNI = cultural and norms issues; BI = behavioural intention.

Discussion

The results of this study show that microsystem factors have a significant influence on the behavioural intentions of university students to persist with TDE during and beyond the COVID-19 era. Characteristics of students that include attitude towards technology, technology self-efficacy, interest, and social presence are important for the development of behavioural intentions to persist with TDE. This has also been confirmed in past studies. For example, Yang et al. (2017) and Fidalgo et al. (2020), in separate studies, found that students' characteristics including time management, technology self-efficacy, social presence, and interest are critical to the development of behavioural intentions to keep using TDE. The critical role of motivation, both intrinsic and extrinsic, in the use of technology for learning has also been highlighted as critical for university students' development of behavioural intentions to persist with TDE (e.g., Yang et al., 2017).

With regard to the characteristics of the instructor or lecturer, the results of this study show that the ways that lecturers prepare to teach and interact with students during both synchronous and asynchronous sessions have bearings on students' attitudes towards TDE, which in turn contributes to their behavioural intentions to persist with it. The technology self-efficacy of the lecturers, particularly, has been identified in various studies (e.g., Au et al., 2019; Tait, 2018) as having a critical role to play in the way lecturers teach and hence in the behavioural intentions of students to persist with TDE. This has been confirmed in earlier

studies. For example, Tait (2018) found that lecturers' competences, attitudes, and perceptions, as well as pedagogic attributes in terms of teaching facilitation and presence, are important for the students developing positive attitudes towards TDE. In their study, Au et al. (2019) also found that lecturers' technology self-efficacy is perhaps the most critical element in promoting effective facilitation of TDE that contributes to the development of students' positive attitudes towards TDE. Tait (2018) found that the lecturers' competences, attitudes, perceptions, and pedagogic attributes, in terms of teaching facilitation and presence, are important for students developing positive attitudes towards and persistence with TDE. Therefore, how lecturers conduct themselves while facilitating TDE, as well as their teaching abilities and knowledge of content, is critical.

Results also indicate that an institution's characteristics have a significant influence on the behavioural intentions of university students to persist with TDE during COVID-19 and beyond. The presence of up-to-date, adequate, and appropriate technological infrastructure at the universities as well as the level of support the students get from both the institutional management and the technology support teams are viewed as critical for the development of positive attitudes by students towards TDE, leading to the development of behavioural intentions to persist with the TDE during the COVID-19 era and beyond. Tait (2018) and Vanides (2018) found that the creation of a conducive learning environment at the universities, where students can easily access online learning resources; use online systems; and are able to interact with each other, with instructors, and with materials synchronously and asynchronously, and also where learning happens in a flexible and relaxing environment, is critical for the development students' behavioural intentions to persist with TDE.

Characteristics of external stakeholders, which are exosystem factors, also emerged as having a significant influence on university students persisting with TDE during and beyond COVID-19. The behaviour and pronouncements of external stakeholders such as government, workplaces and even community members with regards to TDE can make or break how students view the program and whether they will continue with the program. If stakeholders view the program in a negative way, then students will also view it in a negative way and may not want to continue with it. On the other hand, if stakeholders view it in a positive way through, for example, the government coming up with supportive policies and workplaces accepting graduates from the program, university students will also view the program in a positive way, and many may want to persist with the program. Several previous studies have alluded to the important role of external stakeholders in ensuring that university students persist with TDE. In their study, Ettekal and Mahoney (2017) found that the policies that government and its agencies promulgate, as well as quality demands on the nature of university graduates by both workplaces and government, have both a direct and indirect influence on how students view TDE and, in most cases, help to define whether or not the students persist with TDE.

It further emerged from the current study that culture and norm issues, as macrosystem factors, have a significant influence on the persistence by students with TDE during the COVID-19 era and beyond. Culture has always played a critical role in shaping how people think and act, and in the context of the current study, culture shapes and defines whether students support the idea of TDE (Ettekal & Mahoney, 2017) and are prepared to persist with it. If students therefore grow up in an environment, whether at school or outside, where the use of technology is an everyday occurrence, such students may find using technology for DE a

motivating experience and will be prepared to continue with it. At the same time, students who do not grow up in a culture of technology may find using technology for learning a very challenging task and may not develop behavioural intentions to persist with TDE even during COVID-19. This is confirmed in a study by Exploring Your Mind (2020), which found that the sociocultural environments in which students live can either support or oppose the culture of technology use for teaching and learning and hence may affect the behavioural intentions of students to persist with TDE.

Conclusion and Recommendations

This study sought to establish and explain the determinants of students' persistence with TDE in universities during the COVID-19 era and beyond. Based on the results, it was concluded that cultural and norms issues and characteristics of students, lecturers, institutions, and external stakeholders are critical determinants of university students' persistence with TDE. This suggests that the first important thing that universities need to do to ensure that their students continue with the TDE is to provide the necessary human and material resources to support programs. This could be done by creating a conducive e-learning environment with adequate modern technological resources, highly trained teaching and support staff, and consultative and supportive leadership. Also, government needs to come up with necessary and supportive policies that help to portray TDE in a positive manner and also help to ensure that TDE gets adequate support in terms of technology infrastructure and training.

Implications

This study opens an important window to and underwrites the critical role of TDE in general and during periods of pandemics, such as COVID-19. TDE has been shown to be a critical driver of access to education during disasters if factors that inhibit its success are adequately dealt with. Most importantly, this study has implications on both practice and policy with regard to the implementation of TDE in universities. Regarding practice, the study shows how TDE can be effectively implemented by identifying barriers to its implementation and how such barriers can be addressed. With regard to policy, the study can contribute to the development of policies by both government and industry that contribute to positive attitudes towards TDE, since one of the critical factors that affects effect implementation of TDE has been identified as attitudes.

Limitations

The study used a quantitative approach, which may have affected the depth and breadth of data collected about the behavioural intentions of university students to persist with TDE. Future studies may use a mixed-methods approach either to validate the current study's findings or to improve them.

Acknowledgements

The researcher wishes to thank all teachers and their institutional management for the successful completion of this study.

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