

Attitude to Information and Communication Technologies Use and Attrition Intention among Female Distance Learning Students

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Abstract:

Introduction: The purpose of this study is to determine the causal relationship between female distance learning students' attitudes to technology and attrition intention in distance learning programmes.

Methods: Leveraging a quantitative research design, 433 female distance learning students were randomly sampled from four learning centres in Northeastern Nigeria. The analysis of measurement and structural models of the data collected through online questionnaires was done with the aid of SPSS IBM version 29.0 and Smart PLS software version 4.0.9.2.

Results: The study found that technology behaviour has a significant causal relationship with attrition intention among female distance learning students. Meanwhile, technology affection and cognitive attitudes had no significant causal relationship with attrition intention among female distance learning students.

Discussion: This implies that students' behaviour toward technology use in terms of their access to technology resources contributed to the increase in intention to drop out of the distance learning programme in Northeastern Nigeria.

Limitations: The findings might not be generalisable to other regions, especially southern Nigeria.

Conclusions: The distance education stakeholders can use this study's outcome to devise ways of improving the completion rate among female learners, especially.

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Introduction

Technology has been acknowledged as an essential tool in the fast-growing education landscape, especially in facilitating distance learning (Faqih & Jaradat, 2021; Gause et al., 2022). Like many other countries in the world, Nigeria has also adopted the idea of leveraging technology to facilitate virtual learning (Adewale & Tahir, 2022; Jovičić et al., 2024) in distance learning programmes. This deliberate effort aims to enhance citizens' access to higher education. Distance education is purposefully designed to serve numerous objectives globally. Distance education could be described as an instructional means other than the traditional face-to-face form (Ofole, 2018). It accommodates the educationally disadvantaged, the working class, and married individuals who may not have access to traditional educational institutions. Open and distance education eliminates barriers caused by geographical location, job and programme rigidity to have access to education (Itasanmi, 2020).

Despite the beauty and numerous advantages of technology in enhancing access to education, studies (Lakhal et al., 2021) have revealed that several factors, including attitudes towards technology use, can influence the retention and persistence of students in distance learning programmes. The education gap that has been a significant cause of gender inequality (Adewale & Potokri, 2023a) has widened because female students are among those suffering from attrition from distance learning programmes.

Attrition remains a concern in distance learning programmes, with several factors contributing to students' intention to quit. Despite the incremental expansion of distance learning programmes and their ability to admit many applicants, Ofole (2018) observed that distance education still has the highest rate of attrition of students. Attrition is a deliberate attempt by any individual to quit a programme or an activity (Adewale & Potokri, 2023b). In a similar study, Ferrándiz et al. (2022) reiterated that students' attrition usually has socio-economic and personal effects. Understanding the relationship between attitudes towards technology and attrition intention among female distance learning students is essential for devising support mechanisms to enhance retention rates and improve education endeavours.

Therefore, this study examines the attitude towards technology use among female distance learning students vis-à-vis attrition intention in northeastern Nigeria. It is strongly believed that the outcome of this study will benefit the educational stakeholders in making informed decisions.

Research Questions: This study is poised to answer the following questions: i) how does the study scale perform in terms of convergent and discriminant validity cum reliability? ii) What variance did the model variables Theraccount for in the criterion variable (attrition intention in distance learning programmes? iii) Does the measurement model that describes the causal relationship between affective, behavioural, cognitive, and attrition intention among female distance learning students fit?

1 Literature review

1.1 Conceptual framework and hypotheses development

This study used a conceptual framework that shows a direct relationship between female distance learning attitudes toward ICT and attrition intention.

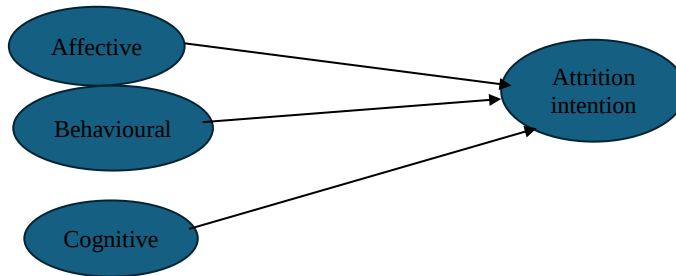


Figure 1. Conceptual model.

1.2 Theoretical framework

The understanding of the interplay between attitudes towards technology and attrition intention among female distance learning students in Nigeria is anchored on the theory of perceived behaviour (TPB) (Huang, 2023). According to Azjen (2012), the theory of perceived behaviour advances the theory of reasoned action (TRA). Attitudes, subjective norms, and perceived behavioural control collectively shape students' intentions to persist or discontinue their participation in distance learning programmes. Using the TPB lens to examine these factors, this study intends to unravel mechanisms driving technology use and attrition among female learners, thus informing targeted interventions to enhance retention rates and promote equitable access to education in Nigeria. According to TPB, attitudes are key predictors of behaviour (Wang et al., 2022). Therefore, in the context of technology use in education, attitudes encompass

beliefs about the perceived usefulness and ease of use of technology. Female distance learning students' attitudes towards technology are influenced by factors like previous experience with technology, perceived benefits in terms of learning outcomes, and perceived barriers in terms of technical difficulties and cultural norms.

Subjective norms are the perceived social pressure regarding a particular behaviour. Subjective norms in the context of female distance learners in Northeastern Nigeria may include expectations concerning women's educational roles, family support for pursuing DL and peer influences. Perceived behavioural control refers to an individual's assessment of their ability to perform a behaviour. This study includes factors such as self-efficacy and access to technology resources, such as internet connections and devices. Previous studies on students' attitudes in technical and vocational education and training have also used TPB (Rathidevi & Sudhakaran, 2019). Intention, according to TPB, is a proximal determinant of behaviour. Therefore, female distance learning students' attrition may be determined by their affective, behavioural, and cognitive technology attitude (Ayanwale et al., 2023).

1.3 Hypotheses development

It has become impossible to separate distance education and information and communication technologies (Arthur-Nyarko et al., 2020). Technologies have become a popular means of transmitting learning in distance education. Interestingly, it can contribute to the persistence and non-persistence of students in open and distance education programmes. In their investigation of what causes students to drop out of open and distance education, Yılmaz and Karataş (2022) categorised the causes into internal and external factors. They explained further that these factors connect with students' characteristics, such as students' skills, study habits, and technical equipment facilities, which are among the factors that originate from the students' end. In a study conducted in Pakistan, Hussain and Akhter (2016) found that students had a general interest in technology, which determined their behaviour towards it. In the study conducted by Itasanmi (2020), insufficient learning resources and a lack of awareness were related to the usage of open education resources among distance learning students in Southwestern Nigeria. Earlier studies have considered several factors as the determinants of students' attitudes to persistence and completion of open and distance education programmes worldwide (Arthur-Nyarko et al., 2020). It has also been found that three dimensions, affective, behavioural and cognitive, determined the attitudinal disposition of learners to engage in online learning (Jaggars, 2014).

Furthermore, it was found that technological barriers contributed to the wrong proposition that students were unwilling to participate in the online learning

mode (Yeh & Tsai, 2022). Many students face challenges in accessing virtual learning environments due to technological barriers. A significant obstacle is the limited availability of devices, which prevents many from actively participating in online learning. In addition, some students perceive virtual learning platforms as unfamiliar and challenging to navigate, creating discomfort and uncertainty.

Consequently, addressing these technological barriers is imperative for promoting equitable access to education and fostering inclusive learning environments. Efforts to mitigate these challenges must prioritise initiatives to enhance students' access to requisite technological resources and provide comprehensive support to facilitate their seamless transition to online learning modalities.

Therefore, it is hypothesised as follows that:

- H1: There is a significant relationship between affection attitude to technology and female distance learning students' attrition intention.
- H2: There is a significant relationship between behavioural attitude to technology and female distance learning students' attrition intention.
- H3: There is a significant relationship between cognitive attitude to technology and female distance learning students' attrition intention.

2 Methodology

This study employed a quantitative research design to explore the influence of technology use attitude on attrition intention among female distance learners in Nigeria. The study sampled female students in the Northeastern part of Nigeria. Nigeria's Northeastern region comprises six states: Borno, Yobe, Adamawa, Bauchi, Gombe and Taraba. The area is at an educational disadvantage and has been battling Boko haram insurgency for the past 13 years, which has made the residents opt for distance education as a last resort.

2.1 Sample and its characteristics

The participants were sampled randomly from all the distance learning centres in Northeast Nigeria. In this study, 433 female distance learners from the northeastern region completed the online survey to examine their attitude to technology use as it determines their attrition intention in the distance education programme. The majority of the participants were in year 4, and they were 148 (34.2%), year three 76 (17.6%), year five 73 (16.9%), year one 55 (12.7%), year six 41 (9.5%) and year two 40 (9.2%).

In terms of marital status, 268 (61.9%) were single, 161 (37.2%) were married, and 4 (0.9%) were divorced. Meanwhile, 60 (13.9%) enrolled for certificate programmes, while 44 (10.2%), 263 (60.7%), and 66 (15.2%) were for diploma, bachelor, and postgraduate programmes, respectively.

2.2 Data collection

The researcher designed a Google Form to collect data from the participants. The Google form has three sections: A, B and C. Section A sought demographic information of the participants, while sections B, C and D have 5, 8 and 7 items on the three constructs (affective, behaviour, cognitive) of students' attitude to technology use and attrition intention in the distance learning programme, respectively. The questionnaire items were adopted from the study conducted by Romero Martínez et al. (2020). The items were rated on 5 Likert responses (strongly agree = 5, agree = 4, neutral = 3, disagree = 2, strongly disagree = 1). The instrument yielded a 0.77 Cronbach's alpha coefficient.

2.3 Ethical considerations

The research received formal approval from the university's ethical committee. As part of the ethical considerations in the study, the informed consents of all the participants were sought and received in writing. The purpose of the study was duly explained to the participants, and how the collected data were processed and kept. Participation in this study was voluntary at all stages of the study. Similarly, the participants could opt out of the study at any stage. The anonymity of the participants was also maintained as none of their identities was revealed.

2.4 Data analysis

This study employed partial least squares structural equation modelling (PLS-SEM) with the aid of SmartPLS software version 4.0.9.2 for data analysis. However, the statistical package for social sciences (SPSS) version 29.0 was used to organise, cleanse, and handle missing data before importing it into the SmartPLS 4.0.9.2 for further analysis. The measurement and structural model in this study were analysed using SmartPLS software.

3 Results

The results are presented here based on the questionnaire purposefully used to gather data in the field. This study examined the interrelationship between the observed variables (perceived attitude of female distance learning students to ICT use as measured by three constructs, affective (AFF), behaviour (BE), and cognitive (COG) and the latent variable (attrition intention (ATR)). This stage was in two phases. Phase one was to determine the data integrity, which was actualised using SPSS version 29 to cleanse the data and deal with the missing data. For the second phase of the analysis, PLS-SEM was used to analyse and appraise the measurement model (construct validity and reliability) and structural model (Ayanwale et al., 2023).

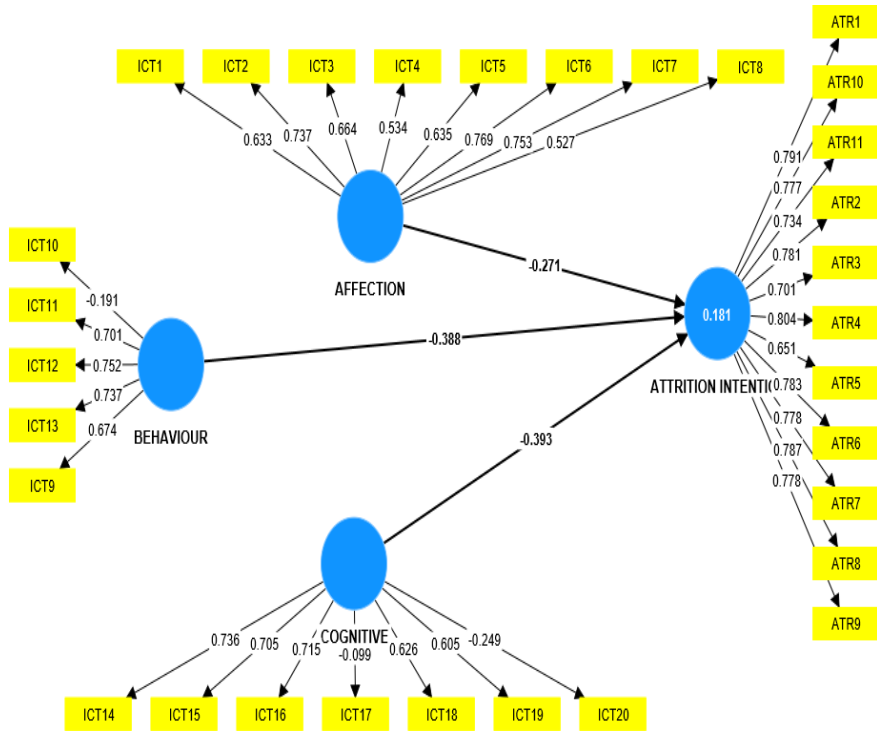


Figure 1. Hypothesised/Measurement model estimates.

Some items in the construct have outer loadings less than 0.60, which eventually affected the AVE of all the constructs of the exogenous variable. As shown in Figure 2, technology affection has some indicators whose outer loading is 0.70, such as ICT1 (0.633), ICT3 (0.664), ICT4 (0.534), ICT5 (0.635) and ICT8 (0.527). As for behaviour, the indicators whose outer loading is 0.70 include ICT9 (0.674), ICT 10 (-0.191), while cognitive ICT17 (-0.099), ICT18 (0.626), ICT19 (0.605) and ICT20 (-0.249). After deleting all items with loadings less than 0.70, the remaining items that have 0.70 and above are recommended by Hair et al. (2017). The AVE increased and fell between 0.579 and 0.72, as revealed in Table 1.

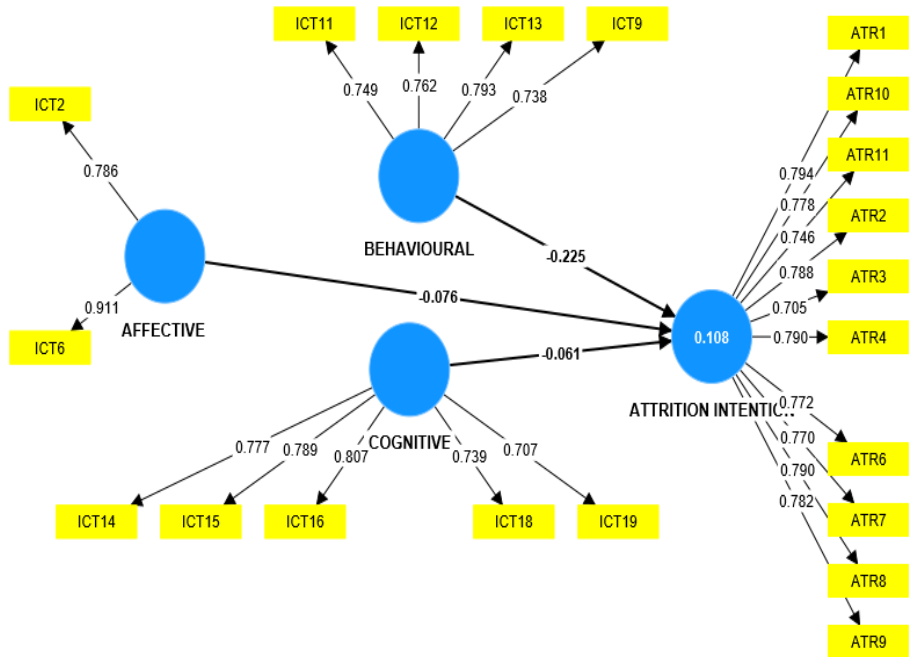


Figure 2. Re-specified measurement model estimates.

Table 1

Summary of the measurement model

<i>Variable</i>	<i>Indicator</i>	<i>Item loading</i>	<i>CA</i>	<i>CR</i>	<i>AVE</i>
Attrition intention	ATR1	0.794	0.925	0.936	0.596
	ATR2	0.788			
	ATR3	0.705			
	ATR4	0.790			
	ATR	0.772			
	ATR7	0.770			
	ATR8	0.790			
	ATR9	0.782			
	ATR10	0.778			
	ATR11	0.746			
ICT affection	ICT2	0.786	0.631	0.839	0.724
	ICT6	0.911			
ICT behaviour	ICT11	0.749	0.759	0.846	0.579
	ICT12	0.762			
	ICT13	0.793			

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ICT cognitive	ICT14	0.777	0.825	0.875	0.584
	ICT15	0.789			
	ICT16	0.807			
	ICT18	0.739			
	ICT19	0.707			

Regarding the reliability of the study, it is essential to note that reliability measures were assessed using Cronbach's alpha values, which varied between 0.63 and 0.92. This range is deemed acceptable according to Taber (2018), indicating a satisfactory level of internal consistency within the measured constructs. Furthermore, the composite Reliability (CR) values, ranging from 0.83 to 0.93, were evaluated, surpassing the recommended threshold of 0.70 as stipulated by Hair et al. (2022). These CR values affirm the robustness of the constructs' measurements and indicate a high degree of reliability in the study's findings. Thus, based on both Cronbach's alpha and CR values, it can be concluded that the measurements utilised in this study demonstrate strong reliability, enhancing confidence in the validity and consistency of the research outcomes.

When conducting an evaluation of the measurement, a researcher must ensure that the issue of collinearity has been settled by assessing the Variance Inflation Factor (VIF) (Huang, 2021). A VIF that is above the threshold of 5 indicates a collinearity problem. This study has a VIF between 1.270 and 2.560, which falls below the threshold. This suggests that collinearity is not a significant concern in this analysis. Consequently, the reliability of the regression coefficients and the validity of the interpretation of the results are enhanced, proving greater confidence in the study's findings.

Table 2

Discriminant validity

	<u>Affection</u>	<u>Attrition intention</u>	<u>Behavioural</u>	<u>Cognitive</u>
Affection	0.851			
Attrition intention	-0.258	0.072		
Behavioural	0.634	-0.318	0.761	
Cognitive	0.640	-0.275	0.735	0.764

As shown in Table 2, a Fornell-Larcker criterion result shows that discriminant validity, which is determined by the square root of AVE (Ayanwale et al., 2023; Lakhal et al., 2021), must at the same time be greater than the correlation between the reflective construct and other constructs. As shown in Table 2, the study used the Fornell-Larcker result to show that the measurement has good discriminant validity. The square root of AVE was higher than the correlation

between each construct. Thus, the model's discriminant validity has been confirmed since the constructs were distinct. Overall, the variables in the model are not only reliable but also have good convergent validity.

Table 3

<i>Measurement model fit</i>		
	<i>Value</i>	<i>Remark</i>
SRMR< 0.08	0.060	Supported
d_ ULS<HI 95	0.844	Supported
d_ G<HI 95	0.353	Supported

Oluwajana et al. (2019) suggested that a PLS-SEM can be used to determine the values of several latent variables and measured variables. As such, multi-category fit measurements were used to determine the model fit in this study. Ayanwale et al. (2023) reiterated that measuring the model fit requires Unweighted least square discrepancies (d_ ULS), and standardised mean square residual (SRMR) must be considered when determining the model fit. Thus, Table 3 indicates the (SRMR)<0.08, d_ ULS<HI 95 signifying a satisfactory level of fit in this study, and d_ G<HI 95 further supporting the adequacy of the fit.

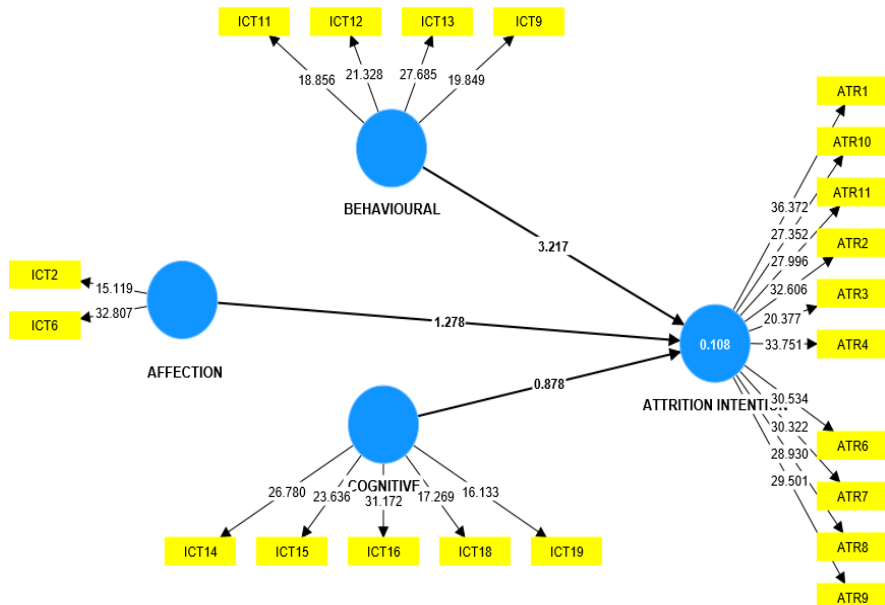


Figure 3. Structural model.

Table 4

Relationship between variables in the model

<i>Casual relationship</i>	<i>B</i>	<i>SD</i>	<i>T</i>	<i>P</i>	<i>Reported</i>
Affection -> Attrition intention	-0.076	0.060	1.278	0.201	Not supported
Behavioural -> Attrition intention	-0.225	0.070	3.217	0.001	Supported
Cognitive -> Attrition intention	-0.061	0.070	0.878	0.380	Not Supported

3.1 Structural model assessment

An indicator of path coefficient significance is the extent to which a variable establishes a causal relationship with an endogenous variable. Path coefficient significance in PLS-SEM is measured with a bootstrap p-value. To achieve this estimation, the researchers used the bootstrapping method to determine the t-values and p-values of the causal relationship. Similarly, a series of random samples was embarked on to replace the original sample. The researchers compared the average values of the new samples with the original sample, and the results of the 5000 bootstrap resamples are presented in Figure 3 and Table 4.

H1: There is a significant relationship between affection attitude to technology and female distance learning students' attrition intention.

Table 4 revealed that affection attitude to technology ($B=-0.076$, $t=1.278$, $p=0.201>0.05$) has no significant relationship with female distance learning students' attrition intention. Therefore, the alternative hypothesis stating that there is a significant relationship between affection attitude to technology and female distance learning students' attrition intention is not supported. This outcome implies that the variable does not contribute to attrition intention among female distance learning students in northeastern Nigeria.

H2: There is a significant relationship between behavioural attitude to technology and female distance learning students' attrition intention.

Table 4 revealed that behaviour attitude to technology ($B=-0.225$, $t=3.217$, $p=0.001<0.05$) has a significant relationship with female distance learning students' attrition intention. Therefore, the alternative hypothesis stating that there is a significant relationship between behaviour attitude to technology and female distance learning students' attrition intention is supported. This outcome implies that the variable does not contribute to attrition intention among female distance learning students in northeastern Nigeria.

H3: There is a significant relationship between cognitive attitude to technology and female distance learning students' attrition intention.

Table 4 revealed that cognitive attitude to technology ($B=-0.061$, $t=0.878$, $p=0.380>0.05$) has no significant relationship with female distance learning students' attrition intention. Therefore, the alternative hypothesis that there is a significant relationship between cognitive attitude to technology and female distance learning students' attrition intention is not supported. This outcome implies that the variable does not contribute to attrition intention among female distance learning students in northeastern Nigeria.

4 Discussion

In this study, it was found that there is no significant causal relationship between affection attitude to technology and female distance learning students' attrition intention. This presupposes that this outcome challenges the assumption that an affective attitude towards technology universally influences attrition intentions among female distance learning students in northern Nigeria. It implies that factors beyond affective responses to technology, such as socio-cultural influences, institutional supports, and personal motivations, may have a greater impact on attrition intention and rates. This disagrees with Yılmaz and Karataş's (2022) and Ferrari and Fabbri's (2022) findings that students' affection for technology will dwindle when they notice instructors' knowledge insufficiency. Guillén-Gámez et al. (2020) also found a positive causal relationship between the affection dimension and the integration and use of ICT in distance education. A significant causal relationship was found between technology behaviour and attrition intention among female students in the distance learning programme in Northeastern Nigeria. This outcome suggests that it is not just the perceptions and beliefs of female distance learners in higher institutions about technology integration and use in their programmes that matter. This means interventions to reduce attrition rates among female distance learning students in Northeastern Nigeria must promote positive and effective technology usage habits rather than solely targeting students' cognitive attitudes towards technology. This finding aligns with the outcome of the study conducted by Yılmaz and Karataş (2022), the students' behaviour may be affected when the resources needed to learn in the open and distance education are not available and accessible. This alignment suggests that how students interact with technology, such as their actual usage patterns and behaviour, can significantly impact their academic outcomes and retention rates in distance learning programmes. This may be a result of weak student-instructor interaction in the online distance education programmes (Jaggars, 2014).

Lastly, this study did not support the causal relationship between the cognitive dimension of attitude to technology use and attrition intention among female

distance learning students in the Northeastern part of Nigeria. This outcome suggests that factors beyond just cognitive attitudes towards technology use may be at play in influencing attrition intentions among female distance learning students in the northeast region of Nigeria. It also indicates that other variables, such as socioeconomic factors, access to resources, or institutional support systems, may significantly impact attrition rates. In addition, the cultural context may have also influenced this finding. This disagrees with the study conducted by Guillén-Gámez et al. (2020), which found a strong positive causal relationship between cognitive dimension and integration and use of ICT in distance education.

4.1 Implication of the study

The findings of this study have some implications for the educational stakeholders (policymakers, administrators, instructors, parents, and students) of distance education globally. Since the findings have supported a positive relationship between technology behaviour and attrition intention among female distance learning students in Northeastern Nigeria, distance learning administrators and instructors should introduce practical strategies to endear the use of technology into the hearts of female students and engage them digitally regularly. Two-way, periodic, and regular training for instructors and female learners is paramount to upscale students' digital knowledge and interest.

Policymakers are urged to adopt a comprehensive approach to addressing attrition rates among female distance learning students in Northeastern Nigeria. The revelation of a negligible causal relationship between affective attitudes towards technology use and attrition intentions challenges the widely held assumption of its universal influence. To effectively combat attrition, distance education policymakers must, as a matter of urgency, integrate socio-cultural dynamics, institutional support structures, and individual motivations into their strategies. Moreover, policies should foster positive technology usage habits rather than exclusively concentrating on cognitive attitudes towards technology. Leaders in education management must also recognise the limitations of a uniform approach solely targeting students' attitudes towards technology. There is a need for a shift towards promoting effective technology use and enhancing interaction between students and their instructors in online programmes.

Furthermore, education administrators within education institutions are tasked with prioritising interventions to cultivate positive and effective technology usage behaviours among female distance learning students. The substantiated causal relationship between technology behaviour and attrition intentions underscores the critical need for nurturing a supportive ecosystem that encourages students to engage constructively with technology. Educational

administrators should also strive to enhance interactions between students and instructors to rectify deficiencies in online distance education programmes.

The findings of this study also imply that instructors have a significant influence on moulding students' technology behaviour and attitudes. Therefore, instructors must ensure equitable access to necessary resources for compelling learning experiences in distance learning settings. Furthermore, instructors should augment their technological proficiency to sustain students' engagement and prevent attrition. By fostering an inclusive and interactive learning environment, instructors can profoundly impact students' academic achievement (predominantly female students) and retention rates.

Parents of female distance-learning students must understand the multifaceted nature of factors contributing to attrition rates. While cognitive attitudes towards technology use may not directly correlate with attrition intentions, socio-economic circumstances, resource accessibility, and institutional support, frameworks exert substantial influence. Parents can improve their children's educational journey by advocating for enhanced resources and necessary support mechanisms within distance education institutions, enhancing academic success and retention.

Moreover, female distance learning students are encouraged to acknowledge the essential role of their technology behaviour in shaping attrition intentions. Rather than exclusively focusing on cognitive attitudes towards technology, students should actively engage with technology positively and purposefully. Proactively seeking out available resources, actively participating in interactive learning endeavours, and fostering robust relationships with instructors can significantly improve academic outcomes and reduce attrition rates. In addition, students should endeavour to remain cognisant of socio-cultural influences and seek assistance when navigating challenges in their distance learning programme.

4.2 Limitations and suggestions for further studies

It must be noted that the study was conducted in the four distance learning centres (Maiduguri, Yobe, Bauchi and Adamawa) in the Northeastern region of Nigeria. Hence, the findings might not be generalisable to other areas, especially southern Nigeria. The study also predominantly relied on the self-reported data from the female students, which may not be free from bias and may not accurately represent the participants' attitudes to technology use. Similarly, perspectives of other distance learning stakeholders, including parents, administrators, community leaders and instructors, regarding the perceived attitude of female distance learning students were not included in this study. Therefore, future studies should conduct a comparative study of gender, region, level and programme type regarding their technology attitude as it affects attrition intention in distance learning programmes.

Conclusions

The instructors should adapt pedagogical approaches to align with the needs and preferences of female distance learning students. The government should ensure equitable access to technology resources and reliable internet connectivity, especially for female distance learning students. This can be through government subsidies for internet services, provision of low-cost or free technology devices, and infrastructure development in remote areas in the region.

Policymakers and DL administrators should offer flexible learning options such as recorded lectures to accommodate the diverse needs of female distance learning students. It is therefore concluded that challenges facing the attitude of females towards technology use and attrition intention in distance learning can be addressed if the recommendations are implemented.

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