COMPARATIVE INVESTIGATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ORIENTED TEACHING AWARENESS, DISPOSITION AND COMPETENCE BETWEEN MIDDLE AND UPPER BASIC SCIENCE TEACHERS IN NIGERIA

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Abstract

The application of Information and Communication Technology (ICT) to various fields of human endeavour has assumed a new dimension in this 21st century. Teaching as a profession is not left out. The ICT awareness, disposition and the competence of teachers, who are transforming agents in schools play important roles in ICT-oriented teaching and learning. There might be differences in these identified factors among teachers at various educational levels which can be investigated. This study therefore compared the ICT oriented teaching awareness, disposition and competence of middle and upper basic science teachers. Two group randomized subjects non-experimental design was adopted using causal comparative approach in this study. Multi-stage and stratified sampling techniques were employed to select participating Science teachers from middle and upper basic schools in Ogun state, Nigeria. Information and Communication Technology Status Scale comprises ICT Awareness (r=0.65), ICT Disposition (r=0.81) and ICT Competence (r=0.93) sub-scales was used for data collection. Descriptive statistics and independent t test were used for data analysis. It was found that higher percentages were recorded for upper basic science teachers in ICT oriented teaching awareness, disposition and competence than their counterparts in middle basic schools. It was in ICT awareness only that significant difference of means (upper basic =5.66) and middle basic = 4.66) was observed $t_{(457)} = -3.55$, $p < .05$. Significant difference of means was not recorded on either disposition or competence. Based on the findings of this study, it is therefore recommended that teachers should be trained and retrained on ICT oriented teaching to block the existing gaps among them. Provision of

ICT oriented teaching and learning facilities by the school owners into the classrooms is equally recommended.

Key Words: Information and Communication Technology (ICT), Awareness, Disposition, Competence, Middle and Upper Basics Science Teachers

Introduction

Information and Communication Technology (ICT) covers equipment created to enhance acquisition, storage and dissemination of information materials. Previously, Information technology (IT) had been used to denote the current nomenclature ICT. The word communication was added, considering the role ICT plays. ICT was initially introduced basically for commercial and administrative purposes because of limited knowledge of its application to different fields. The current trend of research, especially in the developing world, needs to centre on how ICT can be used in classrooms to sustain and enhance learning. Hence, computers, Internet, telephone, digital camera, projector, etc. are now expected to be learning facilities, especially now that the language better understood by people of school age is ICT. According to UNESCO (2004) the use of ICT by teachers to teach the students is highly advantageous. This is because it enables them demonstrate understanding of the opportunities and implications of the uses for learning and teaching in the curriculum context; plan, implement, and manage learning and teaching in open and flexible learning environment.

Integration of Information and Communication Technology (ICT) to teaching and learning processes has now become imperative. Teachers at different levels of education, who are not skilful in ICT oriented teaching may not match the global teaching standards. World Bank (2002) expresses a view that generally, ICT holds out the opportunity to revolutionise pedagogical methods, expand access to quality education, and improve the management of education systems. Corroborating the position of World Bank, the world has turned to ICT-driven globe, where ICT applications have dominated various spheres of Life- Economy, media, communication, Engineering, Administration to mention but a few. Education as an important aspect of human's life cannot be left out. Beukes-Amiss and Chiware, (2006) however identify

inadequate existence of information and how ICTs are being introduced into schools in developing countries to bridge the gap.

Reality of making all teachings ICT-oriented has dawn on practicing teachers. The challenge has not left any teacher with any alternative. Ezekute, (2000) reports that, Nigeria, an African country, is almost two decades behind in embracing the use of computer in primary and secondary classrooms. A year later, Afolabi, (2001) reports that Nigeria ranks lowest among five prominent African counties in the use of ICT. Can we then say that the situation has really changed in Nigeria of today? Hence the need to ascertain the present status. Liverpool, (2001) reports that, in spite of invasion of ICT in different centres of learning in the developed countries, many countries in Africa are still battling with its integration. In Nigeria in particular, ICT awareness, seems to be low especially among teachers at lower levels. Many teachers at the lower levels of education still complain of the dearth of instructional materials, possibly because they are less aware of instant access to vast array of data and materials ICT afford them. According to Fowowe (2006), ICT provides data access, challenging learning situation and assessment skills. It equally imperative to stress the fact that, where teachers are aware of ICT, their disposition to its use seems better and integration to teaching work becomes a possibility.

Smith, Moyer, and Schugar, (2011) reviewed literature extensively on ICT awareness, disposition and Competence and their interrelationships. It was found that, teachers' classroom application of ICT knowledge remains limited, especially, those who have poor awareness and disposition to ICT (Tan & Guo, 2010; Williams, 2011b). Karchmer's (2001) study reveals the need for more competent teacher preparation in the area of computer-oriented teaching and assessment. Marsh, (2008); Rother,(2004) reports that, little progress has been recorded in recent time on ICT application in the classroom, especially in deploying ICT to support teaching and assessment. Kay's (2006) review of the literature suggests that pre-service education programs have not successfully prepared new teachers to integrate technology effectively especially in developing countries. That was the situation some eight years ago, it is hoped that a change might have occurred differently from what Kay reported. Except for key- boarding, technology skills rarely play central roles in school-based learning, and

traditional print literacies continue to dominate (Tierney,2009). Williams (2011b) presents an unfortunate consequence: teachers fail to recognize that what they refer to as "e-learning" is quite simply the way many learners gather information outside of school. The challenge persists for teacher educators and professional developers to identify strategies and pedagogies that will better prepare teachers to integrate computer technology into classroom instruction and engage students in ICT-based learning

Smith, Moyer, and Schugar, (2011) further their review on researchers and theorists in the realm of new literacies (Cervetti, Damico, & Pearson,2006; Leu, Kinzer, Coiro, & Cammack, 2004; O'Brien & Scharber, 2008), they summarise that ICT's are central to literacy within a global community in the information age. They also emphasize that ICTs require new literacies, and that learning within those new literacies is often socially constructed. This explains why ICT usage demands ability to engage in threaded discussions and interactive chats in order to manage information (Guthrie, 2004) and share intellectual capital to solve important problems especially, those identified within learning environment (Leu, Kinzer, Coiro, & Cammack, 2004). To support learners develop these new literacies and acquire the requisite skills, teachers are encouraged (Armstrong & Warlick, 2004; Leu, 2001; Richardson, 2010; Williams, 2011a) to replace traditional learning models with new models whereby students use the Internet and other ICT's to collaboratively explore and solve problems. In these models, geographically remote learners locate, read, write, and synthesize digital texts to socially construct and communicate new knowledge, thereby deepening their understanding of the problems under consideration. Thus, research provides important information about what 21st Century teachers should teach and how they might best teach it. However, additional research reveals that teacher-ICT use competence alone is insufficient. Other important factors, including teacher dispositions, impact the likelihood that teachers will apply what they know about computer-mediated learning in their classrooms.

Teachers' effective integration of computer technology associate significantly with their personal beliefs and dispositions regarding the potential benefits (Cervetti, Damico, & Pear- son, 2006; Ertmer, 2005; MacArthur & Malouf, 1991; Vannatta & Fordham, 2004). Teachers who demonstrate strong positive disposition, use computers

for their own personal and professional purposes and equally believe that computer integration will support their students' learning as well (MacAr- thur & Malouf, 1991). After reviewing related literature, Cervetti, Damico, and Pearson (2006) argue that teacher educators might facilitate much-needed educational reform if they could help teachers recognize technology as helpful for their own personal development. The authors further emphasized that teachers might acquire that important disposition if they had opportunities to learn not just *about* technology, but *through* technology, in courses that focused on other content.

Literature has sufficient explanations on the current state of teachers' ICT awareness, disposition as well as their competence in deploying ICT to the classroom. However, much attention has not been directed to comparing the ICT conditions at various levels of education. Research that will provide such empirical information becomes imperative. Hence, the need for this study titled "Comparative Investigation of Information and Communication Technology (ICT) oriented teaching awareness, disposition and competence between middle and upper basic science teachers".

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Objectives of the Study

Based on the above background, the study sought to:

- investigate pattern of ICT oriented teaching awareness of Middle and Upper basic Science teachers;
- compare the ICT oriented teaching awareness of the two groups (Middle and Upper basic Science teachers) of teachers;
- explore disposition of the sampled Middle and upper basic teachers to ICT oriented teaching;
- differentiate between the ICT-oriented teaching disposition of the two sets (Middle and upper basic) of teachers;
- assess competence in ICT applications usage of the teachers in Middle and upper basic schools; and
- establish difference existing between the teachers in Middle and upper basic schools in ICT Competence.

Research Questions

Six research questions were asked to direct the study.

1a. What is the pattern of ICT oriented teaching awareness of Middle and Upper basic Science teachers?

b. Is the ICT oriented teaching awareness of the two groups (Middle and Upper basic Science teachers) of teacher significantly different?

2a. How positively disposed are the sampled Middle and upper basic teachers to ICT oriented teaching?

b. How significantly different are the two sets of teachers (Middle and upper basic) in their disposition to ICT oriented teaching?

3a. Which of the ICT applications are the teachers in Middle and upper basic schools can competently use?

b. How significantly different are the teachers in Middle and upper basic schools in ICT Competence**?**

Methodology

Research Design

Two group randomized subjects non-experimental design was adopted using causal comparative approach in this study. The study adopted a causal comparative approach to establish differences between groups (Middle and upper basic teachers) on dependent variables (ICT disposition and Competence). No attempt was made by the researcher to manipulate any variable.

Sample

Multi stage sampling technique was adopted to select participating teachers for this study. Stratified sampling was employed to select schools from every Local Government Area (LGA) in each of the three senatorial district in Ogun State, Nigeria. Cluster sampling was equally adopted to select rural, semi-rural and urban Middle and upper basic schools. Basic Science and Science and Technology teachers were selected from middle and upper basic schools respectively. Table 1 presents the distribution of the participating teachers based on senatorial district, School type and location.

Table 1: Distribution of the Participating Teachers Based on Senatorial District, School Type and Location.

School Location	Middle Basic				Upper Basic			
	Senatorial District					senatoria		
	Ogun Central	Ogun East	Ogun West	Total	Ogun Central	Ogun East	Ogun West	Total
Rural	32	26	31	89	31	25	46	102
Semi - Urban	10	20	17	47	25	17	23	65
Urban	40	26	18	84	30	20	22	72
Total	82	72	66	220	86	62	91	239

Instrumentation

Information and Communication Technology Status Scale that comprises four sections was used to collect data for this study. Section A elicited personal information about the participants and where they came from and the status of ICT facilities in their schools. Section B comprises 9 items that measured awareness status with dichotomous responses- "No" and "Yes". Section C consists of 12 items that measured teacher ICT disposition using four levels response format- "Strongly Disagree"; "Disagree"; "Agree"; and "Strongly Agree". List of 7 basic ICT applications that are learning supportive constitutes section D, with the assigned response format-"unsatisfactory", "below average"; "average", "above average" and "outstanding" to gauge teachers' competence. The table below provides psychometric properties of sections B, C, and D using Cronbach Alpha reliability analysis method.

Table 2: Reliability Coefficients of the Constructs investigated.

Construct	Reliability Coefficient
ICT Awareness	**0.65**
ICT Disposition	**0.81**
ICT Competence	**0.93**

Data Collection

The selected participants took part in a 5 day training workshop organized by Ogun State Universal Basic Education Board and Universal Basic Education Commission in Abeokuta. The instrument was administered to all the participants in their respective groups (upper and middle basics) by the researcher who was also a facilitator for the two groups.

Data Analysis

Descriptive statistics (frequency counts and percentages) and independent t test were used for data analysis. The choice was based on the design employed and the nature of research questions raised.

Results

1a. What is the pattern of ICT awareness of Middle and Upper basic Science teachers?

		Middle Basic			Upper Basic		
		No	**Yes**	**Total**	**No**	**Yes**	**Total**
Have you attended any ICT workshop/seminar	Frequency	146	74	220	144	95	239
	Percent	66.4	33.6	100	60.3	39.7	100
Are you aware of the national policy on computer education	Frequency	76	144	220	72	167	239
	Percent	34.5	65.5	100	30.1	69.9	100
Are you aware of the role of ICT on education	Frequency	56	164	220	27	212	239
	Percent	25.5	74.5	100	11.3	88.7	100
Are you aware that teaching & learning can be done effectively with ICT?	Frequency	19	201	220	16	223	239
	Percent	8.6	91.4	100	6.7	93.3	100
Are you computer literate?	Frequency	98	122	220	99	140	239
	Percent	44.5	55.5	100	41.4	58.6	100
Can you access the internet	Frequency	124	96	220	107	132	239
	Percent	56.4	43.6	100	44.8	55.2	100
Do you have a computer or laptop	Frequency	133	87	220	128	111	239
	Percent	60.5	39.5	100	53.6	46.4	100
Did your school have	Frequency	201	19	220	212	27	239

functional ICT centre(s)?	Percent	91.4	8.6	100	88.7	11.3	100
Has computer studies been introduced in your school?	Frequency	102	118	220	74	165	239
	Percent	46.4	53.6	100	31	69	100

Table 3: pattern of ICT awareness of Middle and Upper basic Science teachers

Table 3 presents the result of the pattern of ICT awareness of middle and upper basic Science teachers. Four hundred and fifty nine teachers (middle basic 220, upper basic 239) responded to the questionnaire. The findings revealed that 74 (33.6%) of the middle basic teachers and 95 (39.7%) of upper basic teachers indicated that they have attended ICT workshop/seminar. The table also shows that 144 (65.5%) of the middle basic and 167 (69.9%) of the upper basic teachers indicated that, they are aware of the national policy on computer education. In a similar vein, 164 (74.5%) of the middle basic teachers and 212 (88.7%) of upper basic teachers reported that they are aware of the role of ICT on education. Meanwhile, 201 (91.4%) of the middle basic and 223 (93.3%) of upper basic teachers indicated that, they are aware that teaching and learning can be done effectively with ICT. Among them, 122 (55.5%) of the middle basic and 140 (58.6%) of upper basic teachers reported that they are computer literate. The table further reveals that 96 (43.6%) of the middle basic and 132 (55.3%) of the upper basic indicated that they can access the internet. However, 87 (39.5%) of the middle basic and 111 (46.4%) of the upper basic teachers indicated that, they have computer or laptop. From the table also 19 (8.6%) of the middle basic and 27 (11.3%) of the upper basic teachers indicated that their schools has functional ICT centre(s). It was also found that 118 (53.6%) of the middle basic and 165 (69%) of the upper basic teachers reported that, computer studies has been incorporated into their school subjects.

1b. Is the ICT awareness of the two groups (Middle and Upper basic Science teachers) significantly different?

Table 4: Comparison of Middle and Upper basic Science teachers' ICT awareness Using t-test

School	N	Mean	SD	t	df	p	Remark
Middle Basic	220	4.66	2.09				
Upper Basic	239	5.32	1.91	-3.55	457	.000	S

S= Significant at 0.05 alpha level

The table 4 shows that upper basic teachers' mean score of (5.66) was higher than the mean score of the middle basic teachers (4.66). The observed difference in the mean score was statistically significant, $t_{(457)} = -3.55$, $p < .05$.

2a. How positively disposed are the sampled Middle and upper basic teachers to ICT oriented teaching?

Table 5: Disposition of Middle and upper basic Science Teachers to ICT oriented Teaching

Item	Response	Middle Basic		Upper Basic	
		Frequency	Percent	Frequency	Percent
ICT facilities are essential for effective teaching	Disagree	13	5.9	11	4.6
	Agree	207	94.1	228	95.4
Application of ICT facilities makes teaching very easy.	Disagree	12	5.4	10	4.2
	Agree	208	94.5	229	95.8
The use of ICT facilities in teaching serves as teaching aids	Disagree	32	14.5	38	16
	Agree	188	85.5	201	84
The use of ICT facilities motivates learning	Disagree	16	7.3	11	4.6
	Agree	204	92.7	228	95.4
Learners pay more attention whenever ICT facilities are	Disagree	29	13.1	20	8.3
	Agree	191	86.9	219	91.7

used while teaching.					
Learners understand fast whenever ICT facilities are used.	Disagree	41	18.6	33	13.8
	Agree	179	81.4	206	86.2
ICT facilities make teaching & learning boring.	Disagree	196	89	223	93.4
	Agree	24	11	16	6.6
It is difficult to teach with ICT facilities.	Disagree	175	79.6	207	86.5
	Agree	45	20.4	32	13.5
The use of ICT facilities in teaching is time consuming.	Disagree	160	72.7	170	71.1
	Agree	60	27.3	69	28.9
ICT facilities are more educative compared with textbooks.	Disagree	46	20.8	58	24.3
	Agree	174	79.2	181	75.7
ICT facilities are seldom used in teaching & learning process.	Disagree	64	29.9	56	23.5
	Agree	156	70.9	183	76.5
ICT facilities are essential tools for nation building.	Disagree	23	10.5	22	9.1
	Agree	197	57.3	217	90.9
Total		220	100	239	100

Table 5 represents the result on the dispositions of the middle and upper basic teachers to ICT orientated teaching. Both the middle and upper basic teachers show positive disposition as shown on items 1,2,3,4,5,6,10,11 and 12. On the other hand, the teachers showed negative deposition on items 7, 8 and 9. The result reveals that, the middle and upper basic teachers show positive disposition to ICT-oriented teaching. The table also revealed that the number of middle basic teachers who revealed that ICT facilities are essential for effective teaching was 207 (94.1%) while 228 (95.4%) of their counterparts in upper basic hold the same view. The table also revealed that 208 (94.5%) of middle basic teachers and 229 (95.5%) of upper basic teachers agree to the fact that, application of ICT facilities makes teaching very easy. The result also revealed that 188 (85.5%) of middle basic teachers and 201 (84%) of the upper basic teachers claim that the use of ICT facilities in teaching serves as teaching aids. The table further

shows that 204 (92.7%) of middle basic teachers and 228 (95.4%) of upper basic teachers reported that the use of ICT motivates learning.

From the table also, it is shown that 191 (86.9%) of middle basic teachers and 219 (91.7%) of upper basic teachers indicate that learners pay more attention whenever ICT facilities are used for teaching. In the same vein, 179 (81.4%) of middle basic teachers and 206 (86.2%) of upper basic teachers claim that learners understand fast whenever ICT facilities are used. The table also reveals that only 24 (11%) of middle basic teachers and 16 (6.6%) claim that ICT facilities make teaching and learning boring. Also 45 (20.4%) of middle basic teachers and 32 (13.5%) of upper basic teachers claim that it is difficult to teach with ICT facilities. The table equally revealed that 60 (27.3%) of middle basic and 69 (28.9%) of the upper basic teachers indicate that is time consuming. Further from the table, 174 (79.2%) of middle basic teachers and 181 (75.7%) claim that ICT facilities are more effective compared to textbooks. It is also revealed in the table that 156 (70.9%) of middle basic and 183 (76.5%) of upper basic teachers indicated that ICT facilities are seldom used in teaching and learning process. It was also found that 197 (57.3%) of middle basic and 217 (90.9%) of upper basic teachers claim that ICT facilities are essential tools for nation building**.**

2b. How significantly different are the two sets of teachers (Middle and upper basic) in their disposition to ICT oriented teaching?

Table 6: Comparison of Middle and Upper basic Science teachers' ICT Disposition Using t-test

School	N	Mean	SD	t	**Df**	**p**	**Remark**
Middle Basic	220	25.45	4.77				
Upper Basic	239	25.54	3.99	-.208	457	.835	NS

NS= Not Significant at 0.05 alpha level

Although, table 6 shows that upper basic teachers' mean score of (25.45) was slightly higher than the mean score of the middle basic teachers (25.45), the observed difference in the mean scores was not statistically significant, t (457) = -.208, p >.05

3a. which of the ICT applications are the teachers in Middle and upper basic schools can competently use?

Table 7: Competence of Middle and upper basic Science Teachers in ICT oriented teaching

		Middle Basic Teachers Performance Status						Upper Basic Teachers Performance Status					
		Unsatisfactory	Below Average	Average	Above Average	Outstanding	Total	Unsatisfactory	Below Average	Average	Above Average	Outstanding	Total
E-Mailing	Frequency	52	48	64	37	19	220	53	55	65	33	33	239
	Percent	23.6	21.8	29.1	16.8	8.6	100	22.2	23	27.2	13.8	13.8	100
Internet Surfing	Frequency	56	48	62	35	19	220	59	53	67	33	27	239
	Percent	25.5	21.8	28.2	15.9	8.6	100	24.7	22.2	28.0	13.8	11.3	100
Microsoft word Application usage	Frequency	50	39	77	28	26	220	40	56	69	42	32	239
	Percent	22.7	17.7	35	12.7	11.8	100	16.7	23.4	28.9	17.6	13.4	100
Microsoft Excel Application usage	Frequency	61	68	51	20	20	220	55	80	56	29	19	239
	Percent	27.7	30.9	23.2	9.1	9.1	100	23	33.5	23.4	12.1	7.9	100
Corel draw Application Usage	Frequency	63	79	40	22	16	220	68	90	43	20	18	239
	Percent	28.6	35.9	18.2	10	7.3	100	28.5	37.7	18	8.4	7.5	100
Microsoft Power point Application Usage	Frequency	67	67	42	25	19	220	70	80	48	22	19	239
	Percent	30.5	30.5	19.1	11.4	8.6	100	29.3	33.5	20.1	9.2	7.9	100
Auto-shapes or graphics Application usage	Frequency	69	80	45	16	10	220	73	94	39	15	18	239
	Percent	31.4	36.4	20.5	7.3	4.5	100	30.5	39.3	16.3	6.3	7.5	100

Table 7 presents the result of the ICT applications the teachers in Middle and upper basic schools can competently use. Four hundred and fifty nine teachers (middle basic 220, upper basic 239) were assessed. The table shows that among the middle basic teachers 120 (54.5%) with 64 (29.1%) on average can competently use e- mailing, among upper basic counterparts 131 (54.8%) with 65(27.2%) on average can competently use e-mailing. The table also shows that out of 116 (52.7%) of middle basic teacher s that can use internet surfing 62 (28.2%) are on just average while out of 127 (52.8%) of the upper basic teachers can use internet surfing with 67 (28%) on average. In the similar vein, the table reveals that out of 131 (59.5%) of middle basic

teachers that can use Microsoft word application, 77 (35%) can just averagely use it and out of 143 (58.6%) of upper basic teachers that can use Microsoft word application, 69 (28.9%) are of average. However, the table shows that on Microsoft excel application, only 91 (41.4%) of middle basic can competently use it and only 104 (43%) of upper basic teachers can make use Microsoft excel application. The table further revealed that only 78 (35.5%) of middle basic and 81 (33.9%) of the upper basic teachers can use coral draw application. From the table also it is shown that 86 (39.1%) of middle basic and 89 (37.2%) of the upper basic teachers can use Microsoft power point application. The table also revealed that only 71 (32.3%) of middle basic and 72 (30.1%) of the upper basic teachers can use auto shapes or graphics application.

3b. How significantly different are the teachers in Middle and upper basic schools in ICT Competence**?**

Table 8: Comparison of Middle and Upper basic Science teachers' ICT Competence Using t-test

School	N	Mean	SD	t	df	p	Remark
Middle Basic	220	17.25	7.34				
Upper Basic	239	17.58	7.16	-.477	457	.634	NS

NS= Not Significant at 0.05 alpha level

Although the table above shows that upper basic teachers' mean score of (17.58) was slightly higher than the mean score of the middle basic teachers (17.25), the observed difference in the mean score on ICT competence was not statistically significant, t (457) = -.477, p >.05

Discussions

The pattern of ICT awareness of middle and upper basic Science teachers through attendance of seminars and workshop in the recent time has assumed a new dimension. Some teachers have ICT awareness while others do not still have in spite of the need in classrooms. It was observed however, through the result on the pattern of ICT awareness of middle and upper basic teachers that, larger percentage of the upper

basic teachers indicated ICT awareness than their counterpart in Middle basic schools. This shows that the upper basic science teachers are aware of ICT oriented teaching than their middle basic counterparts. The result on the national policy on computer education and the role of ICT in education revealed that upper basic teachers are more aware than the middle basic teachers. Also, result regarding awareness on ICT for teaching and learning effectively and computer literacy and ownership of desktop or laptop computers indicated that in all, the upper basic science teachers have edge over their middle basic counterparts. This finding reveals extent to which science teachers at the two levels of education are trained to meet the educational challenges in this 21st century. Sizable number of teachers at the two levels are not aware of ICT role in teaching-learning environment, not to mention their competence in the use of ICT to enhance their teaching.

The result on ICT awareness of the two groups (Middle and Upper basics) of Science teachers, shows that, upper basic teachers' mean score was significantly higher than the mean score of the middle basic teachers. Findings with respect to pattern of ICT awareness of middle and upper basic Science teachers and the comparison of the two groups: (Middle and Upper basic Science teachers) support a number of studies such as World Bank, (2002); UNESCO, (2004); Beukes-Amiss and Chiware, (2006). All these studies found out that ICT is advantageous and the use of ICT is being introduced into schools in developing countries to bridge the gap. Conversely, the result of this contradict that of Ezekute, (2000) and Afolabi, (2001) who found out that Nigeria is ranked lowest among five prominent African countries and is behind in embracing the use of computer in primary and secondary classrooms.

Findings with respect to the dispositions of the middle and upper basic teachers to ICT orientated teaching show that, of the twelve items measuring disposition to ICT oriented teaching, nine of those items revealed that both middle and upper basic teachers are positively disposed, only the remaining three items showed that the teachers are negatively disposed to ICT. Both the middle basic and upper basic teachers agreed to the fact that ICT facilities are essential for effective teaching and that application of ICT facilities makes teaching very easy. Also they agreed that use of ICT facilities in teaching

serves as teaching aids and the use of ICT facilities motivate learning. More so, they are of disposition that learners pay more attention whenever ICT facilities are used in teaching and that learners understand easily whenever ICT facilities are used. They also hold to the fact that ICT facilities are more educative compared with textbooks and that ICT facilities are essential tools for nation building. However, they both disagreed that ICT facilities make teaching & learning boring and it is difficult to teach with ICT facilities and that the use of ICT facilities in teaching is time consuming. Teachers at both levels were found to have positive disposition but that of upper basic teachers was slightly higher. The finding corroborates the position of Smith, Moyer, and Schugar, (2011) on difference in ICT disposition among teachers. This is a clear revelation that, all teachers are not positively disposed to ICT use in the classroom. The need to bridge the existing gap then arises.

The finding also reveals slight difference in the competence of the teachers at the two levels. The science teachers at the Upper basic schools have higher ICT competence than their counterpart in middle basic, though the difference was not statistically significant. The finding supports the positions of Tan & Guo, (2010); Williams, (2011b) and Karchmer (2001) that variation exists in the ICT competence among the teachers and that there is need for more competent teacher preparation in the area of computer-oriented teaching and assessment. The positions of the researchers and the findings of this study are buttressing one main point, teachers' need for support to meet with global demand in the field of teaching.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Training and retraining of teachers on ICT oriented teaching and learning approach should be given priority by both federal and state governments to boost their awareness, disposition and competence.
2. Government that owns various schools should provide adequate ICT based learning resources in all the schools. Otherwise, all the trainings given to teachers will be a waste.

3. School owners should support their teachers to procure personal laptop computers which will be of help to prepare their lessons.
4. Inspectorate division should be also trained on ICT oriented teaching and learning and should be integrated to indices of inspection.
5. ICT based learning facilities can be cost implicative, therefore, school owners should improve on security of schools before procurement or supply of the facilities.

Conclusion

This research has yielded much information about ICT-based learning, factors that will facilitate such learning, and disposition and competence of teachers on instructional integration of computer technology in middle and upper basic schools. This information challenges classroom teachers to adopt ICT-based global learning models that will develop students' digital literacy skills and practices. It equally informs teachers, inspectors and stakeholders on ICT-based learning of science. This thereby, has potency to influence the development of positive dispositions that will enhance the classroom integration of computer-based learning. The gain of doing so is highly immeasurable, hence stakeholders in the field of education, especially at the two levels investigated, should implement the five recommendations made in this study.

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