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Factor Analysis of Inhibitors to Uptake of Information and Communication Technology for Teaching and Learning Among Pre-Service Teachers in the University

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Abstract
The concern of this study resides in establishing the inhibitors to uptake of ICT for teaching and learning among pre-service teacher in a university in Nigeria. The study adopted quantitative research approach and of survey type. The final year students of faculty of education constituted the sample of the study. In all, two hundred and two (202) students were purposively used as sample for the study. An adapted and modify questionnaires was used for gathering the data of the study. Prior to the administration of the instrument it was subjected to pilot testing to ascertain its psychometric properties. The reliability of the instrument was established through Cronbach alpha analysis that yielded .82 coefficients. Three research questions were raised to guide the study. The data of the study was subjected to series of analysis including descriptive and factor analysis. The finding showed that there are three major underlying factors that constitute inhibitors to uptake of ICT for teaching among pre-service teachers. Each of the factors contributes to 34%, 19% and 2% variance explained on the each of the three underlined dimension. The factors are embedded in attitudinal and school related factors. The study reported the implications of the findings for the university administrator, teachers' educator and lecturers.
Keywords: Information and communication technology (ICT), Inhibitors and pre-service teachers

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Introduction

One of the fundamental and most discussed issues in the contemporary educational system is the integration of Information and communication technology (ICT) to foster teaching and learning process. The intention of every government in all nation of the world for promoting the use of ICT in education reside in its potential to enhance the quality of learning experience and to equip student with required skill to function in the present rapid changing world (Aypay, Celik, Aypay & Sever, 2012). In Nigeria, the government has place priority to ICT integration since 2001, when National Policy on Information Technology was formulated. Though, the policy was greeted with criticism because it does not provide a cogent framework for education (Yusuf 2005), yet the Nigerian government has over the year's expended substantial amount of fund into education and particularly for procurement of ICT tools for Nigerian school system.

Beside this, the government initiated several capacities building training through its agency such as (NITDA) for secondary and tertiary institution teachers so as to upgrade their skills for acceptance of ICT for pedagogical practice in other to impact such to their students. Despite all the intervention and investment, the integration of ICT for teaching is still rated low, most especially among secondary school teachers in Nigeria (Abubakar, 2016).

Given the importance attached to integration of ICT to education, research into why pre-service teachers would accept to integrate it into teaching has been a focus of research especially at teacher preparation program level. For instance, Wang (2003) opined that the beliefs held by pre-service teachers about ICT would play a significant role in determining their

teaching behavior in terms of integrating ICT for teaching when they eventually get to the field of practice. Relating to that, Gill and Daigarno (2008) were of the view that for a teacher to integrate ICT, such teacher must have experience ICT use during their preparation programmes. At that state, pre-service teacher should be able to identify the purpose for ICT use, and able to reflect on the appropriateness of ICT for learning and teaching. Empirical evidences have revealed factors that shape teacher behavior towards integration of ICT for curriculum implementation and this explain why Ahmad (2012) was of the view that integrating ICT to teaching and learning process is not as easy as it sounds. The sentiment raised about the complexity of factors surrounding ICT use was sum-up to be known as "barriers or inhibitors" and this is defined as condition that hinder the achievement of an objective set by an individual or an organization (Ahmad, 2012).

There are bodies of literature that have reported some of the constraint that teacher advanced as barrier to ICT use. These barriers could be intrinsic or extrinsic in nature. The intrinsic factors are related to teacher variables such as attitudes, beliefs, personal experiences and awareness (Ertmer, 1999; Ahmad, 2012) while the extrinsic factors include inadequate or inappropriate configuration of ICT infrastructure, access, time, technical support, and resources (Chen, Tan & Lim, 2012). Furtherance to the barrier earlier stated, other reasons espoused in literature that are likely to inhibit ICT use among in-service and pre-service teachers especially in less develop nation are: lack of institutional support; outdated hardware and internet facilities; lack of ICT literacy skill; lack of access to ICT and insufficient competence required for successful integration of ICT for pedagogical practice (Ololube, 2006; Agel, 2011; Ozen 2012; Garba, 2014; Augustine, David, Kamarudin, 2018).

In Nigerian secondary school system, integration of ICT is still rated to be low among secondary school teachers, and therefore, the Pre-service teachers that are currently undergoing training to take up teaching function upon graduation are expected to have received a comprehensive knowledge on pedagogical use of ICT for teaching. It is therefore important to identify factors that may hinder their use of ICT so as to provide solution that will nip such in the bud before they proceed to the field of practice.

Statement of the Problem

The pitiable state of Nigerian secondary school education system had continuously becoming a source of concern to researchers and stakeholders in education. One of the noticeable problems among several other that has bedeviling the development of Nigerian educational system in the present digital age can be located in the slow uptake of ICT for pedagogical practice among teachers. To address this problem, it is important that massive use of ICT is encouraged in teacher training institution of learning (Garba, 2014). Despite the important attached to ICT use, studies still show that these resources are inadequate while some reported that there is an adequate ICT resource for the training of pre-service teacher (Ololube, 2006; Onwuagboke, Singh & Onwuagboke, 2014). The pre-service teacher by their training are supposed to be the gate keeper when it came to ICT use for teaching. Ironically, most of these students could not deploy ICT as expected, thus, the issue of inhibitors to integration of ICT come to fore. Hence, the imperativeness of understanding what could be a hindrance to integration of ICT among pre-service teachers in the present setting of this study. The finding from this study would enable government and school administrators to provide a robust environment and strategies that will encourage pre-service teacher behavior towards their ICT uptake when they eventually get to the field of practice.

Objectives of the Study

The objectives of this study are as follow: (i) to determine the hindrance to ICT use among pre-service teachers in Nigeria University, (ii) to explore the dimensionality of the variable inhibiting uptake of ICT use for teaching and learning among pre-service teacher. (iii) to identify which of the factors constituted more hindrance to integration of ICT for learning among pre-service teachers in the university

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Research Questions:

In line with the objectives of the study, the following research questions were raised to guide the study.

(i) What are the inhibitors to uptake of information and communication technology (ICT) for teaching among pre-service teacher in the university?

(ii) What is the dimensionality of factors inhibiting uptake of ICT for teaching among pre-service teacher in the university?

(iii) Which of the inhibitor between intrinsic and extrinsic factor contributed more as hindrances to uptake of ICT for teaching among pre-service teachers?

Methodology

The study employed cross sectional survey design, involving pre-service teachers in a University in Nigeria. The respondents were final year student of faculty of education who have undergone teacher training and have observed teaching practice during their course of study. The final year student from the three Departments of the faculty (Art & Social Science Education; Educational Foundation and Science Education) participated in the study. In all, two hundred and two (202) students were purposively used as sample for the study. Among the respondents, one hundred and fifty-four (n=154) made up of 76.2% were male, while forty-eight (n=48) made up of 23.8% were female. Ninety-six (96) of the respondents representing 47.5% were student from Department of Arts and Social Science education; sixty-one (61) representing 30.2% were students from Department of Educational foundation, while forty-four (44) representing 21.8% were students from Department of Science education. (See fig 1)

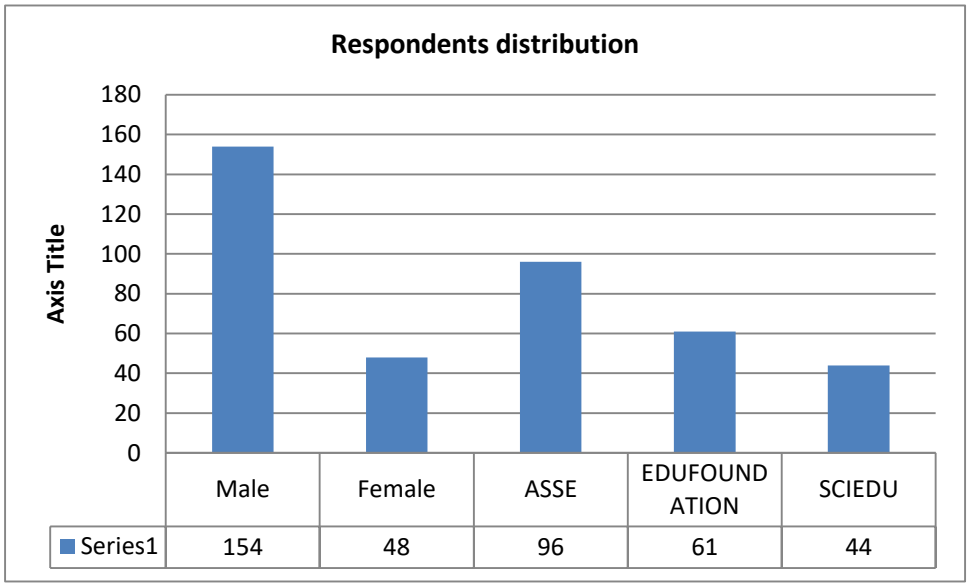

Fig 1: The distribution of the respondents based on gender and their programmes of study

The instrument of the study was adapted from Ahmad (2012) study but modified for the purpose of the study. Prior to the administration of the instrument on the respondents, it was subjected to face and content validity by two experts in Measurement and Evaluation field and one expert in Educational Technology field. All the observations raised were corrected accordingly. The reliability of the instrument was checked through administration of the instrument on some pre-service students that were not part of the study. The reliability index recorded using Cronbach alpha was .82 co-efficient. The instrument consisted of two parts. Part (A) demands for demographic information, while part (B) consisted of items on inhibitors to uptake of ICT for teaching. Likert-type scale was used which range from

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strongly disagree (1) to strongly agree (7) as an options for the respondents to choose. In all, nineteen items were used for data collection.

Data Collection and Analysis

A questionnaire was used for data collection. The instrument was personally administered on the respondents. The administration of the instrument was carried-out after the first semester examination, in all, two hundred and fifty questionnaires was administered and two hundred and two was retrieved back constituting 75% response rate. The data gathered was subjected to descriptive analysis (Mean and Standard Deviation) and inferential statistic (factor analysis) with principal component procedure.

Results

(i) What are the inhibitors to uptake of information and communication technology (ICT) for teaching among pre-service teacher in the university?

Table 1: Inhibitors to Uptake of ICT for teaching among pre-service teachers

S/N	Items	M	SD
1	I do not think I can use ICT for teaching	2.48	1.78
2	I do not have the required ICT skill for teaching	3.11	1.98
3	I lack the confident to use ICT for teaching	3.18	2.07
4	I have no time to learn how to use ICT for teaching	4..28	2.12
5	There are no enough ICT facilities for our lecturer to teach us	2.72	1.94
7	We have enough ICT facilities in our laboratories	2.43	1.81
8	Our university do not provide enough ICT facilities for lecturers in our faculty	3.28	2.02
9	The lecture hour is short for the use of ICT for teaching	3.47	1.92
10	There are no ICT technician to help when the need arise	2.41	1.97
11	For me, I am not interested in using ICT for teaching	2.72	1.89
12	I do not think ICT is important for teaching	2.94	1.97
13	ICT do not improve my teaching	3.41	2.27
14	I think the curriculum is inappropriate for ICT use in education	3.82	2.04

Table (1) above presents the mean and standard deviation of the respondents on the fourteen items used for understanding what inhibits pre-service teacher use of ICT for teaching. The grand mean of the items is 3.01 which implied that inhibitors towards uptake of ICT for teaching among pre-service teachers truly exist. In all the fourteen items, the mean range is between 2.72 to 4.28 while the standard deviation was between 1.78 and 2.27.

(ii) What is the dimensionality of factors inhibiting uptake of ICT for teaching among pre-service teacher in the university?

To ascertain the dimensionality of factors inhibiting uptake of ICT for teaching among pre-service teacher, principal component analysis was carried-out on the data to extract the underlying dimensions. In doing this, Promax rotation was applied rather than the popular Varimax rotation because it is said to be more robust technique for data in social science (Matsunaga, 2010; Ahmad 2012).

The principal component analysis on the data revealed an acceptable result in term of sampling adequacy. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy revealed 0.70, indicating that the sample of the study is adequate for principal component analysis procedure (Ahmed, 2012). The Bartlett's test of sphericity indicating a statistically significant (x^2=1276.00, 190, p = .000) with this output, the overall correlations within the correlation matrix were adequate. The total variance explained was 43.7%. The table 2 below shows the inter-item correlation matrix as well as the communality of the items.

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Table 2: Inter-item Correlation Matrix and Communalities index

	Item1	Item2	Item3	Item4	Item10	Item11	Item12	Item15	Item16	Item17	Item18	Item19	Item20
Item1	1.00												
Item2	.536**	1.00											
Item3	.515**	.620**	1.00										
Item4	.466**	.421**	.424**	1.00									
Item10	.058	.033	.235**	.085	1.00								
Item11	.032	-.068	.164*	.006	.329**	1.00							
Item12	.250**	.151*	.312**	.290**	.308**	.414**	1.00						
Item15	.132	-.034	.043	.097	-.052	-.122	.157*	1.00					
Item16	.166*	.053	.042	.097	.092	-.092	.051	.518**	1.00				
Item17	.374**	-.169*	187**	105	.024	-.018	-.129	.336**	.543**	1.00			
Item18	.327**	-.165*	209**	110	.052	.010	-.181**	.233**	.422**	.636**	1.00		
Item19	.314**	-.138	206**	144*	115	.031	.077	.205**	.346**	.459**	.601**	1.00	
Item20	.177*	.022	.060	004	.068	.022	021	.094	.312**	.431**	.569**	.609**	1.00
Communality	.620	.594	.583	. 541	.491	.504	.556	.348	.556	.639	.640	.544	.439

The Promax rotation extracted indicated three factors structured underlying uptake of ICT which is represented by thirteen items with a total variance explained of 43%. The three factors of the study are presented below with their factor loading, eigenvalue as well as the internal consistency index for each of the variables.

Table 3: Factor Solution with items; Factor Loadings, Eigenvalues, Variance Explained and Reliability index

Factor and Items	Factor Loading	Eigenvalue	Variance Explained	Cronbach's Alpha
I do not think I can use ICT for teaching	.732			
I do not have the required ICT skill for teaching	.763			
I lack the confident to use ICT for teaching	.726			
I have no time to learn how to use ICT for teaching	.728	3.97	19.9%	.72
There are no ICT technician to help when the need arise	.691			
For me, the ICT available for teaching is not enough	.691			
I do not think the class time is adequate for ICT for teaching	.699	2.84	34.0%	.79
My student learn very well during my teaching practice without ICT	.535			
I teach comfortably well without ICT during my teaching practice	.715			
I will not use ICT for teaching	.787			
I would not encourage my colleagues to use ICT for teaching	.783			
Using ICT for teaching will not be easy for me	713			
Using ICT for teaching will not interest me	.660	4.37	1.92%	.82

The factors were group together based on the common psychological construct they shared and their loading pattern. In this study, three factors were empirically realized. The items reflect the mindset of the respondents about what constitute inhibitor to uptake of ICT for

teaching. Out of the three factor, one is attributed to school related factor, while the remaining two was attitudinal related. Thus, "**school related factor**" consisted of three items that stand-out to account for 34% of the variance of inhibitor to uptake of ICT for teaching. Other grouping of the items indicated **"lack of self-efficacy",** this account for 19% variance of inhibitor. The universe of the construct was empirically explained by four items. The last factor realized is tagged **"ICT belief system"** account for 2% of variance of inhibitor. The universe of the construct was empirically explained with six items. All the three underlying construct showed a high internal consistency ranging from .82 to .72 coefficient. No cross loading was observed, all the items loaded in a consistent pattern.

(iii) Which of the inhibitor between intrinsic and extrinsic factor contributed more as hindrances to uptake of ICT for teaching among pre-service teachers?

The finding of the study revealed in (Table 3) that the second factor generated from the underlined dimension contributed more significantly to what contributed to slow uptake or inhibitor to ICT use among pre-service teachers. The construct tagged School related factor account for the highest variance (34%) and therefore suggested that this factor is a strong determinant of inhibitor to uptake of ICT, taking to consideration the two remaining factors which is attitudinal related factor.

Discussion

The empirical findings of this study to some degree have revealed some of what may impede pre-service teachers' uptake of ICT for teaching and learning function. The first question raised in this study on what inhibit uptake of ICT for teaching and learning among pre-service teachers showed that there are issues surrounding why pre-service teachers may choose not to employ ICT as a teaching tools. The descriptive analysis showed that there are myriad of reasons why pre-service teachers would not use ICT in discharging their teaching responsibility even if they used ICT for other ancillary purposes. The analysis revealed that pre-service teacher does not think they can deploy ICT for teaching. They do not think they possessed requisite ICT skills for teaching. The descriptive statistic also showed that school curriculum is not appropriate for the use of ICT. Similarly, the finding of the study as observed from descriptive analysis showed that there no enough ICT facilities and technician that can assist them when the need arises. In other word, there are no support service and other issue that borders on their personal belief about ICT use for teaching. This finding supported the earlier finding of Ololube (2006) study which attest to poor ICT integration in teacher education in Nigeria, in fact, Ololube study showed that pre-service teachers were dissatisfied with level of week integration of ICT into teacher education program which invariably constitute barrier to the effective professional development of teachers in Nigeria. The second question address by the study on the dimensionality of factor inhibiting use of ICT for teaching, revealed the existence of the following as barrier to uptake of ICT for teaching among pre service teachers: the barrier can be sum up to three categories as extracted from factor analysis. The categories are "school related factor" which account for 34% of reason why pre-service teachers may chose not to use ICT as a teaching tool.

The second category is "lack of self-efficacy" this factor account for 19% of the reason impeding uptake of ICT, while the third category is "pre-service teacher's ICT belief system" stand to account for 2% of impediment to uptake of ICT. In this finding, it is observed that school related factor account for the large percentage of the impediment to uptake of ICT, this finding was at variance with Veen (1993) finding which earlier maintained that teacher's factors tend to out-weight school related factors at influencing use of ICT. However, the finding of this study supported Ahmed (2012) finding which revealed that school related factors were observed as the major inhibitor to uptake of ICT among science teachers in Malaysia.

The last question addressed by this study borders on whether intrinsic or extrinsic factor contributed more to the impediment to uptake of ICT. It was observed that out of the three

categories of the dimension, two of the categories which were located in (Lack of self-efficacy and ICT belief system) were intrinsic related factor. This finding agreed with Ahmad (2012) and Ertmer (1999) finding that attitudinal related factors can constitute barrier to uptake of ICT, while Ozen (2012) and Garba (2014) were of the opinion that extrinsic related factor contributed more significantly to impediment of ICT use for teaching. The empirical finding of this study revealed that extrinsic related factor was the strongest factor constituting barrier to uptake of ICT for teaching among pre-service teachers.

On the measurement items used, there are some problematic items observed in the questionnaire, some of these problematic items were found to cross-load which invariably affected the number of factor that was retained for the study.

Conclusion

Therefore, this study can be described as a pilot test to established barrier to ICT use for teaching. More comprehensive study can be undertaken to generate more factor that can further explain reasons for the slow uptake of ICT for teaching among pre-service and in-service teachers.

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