Investigating Smartphone Users' Attitude and Intention: Technology Acceptance Model - TAM

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ABSTRACT

The significance of IT in teaching and learning in this digital age cannot be over emphasized, especially, Nigeria being a developing nation. IT facilities and devices such as the smartphones have been established to positively aid learning. However, despite the obvious benefits accruing to the existence of ICT in teaching and learning in Nigeria, it has been discovered through literatures that nothing much has been done in north east Nigeria, both in terms of schools employing e-learning and researches to drive it, particularly Taraba State. Therefore, this study was designed to investigate mobile users' attitude and intention to use smartphones for learning, using Technology Acceptance Model at *Institute for Distance Education and Life-long Learning* (IDELL), TarabaState University (TSU), Jalingo. For this study, survey design was adopted. The population comprised 71 students in year 2 class and total enumeration was used with 70% responses. Data were collected using questionnaire and analysed with SPSS using frequency distribution. This study found out that perceived ease of use positively influenced attitude towards using smartphones for learning by students of IDELL. The study also revealed that perceived usefulness positively influenced attitude towards using smartphone for learning by students of IDELL. Again, as the study discovered, both perceived ease of use and perceived usefulness positively influence attitude towards using smartphones for learning, which will in turn influence intention to use smartphones for learning. It was also revealed that perceived usefulness alone have the capacity to influence behavioural intention to use smartphones for learning at IDELL, Taraba State University, Jalingo. Finally, recommendations were proffered.

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INTRODUCTION

Smartphones have passed through many stages of innovation to arrive at what they are today; seen to play vital roles and occupying centre stage as far as the Information and Communication industries are concerned. The smartphone technological innovation alongside that of the artificial intelligence is advancing rapidly with many sophisticated features and functions. The integration of the smartphone into so many works of life such as telemedicine in the health sector has accelerated. This was due to the increase in smartphone users with the estimated figure as at 2020 to be more than 3.5 billion users worldwide Feyissa, (2021). In Nigeria, with the current estimated population of 203 million, being the seventh-most populous country in the world and with the fastest growing mobile market on the African continent, mobile phone subscription reached 180 million in October 2019. Smartphone usage in Nigeria is currently estimated at 40 million and is predicted to rise to 140 million in the next years. The predicted rise in smartphones users in Nigeria is similar to the case in Malaysia where it is reported that Smartphone users have increased to over two and a half billion and it was predicted to rise to five billion by the year of 2020Fook, Narasuman, Abdul-Aziz and Tau-Han, (2021). Even though we do not know the current population of the country, what we can deduce is that the population of the smartphone users should have doubled by 2020.

Smartphones are now preferred to; and most widely used than the personal computers as smartphone features and functionalities are ever evolving and upgrading Tuncay, (2016).With the projection above, it is evident that there is wide spread of smartphones in Nigeriaand the possibility that this population is within the youth bracket and within the school age is there. Take a look at the massive mobilization of youth at the end SARS saga. If the smartphone is widely circulated then, why not use it in other sectors of the economy such as health and education? Our objective is to investigate the factors that may influence the acceptance of smartphone owners to use it for learning purposes and to advance the course of education in Nigeria. Having a life long distance programme at TSU, the researchers set out to investigate the influence of the constructs of Technology Acceptance Model (TAM) on their students towards using the smartphone for learning. Two of the constructs to be evaluated are the perceived ease of use and perceived usefulness influence on attitude towards the use of a technology, its behavioural intention and eventually using smartphones for learning as a technology.

Having said that, Osang, Ngole and Tsuma (2013) opined that approximately 63.9% of Nigerians have access to at least one ICT device and many Nigerians use ICT as a means of communication, learning and teaching. However, this is yet to reflect in the education sector positively. This research therefore investigates the influence of smartphone technology on the advancement of learning at IDELL, Taraba State University, Jalingo, in Nigeria. Research will establish the how perceived ease of use and perceived usefulness will determine attitude and intention of users to use smartphones for learning in the institution. To this end, the study objective is to investigate how the constructs of Technology Acceptance Model will influence teaching among the lecturers. Based on the objective of the study, the following research questions were raised:

RESEARCH QUESTION
1. How does perceived ease of use of smartphones influence learning among students in IDELL, Taraba State University, Jalingo?
2. How does perceived usefulness of smartphones influence learning among students in IDELL, Taraba State University, Jalingo?

LITERATURE REVIEW
Smartphone Concept
The idea here refers to the use of smartphone to enable users accomplish task much easier than the conventional way of doing it. We aimed at using the smartphone for learning, vis-à-vis the traditional way

of learning. The society has changed, so also the way of life; it means that culture is also evolving. If that is true as it is then, ways of teaching and learning is gradually changing with the innovation of the Information Technology and Communication Technology. These two have the ability to create a piece of knowledge and disseminate to the other party or parties as the case may be. Our computers right from the first generation to when we had the microcomputer, where the size and cost of the computers are decreasing, the speed increases with the help of the microchip processor innovations. This trend still continues to an extent where our smartphones as tiny as they are can perform very many functions embedded on them and they are easier to move about. This made it easy for people of all works of life to use smartphones for their day to day activities. Nowadays, organizations buy smartphones for staff instead of personal computers because of their portability. The education sector also discovered that it can tap into the wealth of applying smartphones to deliver quality knowledge to its learners.

Smartphone usage in distance education
The acceptance and usage of smartphones in our tertiary education has gradually reduced the need for laptops by students for learning purposes. Students of many universities today take lectures online and even the conventional way of note taking; the smartphones is gradually replacing our use of papers to take notes. The capacity embedded in smartphones made it readily available to drive distance learning programmes, Tuncay, (2016). Many scholars are of the opinion that as the innovation in the information and communication industries is ever evolving, with new and better way of doing things, students and learners from all works of life will find this development to their own advantage. The functionality of smartphones is great, and is proven to handle the task ahead that is why there is this impression supported by empirical studies that there is an increasing number of students using their smartphones for educational purposes and in many situations making the use of laptops archaic, Tuncay, (2016); Morphitou, (2014).

It was further advanced that the higher education sector has witnessed a far-reaching change due to new technologies including smartphones. We got more insight when a general impression of Iraqi private universities students sought about the future role of ICT and the mobile learning in higher education. The Al-Maarif University College was selected as a case study to measure the extent of students' reliance on the use of modern smartphones in research, study and

skills development in their various fields of specialization. The study was encouraging as it shed light on specifying the important variables and methods for enhancing the role of the mobile learning as a part of the electronic education for the private education sector in Iraq Al-Mashhadani and Al-Rawe, (2018).

Having said that we know the distance education students need access to study materials, communications tools and further learning means, not only at home and in their work places, but for persons in different works of life, such as business men who are always on a move to meet up with one business schedule to another. One among these ICT tools being employed easily is the smartphone, which provides access to voice and video services Fojtik, and Habiballa, (2006).The focus of mobile learning is to create an interactive learning atmosphere through the use of the Internet which is of high value to long distance education. It was in that background that these researchers recommended that the government should establish a scheme to supply affordable ICT devices to distance educations. In addition, Internet service providers should provide reliable, affordable and accessible Internet to distance education students Arthur-Nyarko and Kariuki, (2019).

Students' Perceived Ease of Use of Smartphones in Learning Activities

Perceived ease of use concept is all about the fact that when users find a given technology to be easy to use, then the question of using it continuously will have a positive answer. The usage of e-portfolios has been shown to improve students' learning because it was stated that there was a positive Perceived Ease of Use and this in turn predicts student's behavioural intention to use the e-portfolio; Abdullah, Ward and Ahmed (2016). ALjaaidi, Bagais and Sharma, (2020) added their voices to the position above,in an investigation into factors influencing the usage of PSAU Mobile Application by the students at Prince Sattam bin Abdulaziz University, (PSAU) indicated a significantly positive association of the perceived ease-to-use with perceived usefulness, significantly positive association of the perceived ease-to-use and the perceived usefulness with the attitude toward the usage of the PSAU's mobile application, a significantly positive association of the students' attitude toward the usage of the PSAU's mobile application with the behavioural intention of using the application, and a significantly positive association of the behavioural intention with the actual usage of the PSAU's mobile application.

It is becoming evident that perceived ease of use has the propensity to influence students' intention to

accept a technology as a result of its positive attitude toward it and eventually using them for their benefit.

Perceived Usefulness of Smartphone in Students' Academic Achievement

Just like the construct Perceived Ease of Use concept above, Perceive Usefulness also refers to when a user finds the use of a given technology useful to him or her. Not really easy to use here, but it has great benefit and adds value to them. Something might be easy to use, but might not be useful. When a technology has been deployed, it is the end users that will tell whether it is useful and how easy it is to use. This has been subject in many fields of endeavour such as the banking industry where users tell of its usefulness. It was also subjected to learning institutions with positive outcome. Some outcomes with positive acceptance while others with outright rejections due to the prevailing circumstance.

Perceived Usefulness has been proven to have significant effects on students' intention to use massive Open Online Course as opined by Daneji, Ayub and Khambari, (2019). This was made possible in an investigation into Massive Open Online Course. This is of great value in the recent e-learning initiative and acceptable in many institutions of higher learning. Vitoria, Mislinawati and Nurmasyitah, (2018) are inclined to the views of Daneji, Ayub and Khambari, (2019) where they declared that students perceived the e-learning web-based module to be useful in improving their understanding, independence, self-discipline, motivation to learn, and interactions with each other and with the teacher. This study implies that the inclusion of technology in education at the university is beneficial Vitoria, Mislinawati and Nurmasyitah, (2018). Recently, a study was carried out to examine the current use of smartphone apps for learning purposes at the University of KwaZulu-Natal (UKZN), Pietermaritzburg (PMB Campus). The outcome revealed that undergraduate students use smartphone apps to participate in learning activities and Perceived usefulness was found to have a higher positive impact on attitude in comparison to the impact of perceived ease of use Madlala, Civilcharran and Singh, (2020). Here, it could be deduced that even when the perceived ease of use is not completely positive, as long as the perceived usefulness is positive, student will use the technology. In this case perceived usefulness drives the use of smartphones for learning.

Human beings are said to be rational, as when one perceives a thing is good for his or her benefits, they would always go for it. From the opinions of the researchers above that investigated on perceived

usefulness of smartphones in students' academic achievements, it is obvious that perceived usefulness of smartphones usage have the tendency to influence student attitude towards using a technology, which leads to behavioural intention to accept a technology and eventually using them to positively impact their studies and research. On the other hand, Al-Emran, Arpaci and Salloum, (2020) reported to the contrary. This was because according to their report, they stated that perceived usefulness index in the study carried out was shown to be insignificant determinants to continuous intention to use mobile learning devices. This observation may be true as the theorem may not always be positivedue to several other factors.

We can therefore say that smartphones are gradually becoming a compelling learning tool used to enhance teaching and learning in distance education. Its usage ensures flexible course delivery, makes it possible for learners to access online learning platforms, access course resources and interact digitally; Darko-Adjei, (2019). We are of the opinion that when both teachers and students were influenced to this extent with little variation in a region to another, we could see clearly that perceived ease of use and perceived usefulness are very vital in determining the intention to use a technology and subsequently accepting and actually using it for learning.

THEORETICAL FRAMEWORK
Theory of Reasoned Action (TRA)
Theory of Reasoned Action (TRA) is said to be the first theoretical point of view towards general acceptance and adoption of technology (Fishbein and Ajzen, 1975). TRA is a behavioral theory that models the attitude-behaviour relationships. This theory holds that individuals would use technology if they see any positive benefits associated with using them. Ajzen (1985, 1991) as cited in Samaradiwakara and

Gunawardena, (2014), opined that Theory of Planned Behaviour (TPB) is a successor of TRA and it introduced a third independent determinant of intention, perceived behavior control (PBC). It is determined by the availability of skills, resources and opportunities; as well as the perceived importance of those skills, resources and opportunities to achieve outcomes Kriponant (2007) as cited in Samaradiwakaraet al, (2014). Both TRA and TPB have no many indexes to use to measure the degree of acceptance and subsequent adoption of a technology, as such a need for better and stronger theorem.

Technological Acceptance Model (TAM)
The Technological Acceptance Model (TAM) has Actual System Use (ASU) as the key variable. The author defined ASU as an individual's practical usage of a particular system (e.g. smartphones in Learning). ASU is a functionally dependent on Behavioural Intention to Use (BIU) a technology which shows the extent to which a person has cultivated conscious plans to perform or not to perform some future behaviour. BIU is in turn, functionally dependent on both Attitude Toward Using (ATU) and Perceived Usefulness (PU). ATU reflect one's feeling on certain definite behaviors as PU is the extent of believe that utilizes a certain system would improve performance. PU could be functionally dependent on perceived ease of use (PEU), which the author defined as the extent of believes that using smartphones in learning would be free from effort. The theory further states that PU and PEU are influenced by external variables such as training. Based on the above therefore, the proponents of TAM state that ASU is functionally dependent on PU and PEU. They argue that if users find smartphones in learning useful and easy to use then, that will motivate a positive attitude toward using it (Luhamya, Bakkabulindi and Muyinda, 2017).
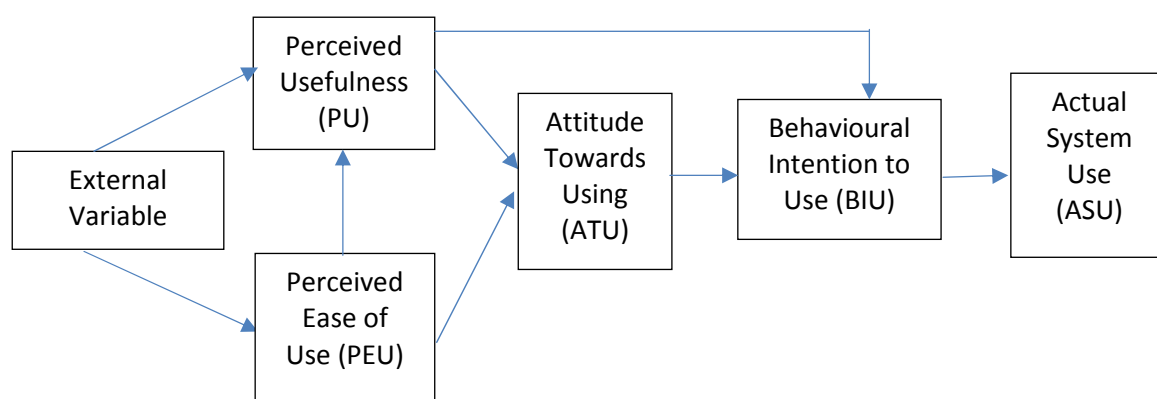

Figure 1.1: Technological Acceptance Model (TAM) (Source: Luhamya, et al., 2017; p 25)

The model has two (2) constructs namely Perceived Usefulness and Perceived Ease of Use. For the sake of this study, the researchers want to concentrate only on the two constructs. So, because of that, this study shall adopt the diagram in figure 1.2 as a study model.
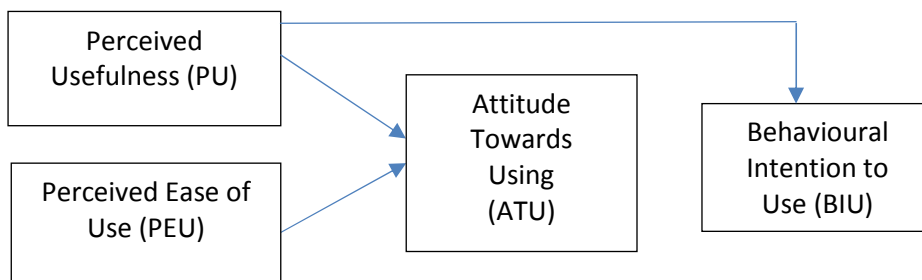
Figure 1.2: Technological Acceptance Model (TAM) for the study

METHODOLOGY

This study adopted descriptive survey design. Survey was adopted due to its advantages. The research location was Taraba State University, Jalingo, which is located in the Northern part of Taraba State, Nigeria. The population comprised the level 200 students of IDELL of the University, from which total enumeration was used since the students were less than a hundred for that session. The whole students participated in the study. Data was collected with a structured questionnaire. The instrument was scaled using five-point Likert scale items, ranging from 1: Strongly Agree to 5: Strongly Disagree.

Major Findings.
Perceived Ease of Use of a Smartphone in learning activities

Table 1: Perceived Ease of Use of Smartphones

S/N		Strongly Agreed (%)	Agreed (%)	Undecided (%)	Disagreed (%)	Strongly Disagreed (%)
1	I will find it easy to use smartphone for reading.	13 (30.2)	13 (30.2)	2 (4.7)	9 (20.9)	6 (14.0)
2	Using smartphone for learning does not require any special computer literacy skills	11 (22.9)	15 (31.3)	4 (8.3)	5 (10.4)	13 (27.1)
3	I will find it easy to use the smartphone for retrieval of material	15 (31.9)	17 (36.2)	8 (17.0)	3 (6.4)	4 (8.5)
4	Smartphone interfaces are user-friendly and flexibleto use	16 (33.3)	21 (43.8)	8 (16.7)	3 (6.3)	0 (0.0)

From Table 1, 26 (60.4%) of the respondents agreed that they will find it easy to use a smartphone for reading, 2 (4.7) were undecided while 15 (34.9%) disagreed. When asked if using smartphone for learning does not require any special computer literacy skills 26 (54.2%) agreed, 4 (8.3%) of them were undecided while 18 (37.5%) disagreed. Also, when respondents were asked if they would find it easy to use the smartphone for retrieval material, 32 (58.1%) of the respondents agreed, 8 (17.0%) were undecided while 7 (14.9%) disagreed. Again, 37 (77.1%) of the respondents agreed to the fact that smartphone interfaces are user-friendly and flexible to use, 8 (16.7%) were undecided whiles 3 (6.3%) disagreed.

Based on the findings as shown on Table 1, it is clearly evident that the use of smartphones will perform remarkable good among students for learning in the institute. This could be seen by a very high rate of responses in favour of technology for learning.

Table 2: Perceived Usefulness of Smartphones

S/N		Strongly Agreed (%)	Agreed (%)	Undecided (%)	Disagreed (%)	Strongly Disagreed (%)
1	Smartphones provides me with quick access to information online.	27 (65.85)	12 (29.25)	2 (4.9)	0 (0.0)	0 (0.0)
2	Using the smartphone for learning will enables me to gain extra skills and experiences outside the classroom.	22 (45.8)	19 (39.6)	4 (8.3)	3 (6.3)	0 (0.0)
3	Smartphone will enable me to record lectures delivered by my tutors.	14 (29.2)	19 (39.6)	7 (14.6)	4 (8.3)	4 (8.3)

4	I can easily access my e-mail using smartphone.	31 (68.9)	13 (28.9)	0 (0.0)	1 (2.2)	0 (0.0)
5	Smartphones promotes online group discussion	30 (62.5)	10 (20.8)	4 (8.3)	2 (4.2)	2 (4.2)
6	Smartphone enables me to use social media platform for group learning activities.	23 (65.7)	9 (25.7)	1 (2.9)	2 (5.7)	0 (0.0)

From Table 2, 39 (95.1%) of the respondents agreed that smartphones provide them with quick access to information online, 2(4.9) were undecided while none disagreed. When asked if using the smartphone for learning enables them to gain extra skills and experiences outside the classroom, 41(85.4%) agreed, 4 (8.3%) were undecided while 3 (16.3%) disagreed. Also, when respondents were asked if Smartphone enable them to record lectures delivered by my tutors, 33 (68.8%) of the respondents agreed, 7 (14.6%) were undecided while 8 (16.6%) disagreed. Again, 44 (97.8%) of the respondents agreed to the fact that they can easily access their e-mails using smartphones, none was undecided while 1 (2.2%) disagreed. As to whether Smartphones promote online group discussions, 40 (83.3%) agreed to that opinion, 4 (8.5%) were undecided, 4 (8.4%) disagreed. Smartphone enables me to use social media platforms for class activities, 32 (91.4%) of the respondents agreed, 1 (2.9%) were undecided while the remaining 2(5.7%) of them disagreed.

Based on the finding in Table 2, it is clearly evident that the use of smartphones will perform remarkable good among students in the IDELL distance learning students of Taraba State University and their academic quest. We made this claim based on the fact that a good number of the respondents truly agreed to that.

DISCUSSION

According to the results obtained, it could be seen that students would find it easy to use smartphones for learning. They have access to smartphones already, but they perceived that smartphones at their possession stand a better chance to be utilised for learning. This gives evidence that the students have positive mind-set in using smartphones to assist in their academic pursuits. This study's finding is consistent with the findings of Buabeng-Andoh, (2021) where it was shown that Perceived Ease of Use positively affects attitude toward using Smartphones for learning in the course of exploring University students' intention to use mobile learning. Abdullah, Ward, and Ahmed, (2016) support the views that perceived ease of use of smartphones influences attitude towards using a technology. It was stated that there was a positive Perceived Ease of Use

and this in turn predicts student's Behavioural Intention to Use the e-portfolio.

Secondly, based on the results obtained with reference to perceived usefulness of a smartphone in learning at the institute, we discovered that students indicated using smartphones in learning is very high. There is a wide gap between those that were optimistic and those that were pessimistic that using it will enhance learning and bring about better way to reach the students with this high traffic of study material obtainable online. Their level of acceptance and intention to use smartphones for learning is very high. This is also in consonance with the findings of Buabeng-Andoh, (2021) which stated that perceived usefulness positively affects attitude toward using smartphones for learning when exploring University students' intention to use mobile learning. Maphosa, (2021) in perceived usefulness of mobile phone technology for learning by distance education students at the University of Eswatini opined in favour of Buabeng-Andoh, (2021) that mobile phone technology was perceived as useful for accessing content, accessing information on the internet, in interaction with the course instructors and with other students and also create room for collaborative learning among students. All these led to the assertion that mobile phone technology was perceived as useful for learning.

On the final note, as discussed with respect to the results obtained again on perceived usefulness of smartphones in learning at IDELL, we discovered that students indicated that using smartphones for learning is very high; this translates to the fact that behavioral intention to use smartphones for learning would be highly influenced. It would be influenced in two dimensions. Firstly, behavioral intention would be greatly influenced due to positive attitude as a result of the influence of both perceived ease of use and perceived usefulness of smartphones in learning. This scenario played out in the study of Buabeng-Andoh, (2021) when exploring University students' intention to use mobile learning, from where it was opined that attitude significantly affects Behavioral Intention. On the other hand, Perceived Usefulness on its own has the capacity to influence Behavioral Intention to Use the technology. The outcome from the perceived

usefulness here showed that when implemented, students would use smartphones for learning, since this result is a positive pointer to their Behavioural Intention to Use smartphones for leaning.

Conclusion

Buabeng-Andoh, (2021)lent this opinion that there is need to maximise research models so as to explain university students' intention to use technology in academic environments, most especially in developing countries like Nigeria. The results obtained are beneficial to students and the administrators of the schools. Based on the results of this study, several conclusions can be drawn and their implications so as to explain TSU IDELL students' attitudes and Behavioural Intentions to use the technology. The fact that students were inclined to be influenced by these two constructs; and then we should create enabling environments where smartphones would be easy to use and useful to them. The indication for usage of smartphones for learning by students of this institute is a welcomed understanding. This empirical finding should serve as an instrument to administrators when drawing policies on the use of smartphones in the university. The world being a global village has created an avenue where students could learn at home and abroad. With more of such studies, it should not be long from now that the use of smartphone for teaching and learning would commence and more finding would come up to fine tune it all. We should be seen taking advantages accruable to an institution while employing the IT using smartphone for learning.

Recommendation

Government at all levels should subsidize the duties on IT facilities for it to be accessible to students at a minimal cost everyone can buy. The internet services should be provided free to students throughout the nation by government to all students, especially for those undergoing distance studies.

Contributions to Knowledge

This study contributed to existing body of knowledge in the area of learning using smartphones with the empirical evidence that perceived usefulness and perceived ease of use influence learning in Taraba State University IDELL, Jalingo, Taraba State, Nigeria. The study can be used for further related studies by researchers, thereby adding to the literature.

Further Research:

The research should be extended to private primary and secondary school students, so as to catch them young and guarantee better outcome of the use of smartphones for learning. Further research should investigate the students' attitude towards using the smartphones, behavioural intention to use smartphones and its actual use for learning in the university.

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