

## **Polytechnic Science Lecturers' Intention to Use ICT as a Tool in Northeast Nigeria: A Smart PLS Approach**

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### **ABSTRACT**

This study appraises the intention of educators to use computer technology for teaching and learning in Northeastern Nigeria, a region comprising Adamawa, Bauchi, Borno, Gombe, Taraba and the Yobe States. Although the Nigerian government has provided computers for teaching and learning, they are underutilised. A survey was conducted to validate items recorded in past studies. The Technology Acceptance Model (TAM) was employed as a theoretical framework. The Bootstrapping Algorithm with SmartPLS was applied for modelling interaction with 269 subjects from the targeted populations of 715 science lecturers from Northeast Nigeria. Several studies affirmed a significant influence of perception of usefulness and perception on ease-of-use on attitude towards technology acceptance and were validated in different behavioural intention to use. Perceived usefulness and ease-of-use explain individual attitude and directly influence intention. This study investigates influence attributes of the Technology Acceptance Model (TAM) towards use of the computer as a teaching aid among lecturers in Nigeria. Constructs based on TAM (perceived usefulness, ease-of-use and attitude on behavioural intention to use a computer) also supported the impact of perceived ease-of-use on perceived usefulness

and towards the lecturers' attitude. Overall, variance explained indicated 40%. The result verifies TAM as robust and can be applied within different cultures. This implies that teaching in polytechnics and other institutions of higher learning can be improved if computers and training to facilitate ease-of-use are provided for lecturers.

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## INTRODUCTION

Davis (1989) on technology acceptance model (TAM) ascertained that attitudes could predict behavioural intention. TAM established that perceived usefulness and perceived ease-of-use could foretell attitude towards technology acceptance. Perceived usefulness is the extent to which one can

use a system to enhance his or her job performance, while ease-of-use is the extent to which one feels that system is not complicated to use. Attitude is defined as the extent to which one has an optimistic/pessimistic assessment towards technology usage. Behavioural intention measures the strength of the individual's intention to perform a specific task (Davis, 1989). TAM is illustrated in Figure 1.

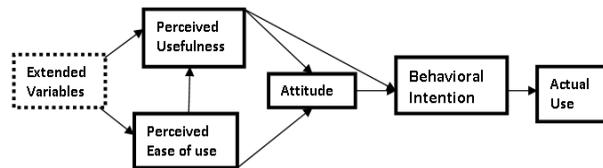


Figure 1. Technology acceptance model (Davis, 1989)

Several studies focussed on testing the sturdiness and power of the questionnaire instruments developed and used by Davis, Bagozzi and Warshaw, (1989, pp. 982–1003). TAM has been widely applied in a variety of studies in social sciences, including technology acceptance based on trust (Ashraf, Thongpapanl, & Auh, 2014; Kim, Lee, Mun, & Johnson, 2016; Ayodele, Oga, Bundot, & Ogbari, 2016; Solomon, Alina, & Eta, 2015). TAM has also been integrated towards structural modelling technology acceptance (Ali & Khalil, 2013; Loiacono, Watson, & Goodhue, 2007) and use in education (Delen & Bulut, 2011; Draper, 2010; Lee & Lehto, 2013; Mai, 2015).

This study investigated the influence of behavioural intention and the effect of perceived ease-of-use towards technology usage based on TAM. In this study computer use was considered the target technology, while science lectures in Northeast Nigeria were considered the sample framework. Considering the technology acceptance model (Davis, 1989), however, this study reoffered five hypotheses based on the model shown in Figure 1, as given below:

- H<sub>1</sub>: Perceived ease-of-use has a significant effect on the attitude of lecturers towards intention to use a computer.
- H<sub>2</sub>: Perceived ease-of-use significantly affects lecturers' perception of usefulness towards using a computer in teaching.

- H<sub>3</sub>: Perceived ease-of-use significantly affects science lecturers' behavioural intention towards using a computer in teaching.
- H<sub>4</sub>: Perceived usefulness significantly affects science lecturers' behavioural intention towards using a computer in teaching.

- H<sub>5</sub>: The attitude of science lecturers significantly affects behavioural intention towards using a computer in teaching.

Figure 2 illustrates the hypothetical framework of this study based on TAM (Davis, 1989, pp. 319–340).

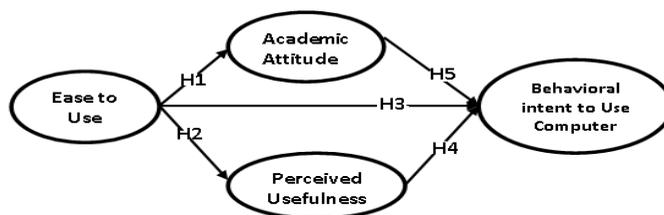


Figure 2. Hypothetical framework

## RELATED LITERATURE

### Behavioural Intention towards Technology Usage

Nor Khalil and Pearson (2007, pp. 1–10) adopted TAM to predict a more serious use of multimedia learning among a proportional number of 362 students. Loiacono, Watson and Goodhue (2007, pp. 51–87) combined TAM and TRA as a foundation to build up a set of instruments that may be accustomed to evaluating consumers' awareness of the specific site and identified 12 dimensions that had strong measurement validity. A number of scientific studies deemed TAM salient in the direction of predicting behavioural intention to make use of technology in a learning setting, including Oshinaike and Adekunmisi (2012) and Shittu, Fakomogbon, Gambari and Owodunni (2016). Other studies deemed

TAM best suited among other theories of technology acceptance, including Hsiao and Yang (2011), Ankit and Bisht (2012), Ali and Nor Khalil (2013) and Solomon et al. (2015), who confirmed the potential power of TAM attributes along with other technology acceptance factors mentioned in other theories. Conclusively, this study related to investigating the potential strength of TAM in relation to using a computer to aid information search in Nigeria.

Cultures in Northeastern Nigeria have significantly affected the belief system, attitude and behavioural intention towards technology use. However, there may be lecturers from other parts of the country who are use computers to teach science (Srite, 2006, p. 9). This study tested the Technology Acceptance Model and behavioural intention towards using ICT in teaching science.

**METHODOLOGY**

This is a quantitative study due to the nature of the problem and location of the researcher (Creswell, 2014). The number of participants was 715 and a random sample of 349 participants was chosen based on sample size determination suggested by Krejcie and Morgan (1970). The target population was the academic staff from Northeastern Nigeria including Gombe, Bauchi Adamawa, Yobe and Taraba states, where technology acceptance is slow due to resistance to Western education as well as religious values (Ukiwo, 2007). The pilot test carried out justified that all the Cronbach’s Alpha values were over 0.7 (Awang, 2014, p. 63) and the factor loading was over 0.7. The t-statistic and (R2) were used to justify model fitness.

**RESULTS**

A total of 349 sets of a questionnaire were provided to the target participants, numbering 715, with a return rate of 85%. The final number of participants was 269, with males representing about 70% of the participants. Most of the participants were in the age group of 30-39 (32%) and most had one to three years of experience (31%).

**Assessment of Measurement Model**

Convergent validity is accomplished whenever the factor loading is statistically above 0.7. A t-statistic above  $\pm 1.96$  indicates a significant value (Wong, 2013, pp. 22–25), an average variance of extracts (AVE) that is above 0.5, a CR that is above 0.6 and a Cronbach’s Alpha that is above 0.7. A total of 18 measurement models were achieved, as reported in Table 1.

Table 1  
*Overview of measurement models*

	AVE	Composite Reliability	Cronbach’s Alpha	R <sup>2</sup>
Att	0.740742	0.895327	0.824243	0.17623
Ease-of-use	0.736592	0.933177	0.911552	
Usefulness	0.683400	0.928056	0.906391	0.073089
Behaviouralintention	0.732864	0.916440	0.878757	0.402438

The structural model shown in Figure 3 indicates that the R<sup>2</sup> of 0.402 implies that 40.2% of the variance of intention of using

a computer is explained by the exogenous TAM constructs in this study.

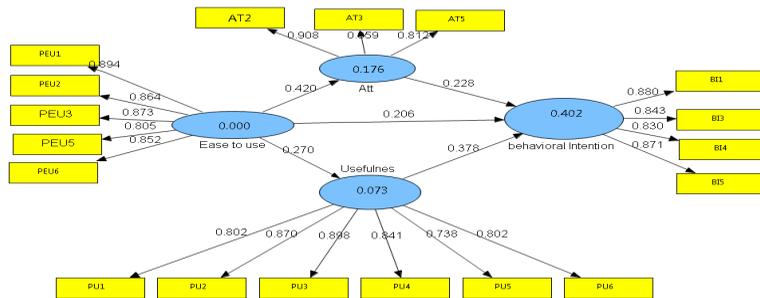


Figure 3. Structural model

The model t-statistic as presented in Figure 4 indicated the significant interaction of all the constructs at t-statistics over  $\pm 1.96$ .

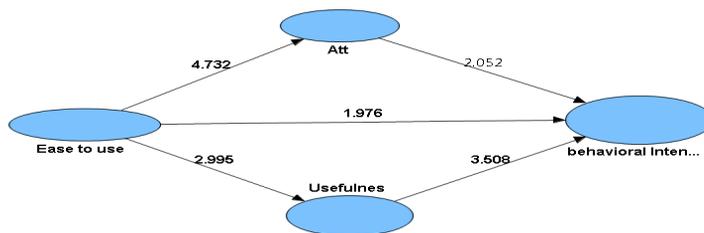


Figure 4. Inner model t-statistic

Statistically, perceived ease-of-use significantly affected usefulness and attitude towards intention to use a computer in teaching with a critical ratio of 4.7032 and 2.995, respectively and perceived usefulness, attitude and ease-of-use all

significantly affected behavioural intention with a critical ratio of 3.508, 2.052 and 1.976, respectively. The results for the hypotheses reoffered in this paper are presented in Table 2.

Table 2  
Overview of measurement models

	Hypotheses – Interaction	t-statistic	Coefficients	Remark
H1	Ease-of-use ----> Usefulness	2.995	0.270350	Supported
H2	Ease-of-use ----> Attitude	4.732	0.419797	Supported
H3	Ease-of-use ----> Behavioural intention	1.976	0.206066	Supported
H4	Usefulness ----> Behavioural intention	3.508	0.378420	Supported
H5	Attitude ----> Behavioural intention	2.052	0.227987	Supported

## DISCUSSION AND CONCLUSION

The final outcome was supported the hypothesis that academic staff's behavioural intention to make use of a computer is impacted by usefulness, ease-of-use and attitude. This outcome is in line with the findings of Solomon, Alina, Eta and Ojo (2013a), Chang, Yan and Tseng (2012) and Ali and Khalil (2013). This implied that the management of educational institutions ought to encourage the use of computers to teach science and ought to provide assisting conditions to aid utilisation of computers/laptops in teaching. On the other hand, perceived ease-of-use also impacted on usefulness and attitude of the academic staff towards the intention to use the technology. This outcome was consistent with the findings of Ali and Khalil (2013), Solomon et al. (2013b) and Nor Khalil and Pearson (2007). This suggests that the management of educational institutions should encourage academic staff to attend workshops and seminars while tracking their usefulness and staff's attitude towards technology acceptance. The outcome of this phenomenal study confirmed the success and potential of TAM to evaluate individuals' behavioural intentions.

Among the limitations of the study was the significant number of male participants (70.3%). This might have biased the end result in term of impact of gender on behavioural intention. In addition, the outcome may not be generalised as academic

staff in other nations may be subject to other conditions and might not share the same level of experience and IT knowledge as well as infrastructure and comprehensiveness of educational recommendations as the Northeastern Nigerian science lecturers surveyed in this study.

The Technology Acceptance Model (TAM) is used to describe the intention to make use of computers/laptops in teaching. The perceived usefulness, ease-of-use and attitude constructs were found to have a significant impact on behavioural intention. This study also justified the end result of perceived ease-of-use on usefulness and attitude towards behavioural intention in the use of computers/laptops in teaching in Nigeria. Future research should look into the other factors that affect lecturers' behavioural intention in using technology in science teaching.

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