



Strategies For Overcoming Barriers To The Use Of Information And Communication Technology For Instructional Purposes In Abubakar Tatari Ali Polytechnic Bauchi

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ABSTRACT

The purpose of this study is to determine innovative means for overcoming the level to which barriers (extrinsic or intrinsic) affect the use of ICT for instructional purposes in Abubakar Tatari Ali Polytechnic. To realize the purpose, two (2) specific objectives were drawn with two (2) research questions and one (1) hypothesis. A descriptive survey research design was used on a population of one hundred and eighteen (118) respondents. A structured questionnaire was used for the collection of data. A reliability test conducted using Cronbach Alpha indicate the reliability index of the item at 0.79. The data obtained were analyzed using a computer special package (SPSS). Mean and Standard deviation were used in the interpretation of the analyze data. Analysis of Variance was used to interpret the tested hypothesis. The findings of the study among others, indicate that, Technology Education lecturers' possession of good knowledge on the basic of computer network is affecting lecturers' skills. Inability to fully comprehend the needs for training and methods to use ICTs do affect the use of ICT for instructional purpose, and lack of access to ICT facilities affects ICT use by the Polytechnic lecturers. There is no significant difference between the mean responses of respondents on how lecturers' skills affect teaching and learning in ATAP. As a possible way to overcome barriers to the use of ICT, the study recommended among others that; the need for Technology Education lecturers' possession of good knowledge on the basic skills of computer network should be emphasized by the managements of ATAP through collaboration with TETFund. Access to ICT facilities should greatly be made available in the Polytechnic to lessen how ICT use affect instructional purposes by the Polytechnic lecturers.

Keywords: Strategies, Overcoming, Barriers, Instructional, Polytechnic.

INTRODUCTION

Information and Communications Technology (ICT) is an important part of most organizations these days. ICT being a relatively new tool in education it is not expected to be embraced with open arms. Salem (2015) expressed that, since the beginning of human existence, mankind has sought to develop tools and improve methods that can be used to enhance his work and life. Man invented preliminary tools for hunting, growing crops, and sewing clothes. ICT in education therefore, has the potential to produce a technologically literate, critically thinking work force, which is prepared to

participate fully in the global economy of the 21st century by transforming teaching. According to Guma, Faruque, and Khushi (2018), ICT is seen as an innovative approach introduced to enhance the efficiency of teaching and learning using electronic information. ICT is therefore, an electronic means of capturing, processing, storing and communicating information in the teaching-learning process.

The use of ICT for instruction as opined by Hashim, (2015) encourages independent and active learning, and self-responsibility for learning. This view indicates that, the use of ICT in the classroom teaching-learning is very important because it provides opportunities for teachers and students to operate, store, manipulate, and retrieve information. ICT as a versatile instrument has the capability not only of engaging students in instructional activities to increase their learning, but of helping them to solve complex problems to enhance their cognitive skills (Guma, Faruque, and Khushi 2018). It is therefore based on the above view that, ICT is widely recognized as a vital resource in economic, social, political and educational development.

Ghavifekr, and Wan Athirah (2015) observed that, it is generally believed that ICT influences teaching as a profession and therefore serves as a key to the improvement of education; it brings changes in education and learning as well as the rest of society. These changes need to be seen in Nigerian Polytechnics so that lecturers and other instructor has to be familiar with the use of modern instructional settings that unite pedagogy and academic life within its entirety. Polytechnics constitute one category of Tertiary institutions recognized by the National Policy on Education (NPE). The aim of establishing Polytechnics in Nigeria is to train technologists, technicians and management skills in courses leading to the awards of Certificates, National Diploma (ND), Higher National Diploma (HND) and Advanced Professional Diploma which are relevant to the needs, aspirations and the development of the nation's diverse economy and industries. The National Board for Technical Education (NBTE), is the main agency for Regulating Nigerian Polytechnic education. The agency makes it clear that the main objectives of polytechnic education are; the promotion of technical and vocational education and training, technology transfer and skills development to enhance the socio-economic development of the country (NBTE 2015).

Based on the need for education particular in the Polytechnics in Nigeria, Amin (2018) was of the view that, education is a socially oriented activity and that quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. Therefore, the use of ICT in Nigerian Polytechnics for teaching and learning is a complex process and can lead one to a number of difficulties. These difficulties are known as “*barriers*”. A barrier is defined as “any condition that makes it difficult to make progress or to achieve an objective” (WordNet Website). Khalid (2019) pointed out that, barriers to teacher use of ICT have been categorized into two, extrinsic and intrinsic barriers. In one study, Ertmer in (Khalid, 2019) referred to extrinsic barriers as ‘first order’ and cited; (*access, time, support, resources and training*) while he referred to intrinsic barriers as ‘second order’ and cited; (*attitudes, beliefs, practices and resistance to change*). In another research Syed Noor-UI-Amin (2013) pin pointed challenges to technology integration that are external (Extrinsic) to the teacher including; (*access to resources, training, and support*). Barriers that are internal (Intrinsic) to teachers including; (*their attitudes and beliefs, resistance toward technology in the classroom, and their knowledge and skills*). It is in line of the above opinion this research work seeks to overcome the said barriers to the use of ICT in North East Polytechnics.

Problem Statement

In Nigerian higher institutions, the use of ICT for instruction is not being given attention as pointed out by Maila, (2020) and this hinders its use for instructional purposes and has also affected the technological development of Nigerian Polytechnics system. A common problem is that, the Nigerian Polytechnics lecturers lack attitude and skills toward effective utilization of computers in education, they also lack pressure to use technology changes of ICT for instruction. Limited or no access to ICT, poor quality of supporting staff. All these are barriers result to a low motivation and lack of confidence in using new technologies for instruction in the Nigerian Polytechnics and therefore affect utilization of ICTs and need to be overcome. It is based on the said problems therefore, forms the basis of this research work by

proposing a way forward for overcoming barriers (Intrinsic or Extrinsic or both) that prevent lecturers from using ICT for instructional purposes in Abubakar Tatari Ali Polytechnic, Bauchi, Nigeria.

Objectives of the Study

The main purpose of this study is to suggest some innovative ways for overcoming barriers (extrinsic or intrinsic) to the use of ICT for instructional purposes in technology education programs in Nigerian Polytechnics. Specifically, the study seeks to;

1. Determine the extent to which lecturers' skills in the use of ICT for instructional purposes affect teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.
2. Determine extent to which access to ICT facilities affect lecturers' use for instructional purposes in Abubakar Tatari Ali Polytechnic, Bauchi.

Research Questions

Based on the purpose of this study as well as meeting the objectives of the study the following research questions were drawn to guide the study;

1. To what extent do lecturers' skills in the use of ICT for instructional purposes affect teaching and learning in Polytechnics in Abubakar Tatari Ali Polytechnic, Bauchi?
2. To what extent does access to ICT facilities affect their use for instructional purposes in Polytechnics in Abubakar Tatari Ali Polytechnic, Bauchi?

Research Hypothesis

The following null hypotheses were formulated to guide the study and tested at 0.05 level of significance; **H₀₁**. There is no significant difference in the mean scores of lecturers, instructors and workshop attendants on the effect of lecturers' skills in the use of ICT for instructional purpose on teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.

Significance of the Study

The findings of this study would be of benefit to the Polytechnic administrators by identifying their strengths and weaknesses in terms of lecturers' confidence in the use of new technologies in the classroom. The Lecturers in the institutions will also find the outcome of this work as beneficial by making them to become aware of the technical competencies expected of them and the challenges ahead of them in their quest for innovative knowledge which will keep them informed with the current trend in the world of instructional delivery in line with internationally accepted practice.

METHODOLOGY

A descriptive survey method was employed in this research work. The study area is Abubakar Tatari Ali Polytechnic, popularly known as ATAP. It is a state-owned tertiary institution in Bauchi State, Nigeria. It was established by Edict No. 1 of 1988. The institution offers National Diploma and Higher National Diploma courses at undergraduate levels. There are seven-unit schools in the entire Polytechnic and additional four directorates. Each of these has its separate newly constructed building complex which make up the entire Polytechnic system. There are about 10,000 students and 800 staffs both academic and non-academic in the Polytechnic which sum up to about 11,000 users of ICT facilities for teaching and learning in the Polytechnic and therefore, some innovative ways to use the limited ICT facilities need to be introduced in the Polytechnic for an effective adjustment to the world era of technological advancement.

The study population is a group of 118 respondents as one of the best techniques in determining the barriers to collect information through focus group as follows: a) Lecturers Cadre; b) Technologist Cadre and c) Workshop Attendants. In order to get data from the respondents a structured questionnaire tagged "Polytechnics Lecturers Opinion Questionnaire on the use of ICT for instruction (PLOQ) was developed through intensive literature review based on the research questions investigated by this study. The respondents were made to answer questions on a modified Five-Point Likert-type scale. Three lecturers from Technology and Science Education Program at Abubakar Tafawa Balewa University (ATBU) Bauchi validate the content of the instrument (questionnaire). The expert, corrections and other guides on the item to elicit respondent opinion were adopted.

The data obtained was analyzed using a computer special package known as SPSS. Mean and Standard deviation was used to interpret the analyzed data relating to the research questions. The mean of the five point's modified Likert's scales with a lower and upper limit. Therefore, the cut-off points of 4.50 – 5.00, 3.50 – 4.49, 2.50 – 3.49, 1.50 – 2.49 and 0.50 – 1.49 were used in the interpretation of data. Because of the consideration of the lower and upper limit. The hypotheses were tested at 0.05 level of significance using Analysis of variance (ANCOVA).

PRESENTATION OF RESULTS

The results of data analysis for this study are presented as tables were used to present the results based on the research questions and one-way analysis of variance (ANOVA) was used to test the hypothesis. The findings and discussions of the findings were also presented below;

Research Question 1: *To what extent do lecturers' skills in the use of ICT for instructional purposes affect teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi?*

Table 1: Mean and Standard Deviation of Responses of Lecturers, Instructors and Workshop attendants on the extent to which lecturers' skills in the use of ICT for instructional purposes affect teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.

S/No.	Items on skills effect	\bar{X}_L	SD_L	\bar{X}_I	SD_I	\bar{X}_W	SD_W	\bar{X}_{GI}	REMARKS
1	Inability to use spreadsheet programs for instructional purpose.	3.97	0.68	3.94	0.83	4.17	0.83	3.98	Affected
2	Inability to use database programs for instructional purpose.	3.62	0.70	3.18	0.88	3.67	0.78	3.57	Affected
3	Inability to use electronic presentation software for instructional purpose. by lecturers.	3.86	0.67	3.47	0.94	3.75	0.75	3.80	Affected
4	Inability to design, create, and maintain a rightful instructional procedure.	3.88	0.67	3.47	0.80	3.58	0.67	3.81	Affected
5	Inability to operate a digital camera and digital imagery for instructional purposes.	3.91	0.67	3.59	0.94	3.50	0.52	3.84	Affected
6	Lack of Network knowledge applicable to the use of ICT	2.79	0.92	2.82	0.73	2.50	0.67	2.77	Moderately Affected
7	Inability to use WebCT/ electronic board teaching skills to teach students.	3.81	0.67	3.35	0.99	3.50	1.00	3.73	Affected
8	Inability to use a video conferencing classroom for instructional purpose.	3.81	0.67	3.35	0.93	3.58	0.99	3.74	Affected
9	Inability to handle the computers and their peripheral devices for instructional purpose,	3.79	0.72	3.23	0.97	3.42	1.00	3.69	Affected
GRAND MEAN								3.67	Affected

Note: \bar{X}_L = Lecturers' Mean Score, SD_L = Lecturers' Standard deviation, \bar{X}_I = Instructors' Mean Score SD_I = Instructors Standard deviation
 \bar{X}_{WA} = Workshop Attendants' Mean Score, SD_{WA} = Workshop Attendants Standard deviation and \bar{X}_{GI} = Grand Mean per Item

It is clear that the table 1, above shows that the respondents have a common view with a mean response of 3.57 – to – 3.98 that skill has effect on lecturers’ use of ICT for instructional purposes. However, with a cutoff point of 2.5 a grand mean of 3.67, shows that all the respondents were of the opinion that, lecturer’s level of skills affects the use of ICT for instructional purposes in Abubakar Tatari Ali Polytechnic, Bauchi.

Research Question 2: *To what extent does access to ICT facilities affect their use for instructional purposes in Polytechnics in Abubakar Tatari Ali Polytechnic, Bauchi?*

Table 2: Mean and Standard Deviation of Responses of Lecturers, Instructors and Workshop attendants on the extent to which access to ICT facilities affect their use for instructional purposes in Abubakar Tatari Ali Polytechnic, Bauchi.

S/No.	Items on Access to ICT	\bar{X}_L	SD_L	\bar{X}_I	SD_I	\bar{X}_{WA}	SD_{WA}	\bar{X}_{GI}	REMARKS
1	Lack of adequate incentives to access ICTs for instructional procedures	3.81	0.69	3.35	0.99	3.50	1.00	3.73	Affected
2	Lack of ICT infrastructure for linking formal and informal learning contexts	4.04	0.66	4.06	0.83	4.42	0.67	4.07	Affected
3	The limited computers available are outdated and obsolete for the use of ICT for instruction	3.81	0.68	3.47	1.00	3.67	0.65	3.76	Affected
4	Lack of internet connectivity in the computer laboratories	4.02	0.64	3.94	0.82	4.33	0.78	4.03	Affected
5	Lack of periodical maintenance as well as accessibility of the computers and their peripheral devices	3.83	0.69	3.41	0.87	3.83	0.72	3.79	Affected
6	Lack of provision for necessary infrastructural support to use ICT for instruction	3.82	0.66	3.35	0.99	3.33	0.89	3.73	Affected
7	The cost of internet bundle and access to internet facilities	3.81	0.68	3.35	0.99	3.50	1.00	3.73	Affected
GRAND MEAN								3.78	Affected

Note: \bar{X}_L = Lecturers’ Mean Score, SD_L = Lecturers’ Standard deviation, \bar{X}_I = Instructors’ Mean Score SD_I = Instructors Standard deviation
 \bar{X}_{WA} = Workshop Attendants’ Mean Score, SD_{WA} = Workshop Attendants Standard deviation and \bar{X}_{GI} = Grand Mean per Item

The result obtained from table 2 indicate respondents were of the view that, access to ICT facilities affect the use of ICT for instructional purposes in ATAP, Bauchi with a grand mean response of 3.73 to 4.07 per item. And a grand mean of 3.78 which is above the cutoff point of 2.5 indicates that access to ICT facilities do affects lecturer’s use of ICT for instructional purposes in Abubakar Tatari Ali Polytechnic, Bauchi.

Hypothesis

H0₁. There is no significant difference in the mean scores of lecturers, instructors and workshop attendants on the effect of lecturers’ skills in the use of ICT for instructional purpose on teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.

One-way Analysis of Variance (ANOVA) was used to test this hypothesis at 0.05 level of significance. The table below therefore present the result of this hypothesis:

Table 3: Analysis of Variance (ANOVA) for comparing the mean scores of responses of lecturers, instructors, and workshop attendants on the effect of lecturers' skills in the use of ICT for instructional purpose on teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.

Source of Variance	SS	Df	MS	F-Cal	F-crit.	Decision
BG	3.507	2	1.754	3.754	.031	Accept H_0
WG	71.159	144	0.494			
Total	74.667	146				

Key: BG = Between Groups, WG = Within Groups, SS = Sum of Squares, Df = Degree of Freedom, MS = Mean Square, F-Cal. = Calculate value. F-crit. = Critical value

From table 3, it is evident that, the total responses of lecturers, instructors and workshop attendants' on how lecturer's skill has affected the use of ICT for instructional purposes the calculated value F-Calculated value is 3.754 while F- critical value is 0.031 at 0.05 level of significance. Since the critical value 0.031 is less than 0.05 level of significance therefore, the null hypothesis is accepted. This shows that, there is no significant difference between the mean responses of instructors, lecturers and workshop attendants on how lecturers' skills in the use of ICT for instructional purpose affect teaching and learning in Abubakar Tatari Ali Polytechnic, Bauchi.

Findings of the study

The findings of this study are as follows:

- 1) On the extent of lecturers' skills in the use of ICT for instructional purposes it was find out that,
 - a. Inability to use spreadsheet programs to compile chart data for instructional purpose do affect lecturers' skills for teaching and learning.
 - b. Inability to use database programs to create tables, store and retrieve data affects lecturers' skills for teaching and learning.
 - c. Inability to navigate the World Wide Web and search effectively for data affects lecturers' skills for teaching and learning.
 - d. Inability to operate a digital camera and understand how imagery can be used for instruction affects lecturers' skills for teaching and learning.
 - e. Inability of a lecturer to provide feedback on a document through a web-based document application affects lecturers' skills for teaching and learning.
 - f. Inability of lecturers to handle the computers and their peripheral devices for instruction affects lecturers' skills for teaching and learning.
- 2) On the extent to which access to ICT facilities affect lecturers' use of ICT it was found that;
 - a. Lack of adequate incentives to access ICTs for instructional procedures do affects lecturers' use of ICT for teaching and learning.
 - b. Lack of ICT infrastructure for linking formal and informal learning contexts affect the use of ICT.
 - c. Lack of internet connectivity in the computer laboratories affect the lecturers' use of ICT
 - d. Limited/poor internet connectivity affect the use of ICT by the Polytechnic lecturers.
 - e. Lack of infrastructural support to use ICT for instruction do affects lecturers' use of ICT for teaching and learning.
 - f. The cost of acquisition of ICT facilities like the computers, their peripheral devices, installation and maintenance affect the use of ICT.

DISCUSSION OF THE FINDINGS

The result of data analysis for research question one, on the extent of lecturers' skills in the use of ICT for instructional purposes, shows that a technology education lecturer's possession of good knowledge on the basics of computer networks is affecting the lecturer's skills. This finding is in support of the assertion of Kaarakainen, Kivinen, & Vainio. (2018) on the ICT skills in Finnish schools that, possession of good knowledge of the basic computer network is one of the ICT skills and a key to its integration for teaching and learning. Likewise, the accuracy of the assessment of ICT skills is one of the key issues to address.

However, Kaarakainen, Kivinen, & Vainio emphasized ICT skill assessment mainly on self-reports and subjective evaluations. This assertion makes it a reality that, to diminish the ICT skill gap interventions, the use of formal education is urgently needed for the possession of good knowledge of the basics of computer networks. It is therefore hoped that this will serve as a way to overcome how the skills level of the lecturers will affect the use of ICT in Nigerian Polytechnics.

The result of data analysis for research on the extent to which access to ICT facilities affects ICT use, shows that lack of ICT infrastructure for linking formal and informal learning contexts affects the use of ICT, lack of access to ICT facilities greatly affects its use by the Polytechnic lecturers, Lack of internet connectivity in the computer laboratories affected the use of ICT and high cost of acquisition of ICT facilities like the computers, their peripheral devices, installation, and maintenance affect the use of ICT is in support of Aramide, Ladipo, & Adebayo (2015) on demographic variables and ICT access as predictors of Information Communication Technologies' usage among science teachers in federal unity schools in Nigeria. Aramide, Ladipo, & Adebayo work agree that accessibility was found to contribute more to ICT use among science teachers than the location of ICT access. the work of Ogunode Niyi, Jacob, Okwelogu Izunna Somadina & Olatunde-Aiyedun (2021) pinpoints inadequate funding as a sole rider to the high cost of accessing ICT facilities, inadequate ICT facilities, unstable internet services, unstable electricity, poor computer literacy of academic staff, poor implementation of ICT policies and problems of deployment of ICT facilities by Public higher institutions during Covid-19 in Nigeria. Based on the findings, Ogunode, Jacob, Okwelogu & Olatunde-Aiyedun work recommends adequate funding of the ICT program, and provision of ICT facilities to subsidize the cost of ICT facilities for the school's teaching and learning process.

CONCLUSION

This research work was embarked on with the purpose to determine the ways for overcoming barriers (extrinsic or intrinsic) to the use of ICT for instructional purposes in technology education courses. The study covers Science Technology, Engineering Technology and Environmental Technology Programmes. The findings of the study among others indicate that a Technology Education lecturer's possession of good knowledge of the basics of computer networks is highly affecting the lecturer's skills. This Research work identified the barriers, personal and institutional (intrinsic and extrinsic), and educators' justifications for the lack of use of ICT for instructional purposes. The implication of this remained lacking in adequate long-term staff development programming and concentration on technology competency as well as classroom-level integration methods. Reductions of the barriers described previously were achieved through technology-focused training. It is therefore concluded that, lecturers first needed to be trained on best practices for the use of ICT as tools and resources for their existing curriculum as well as be supported with accessible facilities and an adequate number of supporting staff throughout their teaching and learning career at the Polytechnics sector of Nigerian educational system.

RECOMMENDATIONS

Based on the findings of this study and a possible means for overcoming the barriers (extrinsic or intrinsic) the following recommendation were drawn;

1. The need for lecturers' possession of good knowledge of the basics skills of computer networks should be emphasized by the management of the Polytechnic through collaboration with the Tertiary Education Trust Fund (TET Fund).
2. The stakeholders in the education sector should emphasize the need for ATAP Lecturers' ability to communicate and participate in collaborative networks via the internet for their skill improvement.
3. The National Board for Technical Education the agency for moderating Polytechnic Education in Nigeria, should make it compulsory for the possession and mastery of skills on Network knowledge applicable to the use of ICT by all ATAP lecturers.

4. All Nigerian Polytechnics lecturers should be encouraged to master/acquire some rudiment skills for the use of ICT for instructional purposes.
5. Biannual workshops and conferences should be organized by the Tertiary Education Trust Fund (TET Fund) on setting priorities and organizing tasks based on timing on the use of ICT for instructional purposes in the Polytechnic.
6. ATAP lecturers should be encouraged to develop their ability to effectively implement and execute plans for educating students per period in the use of ICT for their instructional purposes.

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