

## **Impact of Strategic Training on Science Teachers’ Competencies and Attitudes towards Information and Communication Technology Application in Teaching in Adamawa State, Nigeria**

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**Abstract:** *The study investigated the impact of Computer strategic training on teachers’ competencies and attitude towards Information and Communication Technology (ICT) application in teaching Basic science in the secondary schools. The study adopted the pre-test, post-test control group quasi-experimental design. The population for the study consisted of all science teachers in the 30 secondary schools designated as pilot schools for the eventual implementation of ICT-education integration in the North and Central Senatorial Districts of Adamawa State, Nigeria. Ten schools were randomly selected from the 30 pilot schools. A total of 98 science teachers from the ten schools formed the sample for the study. The teachers were divided into two groups to constitute the experimental and control groups. The experimental group contained 48 teachers, while the control group contained 50 teachers. The treatment group was exposed to strategic training in ICT application in teaching Basic Science. The control group was not exposed to the strategic training but was given manuals used for the training to read on Computer usage. The training lasted for eight weeks. Two instruments were used to collect data for the study. The first is “Information Technology Competency Test” (ITCT) used for pre-test and post-test to assess the teachers’ competencies in Computer skills and usage before and after exposure to the treatment and the second instrument is “Attitude towards Information Technology Scale” (AITS) to determine the attitude of the treatment group towards ICT application in teaching. The result showed a significant difference in ICT competencies between the treatment group and that of the control group after the training.  $t = 5.502$ ,  $p = 0.000$  and  $t = 1.181$ ;  $p = 0.243$  respectively. Result also showed that there was significant difference in the attitude of the treatment group towards the use of ICT in teaching Basic science before and after the training ( $t = 9.459$ ,  $p = 0.000$ ). It can then be concluded that the strategic training was effective in improving the teachers; competencies on ICT integration into the classroom and also enhance their attitude towards Computer usage. We therefore recommend that this sort of strategy training programme should be extended to all serving teachers who had not been exposed to ICT training in their pre-service education by the State government.*

**Keywords:** *Strategic Training, Competency, Knowledge, Skills and Attitude.*

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### **1. INTRODUCTION**

Schools all over the world are under pressure or obligation from clients and proprietors to adapt to the use of Information and Communication Technologies (ICTs) in curriculum dispensation. This is due to the fact that the use of ICTs has become pervasive in every individual’s daily life. Ajayi (2003) asserts that Government and people around the world appreciate the ability of ICTs to stimulate rapid development in all sectors of the economy. The author further observes that ICTs are redefining the way we do almost everything and it is a ready tool for all strata of society – it is as much a tool to the president of any nation in governance as it is a tool to the housewife in her daily chores. The adoption of ICT skill is imperative in schools since its skill is now such a

versatile and indispensable flair in socioeconomic life of all societies across the globe. Similarly, Obijio for, Inayatullah and Stevenson (1999) found that people in Africa considered ICT as appropriate to their societies for various reasons among which include; survival in the 21<sup>st</sup> century, enhancing education process, in monitoring crimes and more. In realization of this, most African nations have made moves to cue in to the digital world.

African nations as member states of the global community need to cue into ICTs education integration as their counterparts in all other sub-regions of the world. Despite numerous social and economic challenges facing the African nations, no nation would wish to be left behind in the struggle for relevance in the world economy dictated by ICTs culture. To achieve this global ICT culture, the UNESCO is poised to support most especially the developing nations in their quest to introduce the new technology in their school curriculum process. The New Partnership for African Development (NEPAD), a subsidiary organization of the Africa Union (AU) has since embarked on exploring the possibility of integrating ICTs into the education system across the sub-region. In pursuance of this goal, also, NEPAD launched an e-school initiative in October 26, 2003 at the African Summit of the World Economic Forum in Durban, South Africa (NEPAD, 2003). The initiative was adopted as a priority continental undertaking aimed at ensuring that youth graduating from African schools have the skills that will enable them to participate effectively in global information society. The aim of the initiative is to impact ICT skills to young Africans in primary and secondary schools as well as harness ICT technology to improve, enrich and expand education in African countries. This continental initiative underscores the importance of ICT-education integration in the continental sub-region in order to get Africa on board the 21<sup>st</sup> century ICT revolution.

Nigeria being a member state of NEPAD is also committed to the promotion and development of Information Technology (IT). This is reflected in its numerous policies aimed at promoting ICT development in the country. Some of the policies include;

- Launching of National Telecommunication Policy in September in 2000
- Development of Comprehensive Science and Technology Policy in 2001
- Development and Launching of Information Technology Policy in 2001
- Establishment of National Information Technology Development Agency (NITDA) in 2001
- Launching of Satellite Programme by National Space Research
- Development Agency (NASRDA) in 2001
- Granting of license to private mobile phone operators in 2001 when MTN first came on board.
- First Ministerial initiative on e-education by the ministry of education in 2004
- Formulation and presentation of a bill on Information Technology (IT) in 2006
- Policy on computer training for teachers across the country by Education Trust Fund (ETF) in 2006

The implementation of the ICT-education project like any curriculum innovation requires capable teachers, teachers who have the knowledge, competencies and pedagogical skills of the subject matter. It is however observed by Bebee (2004) that the bulk of teachers serving in Nigerian school system were not trained on the ICT application in education as it was not reflected on the curriculum at the time of their training. This therefore requires that serving teachers must be retrained particularly on computer literacy a basic requirement for understanding the paradigm of ICTs as well as professional competencies in the use of ICTs in teaching. Seminars and workshops may not be effective enough in providing teachers with the required proficiency for the successful implementation of ICT-education integration and to develop positive attitudes towards ICT usage in their daily life in general and its application in teaching in particular.

Many educationists, curriculum experts in particular have called for the retraining of teachers on the use of ICTs with all seriousness that it deserves. Highlighting the importance of teachers in curriculum dispensation, Ehindero (2006) underscores the importance of teachers and cautions that the imminent changing role of the Nigerian teacher in the wake of globalization characterized

by the information age of the 21<sup>st</sup> century requires that they acquire basic knowledge and skills of ICTs. He calls for a redefinition of the teachers' work through professionalism and ideals for best practices. This study is therefore conceived around the expressed principles that the quality of an education system cannot go beyond the quality of its teachers. The ICT-education integration should start with retraining and training of teachers for the programme to succeed. This study is therefore designed to test the efficacy of using comprehensive and strategic training programme on teachers in ICT professional skills.

That Nigeria has earmarked the year 2011 for ICT implementation in school curriculum is a positive development. To achieve this goal, several states have set up pilot projects in schools. It was in this line that Adamawa State Government created ICT Directorate in its State Ministry of Education. The directorate has since launched ICT pilot projects in schools (Adamawa State Gazette, 2007). The state has so far enlisted a total of 72 schools on the pilot programme; 25 Primary Schools, 30 Junior Secondary Schools and 17 Senior Secondary School. Detail of equipment supplied to the pilot schools is presented on table 1.

**Table1.** *Equipment Supplied to the Pilot Public Schools in Adamawa State*

Level No	School	Computer	printer	Server	5.5 KVA Generator
Primary	25	0310	44	25	18
JSS	30	0102	19	14	03
SSS	17	1,638	32	14	32
Total	72	2,150	95	48	53

**Source:** *Adamawa State Ministry of Education, 2008.*

Despite all these preparations by way of policies, funding and all essential structures being put in place, a big challenge that could seriously undermine the successful integration of the ICT scheme is the teacher factor, with particular reference to competencies and attitudes. Simply having ICT in schools will not guarantee effective utilization of ICT in teaching.

The study therefore intends to investigate the effectiveness of strategic training in ICT on science teachers' competencies and attitudes towards ICT deployment in teaching Basic science. The strategic training entails in this study involve an organized intensive short term training programme similar to the Russian model of ICT training scheme for teachers (Gorbunova, 2008).

## **2. THE SPECIFIC OBJECTIVES OF THE STUDY ARE TO**

- develop a strategic training programme to train teachers for competencies in ICT usage in teaching science; and
- determine the efficacy of the strategic training on science teachers' competencies on the ICT use in teaching Basic science and
- examine the effect of the training programme on the attitude of the science teachers to ICT use in teaching Basic Science

Two null hypotheses were formulated to guide in data collection and analysis:

- There is no significant difference in the science teachers' competencies in ICT use due to strategic training received.
- There is no significant difference in the science teachers' attitude towards ICT due to strategic training received.

## **3. METHODOLOGY**

The study adopted the Pre-test and post-test control group quasi-experimental design. Ten schools were randomly selected from the 30 pilot schools being used for ICT-education integration in the North and Central Senatorial Districts of Adamawa State. All science teachers (Biology, Chemistry, Physics, Mathematics and Agriculture science and Basic science) from the ten schools selected totaling to 98 constitute the sample for the study. All the 48 science teachers from five of the ten schools served as the treatment group while 50 from the other five schools served as the control group.

Two instruments namely; Information Technology Competency Test (ITCT) and Attitude towards Information Technology Scale (AITS) were used for data collection. The ITCT used to obtain data on ICT competencies was adapted with modification from Olawale (2010). The AITS a self rating instrument also adapted from Selwyn-Soh Information Technology Attitude Scale and modified to make it relevant for the study.

The content of the training package covers Microsoft word, Excel and multimedia application in teaching. Learning experiences are on the basic computer knowledge and skills, and suggested application in instructional delivery, evaluation and the use of data base in teaching e. g. students' bio-data, academic record, computation of students test scores and resource management. The treatment lasted for eight weeks. Pretest, posttest competency tests were administered on both the treatment and the control groups. The pretest was administered before the commencement of the treatment. After the treatment, the post test was administered to the two groups as well. The data generated were subjected to t-test analysis.

#### 4. RESULTS

The hypotheses raised were subjected to statistical analysis based on the data generated from the pretest and posttest measurements on ITCT and AITS, respectively. The results obtained are presented as follows.

##### 4.1. Hypothesis One

There is no significant difference between science teachers' competencies in ICT due to strategic training received.

The data generated from administering the ITCT instrument on the two groups (the treatment groups (TG) and the control group (CG)) before and after treatment were analyzed using computer software SPSS 16.0 version. The t-test analysis was used to determine if differences exist between the pairs. The result is as presented in tables 2, 3 and 4.

**Table2.** *T-test analysis of the (TG) and (CG) on pretest scores in ICT competence*

Group	N	Mean	Std. Deviation	df	t	Sig. (2-tailed)
TG Pretest	48	34.29	11.506	96	1.095	.276
CG Pretest	50	30.88	18.404			

$p > .05$

Table 8 shows that no significant differences exist between the two groups in thier pretest scores ( $t = 1.095$ ;  $p = .276$ ). This indicates that there is no significant difference between the TG and CG group before the treatment.

**Table3.** *T-test analysis of the pretest – posttest scores of the treatment group on ICT competency test.*

Group	N	Mean	Std. Deviation	df	t	Sig. (2-tailed)
TG Pretest	48	34.29	11.506	47	5.46	.000
CG Pretest	50	46.94	10.157			

$p < .05$

Results on Table 3showed that there was a significant difference in the pretest and posttest scores of the treatment group ( $t = 5.46$ ;  $p = 0.000$ ). This is an indication that the strategic training has a significant impact on the treatment group on ICT usage.

**Table4.** *T-test analysis of the pretest – posttest scores of the Control Group on ICT competency test.*

Group	N	Mean	Std. Deviation	df	t	Sig. (2-tailed)
TG Pretest	50	30.88	18.404	49	1.181	.243
CG Pretest	50	32.46	19.436			

$p > .05$

Results on table 4 showed that there was no significant difference between the pretest and posttest scores of the control group,  $t = 1.181$ ;  $p = 0.243$ . This indicates that the control group did not exhibit significant difference on ICT competence on their pretest-posttest scores. The differences observed in the TG scores can only be accounted for in terms of the strategic training in Computer usage received.

## **4.2. Hypothesis Two**

There is no significant difference in the science teachers' attitude towards ICT due to strategic training received.

To test this hypothesis, the AITS instrument was administered to the treatment group before and after their exposure to the Computer training. The scores obtained were subjected to t-test statistical analysis. The result obtained is as presented in Table 5.

**Table 5.** *T-test analysis on the attitude of the treatment group before and after their exposure to ICT training in teaching science*

Treatment group	Mean	N	Std. Deviation	Std. Error Mean	t	Sig. (2-tailed)
Before Treatment	39.5833	48	11.79223	1.70206	9.459	.000
After Treatment	51.4583	48	11.69644	1.68824		

$P < .05$

The value of t is 9.459 at  $p = .000$  indicates that significant difference existed between the mean scores in the pre-test and post-test assessment of the treatment groups' attitude towards the adoption of ICT in teaching. Thus, the hypothesis is rejected. This suggests that the treatment has impacted positively on the science teachers' attitude towards the adoption of ICT in teaching.

## **5. DISCUSSION**

Majority of teachers serving in primary and secondary schools in Nigeria received their teaching training at a time when ICT was not part of, or reflected in teacher education curriculum in the country (Beebe, 2004). Although, Government organizes seminars and workshops on ICT training but, the seminars and workshops lasting for only three to four days or at most a week may not be sufficient to impact positively on the teachers' competencies and attitudes towards ICT usage. Their lack of appropriate and adequate knowledge and skills in Computer use could also affect their attitude towards its usage and adoption into classroom processes. It has thus been shown that a better and more strategic programme is necessary to be put in place to empower these teachers for a smooth take off and sustainable ICT-education integration in Nigeria. The results of the study indicate that a strategic training programme is effective in the cultivation of ICT knowledge and skills. Teachers who participated in the training were also found to develop positive attitude towards ICT application in teaching.

Since the success of any curriculum depends on the teachers' competencies and attitude, the integration of ICT into school curriculum in Nigeria requires that teachers are adequately prepared for what they may perceive as new challenges to their status co. Teachers need to be equipped with the much desired ICT skills so as to empower the schools in their effort of providing the youth with the relevant skills needed for the 21<sup>st</sup> digital age. This will also avert immediate digital crisis situations in the classrooms between digital native students and digital immigrant teachers (Prensky, 2001; Ololube, 2006). Nigeria could borrow from the Russian Model of ICT for teachers. Despite her advancement in ICT, and high level of ICT education integration, yet it was clear to Russia that her teachers and educators needed more in-depth training on how to incorporate ICT into teaching and learning processes. To achieve this, a partnership pact was signed with Microsoft to deploy regional Microsoft IT Academy for Teacher Training centers. Within six months from commencement of the training programme, 20,000 teachers received training on Information Technology (IT) and professional training on the use of IT in education.

## **6. CONCLUSION**

The study concluded that the strategic training has a significant impact on the teachers on ICT usage and it impacted positively on their attitude towards adopting ICT in teaching. it is therefore recommended that each state in the federation should organise an indepth ICT training programme for its teachers to empower them on ICT usage in teaching and learning.

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