Analysis of the Expectation of Effort Expended when ICT is used in Academic Learning Activity: Influence of Effort Expectancy and Moderating Role of Experience

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Abstract

This paper seeks to provide further understanding of issues surrounding university students' cognitive belief about the effort an individual would expend when using information and communication technology (ICT) to perform a given task related to academic learning. The unified theory of acceptance and use of technology (UTAUT) perspective was adopted to determine the strength of effort expectancy (the belief that ICT is easy to use and effort-free) and the moderating influence of experience on ICT use in academic context. A pre-tested questionnaire was administered to 400 respondents that were selected using purposive sampling from students at University of Maiduguri and University of Ibadan in Nigeria. This study aims to achieve three objectives: to determine the respondents' level of ICT use; to determine the effect of effort expectancy on ICT use; and to assess the moderating influence of prior ICT use experience on the relationship path between effort expectancy and ICT use. The Cronbach alpha of the measurement scale was (α = .85) very good. The results indicate that effort expectancy significantly predict ICT use and that low experience significantly moderates the relationship path between effort expectancy and ICT use, which led this paper to conclude that most Nigerian university students possess basic (rudimentary, or low) ICT use skills; and the majority of them believe that an individual student would need to expend lot of effort when using ICT to accomplish a given academic task. Hence, this paper recommends that practical e-learning courses should be included in public universities' academic curriculums.

***Keywords**: Academic learning, Effort expectancy, Experience, E-learning, ICT use, Moderating effect, Public universities, Students*

Introduction

Information and Communication Technologies (ICTs) have increasingly gained attention in scholarly discourse in research as a means to enhance academic learning both *intra* and *extra mural* (Cullum & Jeffrey, 2013). Recent developments in ICTs and the introduction of electronic learning (e-learning) in tertiary institutions across Nigeria have generated huge research interest (Clegg, Hudson & Steel, 2003; Gu, Zhu & Guo, 2013). The benefits of using ICT in academic learning are continuously being revealed as copious past research studies have investigated various means of harnessing ICTs and tapping their potential benefits for educational development (Aubusson, Schuck & Burden, 2009; Callum & Jeffrey, 2013; Churchill & Churchill, 2008). Hence, researchers need to understand the factors that influence the future use of ICT in academic learning context.

ICT has been defined as any device, system and facility that can be employed to collect, process, store and diffuse information (Njoh, 2012). ICT use in learning simply means the direct contact with and performing learning tasks using a technology system (Gu, et al., 2013; Pynoo, Devolder, Tondeur, Braak, Duyk & Duyk, 2011). Furthermore, e-learning has been defined as "learning through electronic devices such as desktop/laptop computers, CD/DVD players, etc." (Nassuora, 2013, p. 1). ICT use in academic learning has been there for a while (Eteokleous-Grigoriou, 2009). However, despite its immense benefits, it can pose daunting challenge to students of tertiary institutions (Pynoo, et al., 2011).

Nowadays ICTs are ubiquitous, and their significance continues to soar in virtually every aspect of human endeavour. Similarly, in education there is an increased use of ICTs both within and outside the classroom (Pynoo, et al., 2011). Considering the fast rate of ICT development nowadays, students constantly need to adapt to new ICTs and refine their skills in order to utilise their experience of ICT use to enhance academic learning (Pynoo, et al., 2011) both in and outside the classroom. Experience is simply defined as the practical knowledge acquired through past or prior use of or interactions with ICTs (Venkatesh, et al., 2003; Kijsanayotin, Pannarunothai & Speedle, 2009). However, the adoption and use of ICT for learning purposes will chiefly depend on whether students and instructors believe that using ICT in teaching and learning processes is easy and meets their particular academic needs (Engotoit, Moya, Mayoka & Bonface, 2016).

This research study adopted a quantitative approach, hence, a questionnaire that was pre-tested was used to gather the research data (refer to 'Material and Methods' section for details on the research methodology). The research measurement scale used in this study was adopted with some adjustments from the work of Venkatesh, Morris, Davis and Davis (2003); these adjustments are common to other ICT adoption studies (Venkatesh, Morris & Ackerman, 2000). Although many studies have attempted to determine the effect of expectancy factors on ICT use in business organisations, minimal data is available on the effect of expectancy factors on Nigerian university students ICT use in academic context. Hence, this research study was conducted in order to close that

gap by targeting to achieve three objectives, namely (i) to determine the level of ICT use by Nigerian university students in learning activity; (ii) to determine the effect of effort expectancy on ICT use; and (iii) to determine the moderating role of experience on the path between effort expectancy and ICT use.

Over the years, the Nigerian education sector has achieved some level of ICT application in public universities (Federal Republic of Nigeria [FRN], 2004). The Federal Government of Nigeria, in the *National Policy on Education*, recognises the prominent role of ICTs in the modern world, and has integrated ICTs into education (FRN, 2004). However, Aduwa-Ogiegbaen and Iyamu (2005), cited by Adomi and Kpangban (2010), assert that ICTs are not part of classroom technology in over 90% of Nigerian public schools. This implies that the chalkboard and textbook continue to dominate classroom activities in most Nigerian public universities even though a little progress has been made as claimed by FRN (2004). Although efforts have been made to ensure that ICTs are available and used in Nigerian universities particularly public universities, the level of application is still low and most universities, both public and private, do not offer ICT training programmes (Goshit, 2006; Kabir & Kadage, 2017).

ICT adoption in learning allows students to increase individualisation of learning. For instance, in higher institutions where new technologies are used, students have access to tools that adjust to their attention span and provide valuable and immediate feedback for literacy enhancement (Enuku & Enuku, 2000; Kabir & Kadage, 2017), which is currently not fully implemented in the Nigerian education system (Adomi & Kpangban, 2010). Although ICT use in higher education learning processes is still at its infancy, more especially with respect to university education, a number of studies have demonstrated the potential of ICT use at higher education in the country (Adedoja, Botha & Ogunleye, 2012; Kabir & Kadage, 2017; Reed, 2010). One good example of application of ICTs in higher education is a systematic mobile project funded by Partnership for Higher Education in Africa-Educational Technology Initiative (PHEA-ETI), which is currently being executed in the University of Ibadan. The project was developed and designed via the collaborative efforts of various research experts with the aim to provide students access to instructional contents to enable learning at any time and in any place (Kabir & Kadage, 2017; Adedoja, et al., 2012).

The system was designed in such a way that it delivers the required learning materials via mobile phones seamlessly from its learning content management system (LCMS) infrastructure (Kabir & Kadage, 2017; Reed, 2010). According to the researchers, provision of such learning materials via mobile phones will produce a number of benefits for students, teachers and administrators. The benefits include:

1) Easy distribution and collation of tests, quizzes and surveys
2) Interaction in real time between the teacher and student, as well as among students, via the forum and chat room

3) Ease with which notifications of events, deadlines and timetables are sent to each student
4) Accessing e-books via mobile phone at about ten to 15 percent of the cost of supplying hard copies

ICT application and use can improve Nigeria's education system and provide students with better education (Kabir & Kadage, 2017). A technologically-literate young citizenry will lead to sustainable ICT growth in the country, with the potential to improve telecommunications, media communications, political communications and skilled ICT professionals who will be well-equipped to solve ICT problems (Adomi & Kpangban, 2010; Goshit, 2006).

As mentioned earlier, the UTAUT perspective was adopted in this research. The UTAUT model has four key ICT use predictors, namely performance expectancy, effort expectancy, social influence and facilitating conditions, which are variously moderated by four moderating variables, namely gender, age, experience and voluntariness of use (Venkatesh, et al., 2003) for details on the UTAUT model). However, as part of the adjustments mentioned earlier, this research paper focuses on investigating the influence of only one key predictor (effort expectancy) out of the four key predictors, and determining the moderating influence of only one moderating variable (experience) out of the four moderating variables mentioned above in the UTAUT model. The core concept of the construct *effort expectancy* focuses on the easiness or otherwise associated with the use of ICT by users to perform a given task. In other words, *effort expectancy* is defined the degree of easiness or difficulty an individual ICT user believes (perceives) as he or she uses a particular ICT to perform a task (Venkatesh, et al., 2003).

Investigating one predictor and one moderating variable from the unified theory of acceptance and use of technology (UTAUT) is one of the limitations of this study. Nonetheless, this research paper contributes to the field of ICT use in learning by explaining the effect and influence of both effort expectancy and experience on the use of ICT in academic learning context.

Literature Review

The UTAUT Model based on Existing Literature

Past studies have revealed that the decision to adopt a particular technology is a very complex phenomenon that requires holistic, empirical investigation to be understood (Abu Bakar, Abdul Razak & Abdullah, 2013; Abdul Rahman, Jamaludin & Mahmud, 2011; Callum & Jeffrey, 2013). Many influencing factors are involved in the ICT adoption processes (Venkatesh, et al., 2013). The literature suggests that ICT users' experience positively influences their use level (Abdul Rahman, et al., 2011; Abu Bakar, et al., 2013), especially when the level of the users' experience is high.

The UTAUT is one of the latest and most comprehensive models that focus on ICT adoption and use (Abu Bakar, et al., 2013; Qinfei, Shaobo & Gang, 2008). The theory integrates eight major ICT adoption models: the theory of reasoned action (TRA),

the technology acceptance model (TAM), the motivational model (MM), the theory of planned behaviour (TPB), the model of PC utilisation (MPTU), the innovation diffusion theory (IDT) and the social cognitive theory (SCT). The UTAUT model aimed to achieve a unified view of ICT user acceptance (Abu Bakar, et al., 2013; Abdul Rahman, et al., 2011; Venkatesh, et al., 2003).

The model consists of four major predictors of intention and use of ICT as follows: performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). The predictors are moderated by gender, age, experience and voluntariness of use. The present study examined only effort expectancy in relation to ICT use. Effort expectancy is defined as the degree of ease associated with the use of any technological system (Abdul Rahman, et al., 2011; Venkatesh, et al., 2003). Copious past studies have suggested that ICT use experience significantly influences ICT adoption (Gefen, 2003; Klopping & McKinney, 2006).

The introduction and use of ICTs for learning purposes has attracted a lot of research interest. Two main research perspectives can be identified: first, acceptance studies (Hu, Clark & Ma, 2003; Pynoo, et al., 2011; Teo, 2009) and second, more educational research in which user attitude and the integration of ICT in the classroom are studied (Shapka & Ferrari, 2003). To know how and why individuals adopt ICTs is the primary goal in information system (IS) research (Abdul Rahman et al. 2011; Abu Bakar, et al., 2013).

In the UTAUT model, effort expectancy is theorised to predict technology use, such that while users may believe that ICTs are useful, they may be cumbersome to use. Thus, the performance benefits might be overweighed by the effort of using the technology (Teo, Luan & Sing, 2008; Venkatesh, et al., 2003). Furthermore, effort expectancy explains the amount of effort required to use the technology. In other words, effort expectancy it is the belief that using a particular ICT system would be effortless (Venkatesh, et al., 2003). Therefore, it is possible that, for example, a system with sophisticated e-learning applications, but with a low level of effort expectancy "is more likely to induce positive attitudes" (Teo, et al., 2008, p. 267).

In addition, the relationship between effort expectancy and ICT use is that the level of effort expectancy of ICT adoption determines the degree to which a user would be able to use the system (Moon & Kim, 2001; Teo, et al., 2008) and that experience moderates the relationship between the two variables (Venkatesh, et al., 2003). Hence, the present paper proposed this hypothesis:

H_1: There is a significant relationship between effort expectancy and ICT use.

Previous research has indicated that ICT use positively effects technology adoption in academic learning (Lee, Yoon & Lee, 2009), and that factors such as experience, self-efficacy and attitude towards ICT use influence ICT use. In addition, a number of studies have provided evidence that supports a direct relationship between experience and ICT use (Beaudry & Pinsonneault, 2010), which claim that experience exerts direct influence on ICT adoption through perceived ease of use (Klopping &

McKinney, 2006; Venkatesh, et al., 2003; Venkatesh, et al., 2000). Experience has a direct effect on students who continue to use a particular ICT in their learning activities (Liao & Lu, 2008). Hence, the present study hypothesised that:

H_2: Experience significantly moderates the relationship between effort expectancy and ICT use.

Methods

Participants

The sample (387) of the respondents consisted of undergraduate students that used any ICT device such as laptop, personal computer (PC), handset (mobile phone/smartphone), etc. both within and outside the classroom to perform any task related to academic learning such as assignments, development of lecture notes, etc. Most of the participants were male (n = 219, 56.6%), with an average age of 24.51 years old (SD = 7.55, range 18 –37). Participants' region of origin was also considered (but was not included in the data analysis because that was not the focus of this paper). Participants from the north (any of the 19 northern states, including Abuja) were 157 (40.57%), while those of them from the south (any of the 17 southern states) were 230 (59.43%).

Sampling Procedure, Data Gathering and Data Analysis

A pre-tested five-section questionnaire, containing 30 items was administered to 400 undergraduate students at University of Maiduguri and University of Ibadan. Simple random sampling approach was employed to determine the locations of the study. There are not less than 72 public universities spread across northern and southern parts of Nigeria (Nigerian Elites Forum [NEF], 2011). Focusing on the northern and southern divides of the country, two universities were paired and then one pair was randomly selected using an online software (Randomizer). While, purposive sampling was adopted to select the respondents.

With a 96.75% return rate, data from only 387 survey forms were analysed, falling short of 13 survey forms. Eight survey forms could not be retrieved and 5 cases were omitted from analyses due to various analytical defects. Hence, data from only 387 survey forms were successfully analysed. Analysis of Moment Structures (AMOS) and correlation analyses in the statistical package for social sciences (SPSS) version 22 were employed to analyse the data. The questionnaire was self-administered face-to-face. Even though only about 10 minutes were required to complete a survey form, data collection lasted for five days because of logistic reasons. Supported by a few research assistants, 200 survey forms were administered in each of the universities.

Validity and Reliability of the Scale

The questionnaire contained items that measured all the three constructs (the independent, dependent and moderating variables; i.e., effort expectancy, ICT use and experience respectively). A five-point Likert scale (ranging from (1) strongly disagree to (5) strongly agree) was used throughout the instrument. Researchers are required to measure and report the Cronbach alpha coefficient of their research instruments when

using a Likert scale for its internal consistency reliability (Santos 1999). The values of the reliability coefficient for both the pre-test and actual research studies are presented in Table 1. A reliability coefficient of .70 for Cronbach alpha is considered as good (Streiner, 2003). Furthermore, prior to administering the questionnaire, the advice of experts in this research field was sought about the validity of the instrument, which they affirmed valid.

Table 1: Reliability of the Research Scale

Construct	Number of Items	Cronbach alpha Pre-test Study (n = 40)	Cronbach alpha Actual Study (n = 387)
ICT Use	10	.86	.90
Effort Expectancy	10	.87	.77
Experience	10	.90	.88
Overall Cronbach alpha		*.88*	*.85*

Note: n = Sample size; (This scale was adapted with modifications from Venkatesh, et al., 2003)

The Conceptual Model of the Study

The researchers modelled experience as a factor that moderates effort expectancy in the relationship with ICT use in learning (see Figure 1). The respondents' cognitive perceptions of efforts needed to use a particular system to accomplish a particular task within a time period (effort expectancy) and prior experience were gauged. However, unlike Venkatesh, et al. (2003) who in a similar study investigated their respondents' experience based on a three-tier training session (T1-T3) the respondents had undergone, this study could not organise any pre-investigation training course for the respondents because of meagre resources and restricted study period. However, the researchers deemed most students of tertiary institutions nowadays possess rudimentary levels of ICT use skills in learning (FRN, 2004).

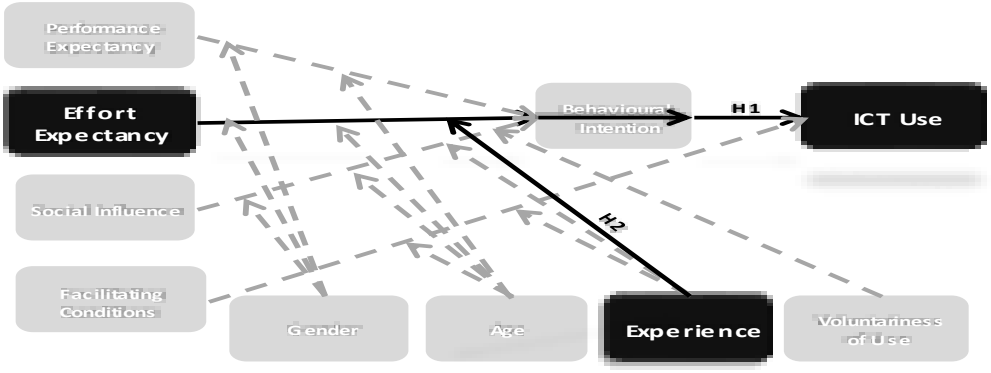

Figure 1: The conceptual model of this study (Adopted with modifications from Venkatesh, et al., 2003)

Note: H_n = Hypothesised path; Grey background images (watermarks) = UTAUT constructs that were not investigated

Furthermore, This study investigated only effort expectancy (moderated by experience), which is one of the five key predicting variables in the UATAUT model because it is found to be more significant for individuals with less ICT experience (Venkatesh, et al., 2003). In addition, the choice of that particular construct was to suit the nature of the environment in which the study was conducted and to attempt to explore new approaches of solving ICT adoption research problems.

Determining Moderating Effect of Experience

To determine the presence and degree of moderating influence on the hypothesised paths, the researchers ran two AMOS tests for satisfactory fit indices based on the comparative fit index (CFI) and root mean square error of approximation (RMSEA) based on Hair, Black, Babin, Anderson and Tatham (2006) recommendation. The rule of thumb regarding tests of moderating effect is that if there is a significant change in the value of the chi-squared between the measurements of residual and the unconstrained models, the presence of moderating effect on the hypothesised paths is confirmed (Garson, 2008; Dabholkar & Bagozzi, 2002). The chi-square difference (χ^2) between the models was 19.67, with a degree of freedom difference (*df*) of 42.

Based on the extant literature (Venkatesh, et al., 2003), experience was measured on a high-and-low level scale. The respondents' demographic information section in the questionnaire provided the data on the respondents' number of years using ICTs. The respondents' average years of ICT use was 6 years, 5 months (M = 6.5, SD = 1.45). The highest ICT use year range was 7 – 9 years while the lowest use year range was 3 – 5 years. Similarly, a five-point Likert type scale, which ranges from 1) once per week to 5) seven days per week was used to gauge the respondents' ICT use experience.

Determining Respondents' ICT Use Level

The level of ICT use was measured by using the range score from the mean scores of the ICT use distribution (refer to Table 2) as the lowest (starting off) threshold. Since the study adopted a five-point Likert scale, '5' was therefore used as the highest threshold. The range score was obtained by subtracting the lowest mean score from the highest mean score in the ICT use frequency distribution table. Then, finally, the level was determined by grading the *overall mean value* of the ICT use frequency distribution against the mean score ranges.

Results

Descriptive Statistics of ICT Use Constructs

Frequency distribution of ICT use

In the frequency distribution, the overall mean value (M= 3.70, SD = .46) was high, indicating that the students' ICT use level was high. However, specifically only 40% (4 items) scored a very high mean value, with most of the remaining items scoring a good mean value (see Table 2).

Table 2: Frequency Distribution of ICT Use

Item		Likert Scale Frequency& Percentage					Descriptive Statistics	
		1	2	3	4	5	Mean	SD
1	I use ICT to print my learning material.	14 (3.7)	18 (4.7)	38 (9.9)	182 (47.6)	207 (54.2)	4.89	.46
2	I use ICT to photocopy my learning material.	24 (6.3)	25 (6.5)	32 (8.4)	137 (35.9)	204 (53.4)	4.67	.55
3	I use ICT to submit assignments/homework to my lecturers.	21 (5.5)	12 (3.1)	10 (2.6)	132 (34.6)	188 (49.2)	4.39	.45
4	I use ICT to communicate with my colleagues about activities related to my learning.	32 (8.40	7 (1.8)	70 (18.3)	124 (32.5)	171 (44.8)	4.27	.45
5	I use ICT to conduct peer review with my colleagues.	9 (2.4)	16 (4.2)	37 (9.7)	132 (34.6)	164 (42.9)	3.40	.41
6	I use alarm service on ICT device(s) to remind me of activities related to my studies.	28 (7.3)	8 (2.1)	62 (16.2)	134 (35.1)	150 939.3)	3.32	.47
7	I use ICT to access online public (free) catalogues.	32 (8.4)	19 (5.0)	55 (14.4)	118 (30.9)	158 (41.4)	3.30	.44
8	I use audio-visual facilities, both online and offline to enhance my academic performance.	23 (6.0)	12 (3.1)	47 (12.3)	152 (39.8)	148 (38.7)	3.27	.41
9	I use ICT to explore new learning areas related to my course of study.	18 (4.7)	5 (1.3)	19 (5.0)	169 (44.2)	149 (39.0)	3.07	.54
10	I use ICT to receive instructions from my lecturers.	16 (4.2)	7 (1.8)	14 (3.7)	141 (36.9)	130 (34.0)	3.00	.40
	Overall Mean						*3.70*	*.46*

Note: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree nor Disagree, (4) Agree, (5) Strongly Agree; SD = Standard Deviation (This scale was adopted with moderations from Venkatesh, et al., 2003)

Level of ICT use

The level of ICT use by the students in academic activity was moderate, in other words, neither low nor high. This was so because the overall mean value of the ICT use scale (M = 3.70) falls within the moderate score range (3.01 – 3.99) (see Table 3).

Table 3: Level of ICT Use

Mean Score Range	Level of Measurement	Overall Mean Value of ICT Use	
1.89 - 3.00	Low	Mean	SD
3.01 -3.99	Moderate	3.70	.46
4.00 -5.00	High		

Note: SD = Standard Deviation

Frequency distribution of effort expectancy

The mean values of the individual items across the table indicate 40% of the items scored very high scores, while the remaining items scored high mean values. Generally, also, the mean value was very high (M = able 4.04, SD = .70) (see Table 4).

Table 4: Frequency Distribution of Effort Expectancy

Items		Likert Scale Percentage and Frequency					Descriptive Statistics	
		1	2	3	4	5	Mean	SD
1	It is easy for me to obtain online learning materials using ICT devices.	30 (7.8%)	121 (31.3%)	5 (1.3)	122 (31.5)	119 (31.2)	4.56	.44
2	It takes very little effort to use ICT devices in learning activity.	7 (1.8%)	127 (32.8%)	11 (2.9)	163 (42.1%)	200 (52.4)	4.23	.56
3	Using ICT involves less time doing mechanical operations, for example, data input.	14 (3.6%)	121 (31.3%)	22 (5.8)	113 (29.2%)	200 (52.4)	4.11	.77

4	Overall, I believe that ICT is easy to use in learning activity.	8 (2.1%)	100 (25.8%)	23 (6.0)	203 (52.5%)	123 (31.8%)	4.08	.32
5	I would find ICT facilities flexible to use in learning activity.	14 (3.6%)	134 (34.6%)	48 (12.6)	92 (23.8%)	102 926.7)	3.93	.53
6	It would be easy for me to be skilful at using ICT devices in learning activity.	8 (2.1%)	153 (39.5%)	23 (6.0)	123 (31.8%)	140 (36.6)	3.93	.50
7	My interaction with ICT would be clear and understandable.	7 (1.8%)	160 (41.3%)	30 (7.9)	113 (29.2%)	85 (22.3)	3.72	.68
8	I would find ICT systems easy to use to boost my academic performance.	13 (3.4%)	132 (32.1%)	22 (5.8)	99 (25.6%)	140 (36.6)	3.72	.97
9	I believe that it is easy to get ICT to do what I want it to do in relation to my learning activity.	8 (2.1%)	153 (39.5%)	46 (12.0)	123 (31.8%)	93 (24.3)	3.70	.93
10	It is easier for me to improve my learning through ICT use.	4 (1.0%)	124 (32.0)	3 (0.8)	164 (42.4%)	158 (41.4)	3.67	.81
	Overall Mean						*4.04*	*.70*

Note: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree nor Disagree, (4) Agree, (5) Strongly Agree; SD = Standard Deviation (This scale was adopted with moderations from Venkatesh, et al., 2003)

Frequency distribution of prior experience

With an overall mean score of M = 2.83, SD = .71, the overall mean value was low. Majority of the items scored between moderately low to low mean values (see Table 5).

Table 5: Result of Prior Experience Level

Items		Likert Scale					Descriptive Statistics	
		1	2	3	4	5	Mean	SD
1	I use ICT to improve my academic performance.	8 (2.1%)	123 (31.8%)	24 (6.2%)	79 (20.4%)	153 (39.5%)	3.57	.72
2	I use ICT to make up my study notes.	13 (3.4%)	99 (25.6%)	34 (8.8%)	109 (28.2%)	132 (32.1%)	3.33	.95
3	I use ICT to do my assignments.	7 (1.8%)	163 (42.1%)	21 (5.4%)	69 (17.8%)	127 (32.8%)	3.23	.98
4	I use ICT to do my homework.	30 (7.8%)	122 (31.5)	26 (6.7%)	88 (22.7%)	121 (31.3%)	3.23	.87
5	I interact with my lecturers on Internet platforms using ICT.	14 (3.6%)	92 (23.8%)	30 (7.8%)	117 (30.2%)	134 (34.6%)	3.13	.99
6	I interact with my colleagues on Internet platforms using ICT.	8 (2.1%)	203 (52.5%)	14 (3.6%)	62 (16.0%)	100 (25.8%)	3.12	.98
7	I browse the Internet to gain new knowledge of doing things I value much.	10 (2.6%)	77 (19.9%)	44 (11.4%)	129 (33.3%)	127 (32.8%)	3.12	.94
8	I use social networking sites.	7 (1.8%)	113 (29.2%)	14 (3.6%)	93 (24.0%)	160 (41.3%)	2.93	.95
9	I visit online news sites.	4 (1.0%)	164 (42.4%)	13 (3.4%)	82 (21.2%)	124 (32.0)	2.93	.67
10	I use instant messaging applications to interact with my colleagues and lecturers.	14 (3.6%)	113 (29.2%)	42 (10.9%)	97 (25.1%)	121 (31.3%)	2.90	.75
	Overall Mean						*2.83*	*.71*

Note: (1) Strongly Disagree, (2) Disagree, (3) Neither Agree nor Disagree, (4) Agree, (5) Strongly Agree; SD = Standard deviation (This scale was adopted with moderations from Venkatesh, et al., 2003)

Correlation Statistics

Relationship between effort expectancy and ICT use

With a p value of .027, the result in Table 6 (also refer to Figure 2) indicate that effort expectancy significantly influenced ICT use in learning at .05 level. This result is consistent with Tan (2013).

Table 6: Regression weights in the Direct Hypothesised Model

Hypothesised Relationships	Unstandardized Regression Weights B	SE	Standardised Regression Weights β	CR	*P*
EE ⇨ ICT Use	.795	.181	.323	4.387	.027∗

Note: EE = Effort expectancy

Moderation Statistics

Moderating effect of experience on the hypothesised path

The direct hypothesised path was tested for the moderating influence of experience. The result indicates that low experience was significant (p = .036) at .05 level while high experience was not significant (p = .922) at .05 level (see Table 7 and Figure 2). This indicates that experience significantly moderates the relationship between effort expectancy and ICT use such that the influence is stronger on students with low effort expectancy.

Table 7: Moderating Effect of Experience on Hypothesised Path

Hypothesised Paths	**B**	**Beta**	***p*< .05**
EE ⇨ IU			
⇧ Experience (Low, 3 – 5 years)	.550	.344	.036∗
⇧ Experience (High, 7 – 9 years)	.007	.005	.922

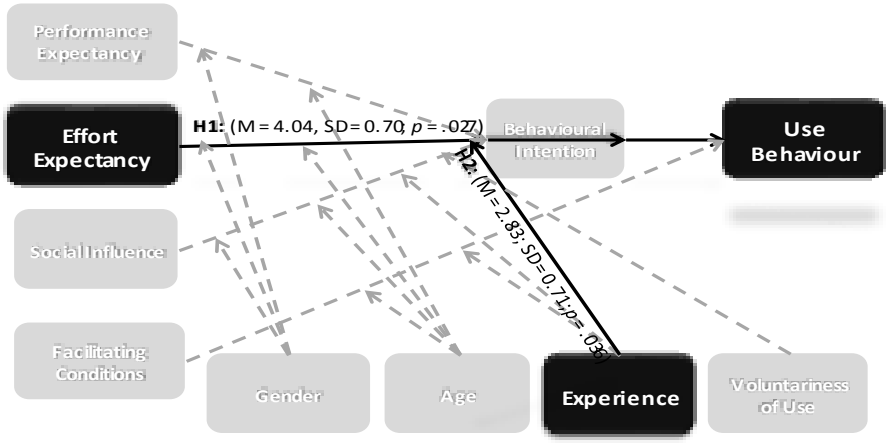

Figure 2: Model of the research hypothesised paths with findings

Note: Grey background images (watermarks) = UTAUT constructs that were not investigated

Discussion

An empirical investigation was carried out to determine the level of ICT use in academic learning by undergraduate students of Nigerian public universities. In addition, the effect of effort expectancy and the influence of past experience on ICT use were also determined. Although all the participants used various technology devices to enhance their academic activity, the results of this study indicate a moderate (M = 3.70, SD = .46) use level by them. Therefore, H_1 was accepted. Judging from these results, it can be said that students of tertiary institutions are increasingly incorporating technology use in their learning activity. Nowadays, ICTs are becoming somewhat necessary to use, especially in learning (Edmund, Thorpe & Conole, 2012; Selwyn, 2009) rather than just fun. Generally, the level of ICT use in education by students is low, especially in developing countries (Ibrahim & Adamu, 2015) compared to a general-purpose use (McMahon & Pospisil, 2005; Dede, 2004).

Not many of the participants (only between 23 and 31%) ordinarily or strongly believed that they could use ICT in their academic activities confidently based on their prior experiences. However, over 50% of them believed that ICT use is less task-laden. The overall mean value for the effort expectancy scale was high (M = 4.04, SD = .70). This result further shows that effort expectancy significantly predicts ICT use behaviour. This finding is consistent with Tan (2013), Attuquayefio and Addo (2014), and Avdic and Eklund (2010) who found that effort expectancy significantly and positively affects technology use.

It should be noted that the core concept of the construct, effort expectancy is the ease with which an individual ICT user would use it to accomplish given task (Venkatesh, et al., 20003). Long time use of technology increases experience, and, according to Venkatesh, et al. (2003) the influence of experience on effort expectancy is inverse. That is, the higher the level of ICT use experience the lower the level of effort expectancy and *vice-versa*. These findings also agree with Agarwal and Prasad (1997).

The test of the hypothesised path to determine the presence of moderating influence given that the effect of experience on the model had been confirmed, indicates that low experience is significant (p = .036) at the .05 level, while high experience is not (p = .922). In this context, this suggests that high experience is not as important as low experience is in influencing the effect of effort expectancy on technology use by the students. Furthermore, this finding confirms that experience significantly moderates the relationship between effort expectancy and ICT use such that the effect is stronger on students with high effort expectancy. The finding is consistent with Venkatesh, et al. (2003), that when the level of prior technology use experience is high, inversely the level of effort expectancy becomes low and vise vasa. Hence, H_2 was also accepted.

Furthermore, this result suggests that students with a high ICT use experience are ordinarily not obsessed with the perception that using a technology to perform a given task will be an effort-intensive work to accomplish as much as students with a low technology use experience are. The implication of this finding is that experience molds users' belief as regard whether the use of a system in a learning activity task-intensive or easy. That belief or perception in turn drives use behavior (Venkatesh, et al., 2003). This finding is also consistent with that of a study conducted by Abdul Rahman, et al. (2011) on the use of e-library who discovered that experience moderates the relationship between effort expectancy and students' intention to use e-library. However, it is important to note that, the results of this study suggest that university undergraduates are increasingly becoming skillful at ICT use in performing academic activity, something that is believed can improve students' past technology use experience.

Conclusion

This study discovers that most students in Nigerian public universities make a considerable use of ICTs to help them improve their academic performance. However, majority of them possess low ICT use prior experience. This invariably suggests that most of the students had not been using ICTs prior to joining universities. The importance of effort expectancy (which is significantly moderated by experience) explains the reasons the students' ICT use in learning is categorised as largely basic (i.e., moderate). Consistent with previous studies (Abu Bakar, et al., 2013 and Venkatesh, et al., 2003), the results of this study further confirm the claim that as the degree of users' experience increases, the level of their effort expectancy inversely reduces (and *vise-versa*). Thus, the study strongly suggests that theoretical and practical ICT use skills courses should be incorporated into public universities' academic curriculums. These findings also re-

underscore the need for the introduction of a comprehensive e-learning system in Nigerian public universities and other tertiary institutions.

Recommendations

The importance of ICT for both education and other needs cannot be underestimated. Since the level of using ICT in learning activities is appreciably rising among students of tertiary institutions, especially those in the developing world (Abu Bakar, et al., 2013; Bhuasiri, Xaymoungkhoun, Zo, Rho & Ciganek, 2012; Callum & Jeffrey, 2013; Osang,Ngole&Tsuma2013), it is imperative to incorporate more effort-free features and applications into computer systems right at the manufacturing stage. Furthermore, the literature reveals that majority of students in the developing countries use smartphones, tablets and similar mobile devices for learning purposes more than they use other technologies like PCs and laptops (Ibrahim & Adamu, 2015). It is, therefore, recommended that ICTs makers should, by default, incorporate more flexible and user-friendly e-learning applications and features in the devices. Furthermore, much as ICT use past experience is advantageous to users, to encourage more and more students to adopt ICTs in their learning activity Link and Marz (2006) have recommended that effort should be made to prevent students who have less ICT use experience from being disadvantaged or developing computer-hostile attitudes.

Limitations

The limitations of this study are that only two (ICT use and effort expectancy) constructs out of the six key predictors, only one moderating variable (experience) out of the four moderators in the UTAUT model were investigated in this study. In spite of the limitations of this research, those findings have increased the level of our understanding of ICT use in education and contribute to the growing body of literature.

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