Investigating Science Teachers' Level of Computer Literacy and Perceptions toward Computer Devices Usage in Teaching in Oyo State

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Abstract

This study investigated Science Teachers' Level of Computer Literacy and perceptions toward the Use of Computer Devices in Teaching in Oyo State. Descriptive survey research design was used for the study. The population for the study comprised all junior secondary school teachers in Ibadan North Local Government Area, Oyo State. A sample of 203 Mathematics and Science teachers from 20 schools selected through purposive and simple random sampling techniques participated in the study. The research instrument for the study was a questionnaire entitled: Science Teachers' Level of Computer Literacy and Teaching Questionnaire (STLCLTQ). The instrument was validated by four experts in the areas of Science Education and Educational Measurement and Evaluation. A reliability coefficient of the instrument was 0.76 using Cronbach's Alpha statistic. Frequency counts, percentages and the mean were adopted for the result analysis. The findings showed that most of the teachers were computer literate and they showed positive perceptions and attitudes towards the use of computers in teaching and learning. It was recommended that teachers should be encouraged to attend more computer oriented workshops and seminars to update their knowledge in

computer based instructions for effective teaching and learning in order to meet up with the changing trends in the global society and for national development.

Keywords: Computer literacy, teachers perceptions, junior secondary school, national development

Introduction

Computer literacy can be viewed as the knowledge and ability to interact with the computer and its application packages for effective use in carrying out needed outputs. The influence of computer has saturated many spheres of the global system such that the world today is viewed as a digital era. This is however making the world to become a global village. It is therefore imperative for every citizen to be computer literate in order to meet up with global demands in science and technology. Computer literacy has been defined in various ways. For example Ikolo and Okiy (2012) viewed computer literacy as the knowledge and ability to use computers and related technology efficiently with a range of skills covering levels from elementary use to programming and advanced problem solving. The business dictionary online defined computer literacy as the use of specialized document manipulation software running on a computer or terminal that allows a user to create, edit, store and print out text based documents.

In recent times, the world has witnessed a rapid increase in technological innovations which ushered in the advent of the electronic computer system among other modern technologies. At present, the computer technology has penetrated many aspects of human, organizational and societal roles as well as in the educational system (Bada, Adewole & Olalekan, 2009). Development in science and technology has brought into lime light the indispensable roles of computer in the area of information technology. The inclusion of computer studies into the school curriculum made the teaching and learning processes to be more interesting in a new dimension than what it used to be in the past. The computer has become the most widely used technology in the world today. The importance of

computer in education cannot be under estimated especially in the recent times that the world has become closer than ever since the history of mankind. The ability to use computers to perform a variety of tasks is becoming fundamental to the teaching and learning process such that, computer literacy has become a necessity for being able to handle a wide range of varying computer applications for various purposes (Osuji, 2010).

The Federal Government of Nigeria recognizes the roles of computer technology in the society hence its inclusions in the National Policy on Information and Communication Technologies and its integration into the Education system (FRN, 2013). The main goal of the policy is to meet the human resources requirements of the nation for attaining and enhancing sustainable socio-economic development, global competitiveness as well as individual's ability to survive in a contemporary environment. The Nigerian National Policy on Education aims at enhancing and improving the competences of teachers in the development and promotion of effective use of innovative materials in schools which can only be achieved through computer literacy. Literacy in computer can be likened to the air we breathe which is indispensable for every living thing and is second to no other for any individual or organization to function effectively in today's societies for both social and economic development.

Teachers are important in the implementation of the policy on education and successful integration of Information and Communication Technology into the school system, because they are the channels through which the policy on ICT can be attained. It is therefore necessary for teachers to have adequate knowledge of the computer which is a major tool for ICT. Studies have shown that the extent to which teachers integrate Information and Communication Technology in their teaching and students' learning is related to many factors, among which are the teachers' knowledge and competence, teachers pedagogic skill and professional development. Furthermore, teachers' ability and willingness to integrate Information and Communication Technology into their teaching will largely be

dependent on the professional training and development which they receive (Omoniyi & Quadri, 2013; Osuji, 2010).

Studies have shown that technology can be used effectively as a cognitive tool as well as an instructional media in the classroom by encouraging inquiry, effective communication, constructing teaching products, and assisting students' self-expression (Gilakjani, 2013). The use of computers in education opens new dimensions to many areas of teaching and learning activities due to its potentials in changing some of the existing educational pedagogies. Teachers are very significant in the effective exploitation of this resource in the educational system. As computer usage continues to increase teachers in the society must also prepare for the use of computers within the classroom. There are many factors that encourage the use of computers by teacher in the classroom. These factors include computer technology training, computer self-efficacy, possession of personal computer, teachers' beliefs and attitudes towards computer technology, access to professional development in the computer technology, knowledge and experience. All these factors are important motivations needed for teachers' computer literacy in educational sectors (Gilakjani, 2013).

Teachers' attitudes to computers affect the successful use of computers in the classroom and these attitudes, whether positive or negative, affect how teachers respond to technologies. This in turn affects the way students view the importance of computer in schools and affects current and future computer usage. For example, teachers often view the computer as a tool to accomplish housekeeping tasks, manage their students more efficiently, and to communicate with parents more easily. Gaining an appreciation of teachers' attitudes towards computer usage may provide useful insights into computer technology integration and acceptance and usage of computer technology in teaching and learning. Teachers' attitudes to computer usually encompass statements that examine users' interaction with computer hardware, computer software, other persons relating to computers, and activities that involve the use of computer. Studies on Teachers' attitudes to the use of computers include Kutluca (2011),

Bebetsos and Antoniou (2009) and Deniz (2007) among others. It is necessary to enlighten teachers on effects oftheir attitudes to the knowledge and the use of computer which could either make or mare the successful implementation of the knowledge of computers into classroom and general educational activities for meaningful and impactful teaching and learning.

Statement of the Problem

Computers are useful tools in teaching and learning because they make the work of teachers easier. For example, computers are used in demystifying complex concepts in different subjects. Computers help teachers to teach better by enhancing their teaching environment and increasing learning resources. Teachers' computer literacy is the first stage in the successful adoption of computers in teaching any subject in secondary schools. This is because teachers can only be competent and interested users of computers as teaching tools if they are computer literate. Studies have shown that teachers are less competent in the use of computer technologies in the classroom such as in connecting the computer system with some accessories such as the projector for the presentations. Also, some teachers found using power points for their presentations as additional tasks. However, teachers will not adopt computer technologies into their instructional tasks if they cannot effectively operate a computer. Moreover, when computers are effectively used, they have a dramatic effect on teachers and learners. In view of the roles played by computers in teaching and learning, this study investigated science teachers' levels of computer literacy and their perceptions towards the use of computer devices in teaching in Oyo State.

Purpose of the Study

The purpose of this research was to investigate science teachers' levels of computer literacy and their perceptions towards the use of computer devices in teaching in Oyo State.

Specifically, the research investigated:

1. Availability and adequacy of computer facilities in Junior Secondary School in Ibadan North Local Government Area, Oyo State;
2. The perceived level computer literacy of junior secondary school mathematics and science teachers in Ibadan North Local Government Area, Oyo State; and
3. Mathematics and science teachers' perceptions of the use of computer facilities in teaching and learning in Ibadan North Local Government Area, Oyo State.

Research Questions

1. Are there adequate computer facilities for teaching and learning at the Junior Secondary Schools in Ibadan North Local Government Area, Oyo State?
2. What is the level of teachers' computer literacy in Ibadan North Local Government Area, Oyo State?
3. What are Mathematics and Science teachers' perceptions of the use of computer facilities in teaching and learning in Ibadan North Local Government Area, Oyo State?

Methodology

This study adopted a descriptive survey design. A sample of two hundred and three (203) Junior Secondary School Mathematics and Basic science teachers randomly selected through purposive and simple random sampling techniques from twenty (20) schools in Ibadan North Local Government Area, Oyo State participated in the study. The Instrument for the study was a questionnaire entitled: Science Teachers' Levels of Computer Literacy and Teaching Questionnaire (STLCLTQ).The questionnaire consisted 2 sessions. Session A contains demographic information of the respondents and Section B was divided into three parts covering the purpose of the study and was based on 4-point Likert scales. Part (1) was on availability, functionality and adequacy of computer facilities for teaching and learning at the Junior Secondary Schools in Ibadan North Local Government Area, Oyo State. This was scaled as: Available, Functional and Adequate (AFA); Available, Functional but Not

Adequate (AFNA); Available but Not Functional (ANF); and Not Available (NA) to get information on availability of computer facilities which were scored 4, 3, 2 and 1 respectively. Part (2) was on Teachers' Levels of Computer Literacy, and was also scaled as: Very Well (VW), Not Very Well (NVW), Not At All (NAA), No Idea of the Application (NIA) to sieve information on teachers' levels of computer literacy which were also rated respectively as 4, 3, 2 and 1. In Part (3), responses were sought on Teachers' Perceptions on the Use of Computer Facilities in Teaching and Learning, and were scaled as Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) rated as 4, 3, 2 and 1respectively.The instrument was scrutinized and vetted by three (3) experts in fields of Science Education and Education Management to ensure content and face validity. All corrections were effected before the final draft was printed for administration on the respondents. The instrument was administered on a small portion of the population who did not partake in the main study for reliability test and Cronbach's Alpha statistics was used to determine the reliability coefficient (r) of the instrument. A reliability index of 0.76 was obtained from the exercise. Frequency counts, percentages and the mean were used to answer the research questions raised for the study. A mean value of 2.71 and above was considered significant for table 4 in response to research question 1 while those below 2.71 were considered not significant. In table 5, a mean value of 3.10 and above was considered significant in response to research question 2 while below 3.10 were considered not significant. Also in table 6, a mean value of 3.15 and above was considered significant in response to research question 3 while below 3.15 were considered not significant. The decisions on the mean values considered significant were based on the total grand mean calculated for each table in the results.

Results

The summary of the results are hereby displayed:

Table 1: ***Distribution of the Respondents based on Gender***

Gender	Frequency	Percentage
Male	87	42.86
Female	116	57.14
Total	**203**	**100.00**

Table 1 shows the distribution of respondents by gender. The result shows that 87 (42.86%) of the respondents are males while 116 (57.14%) are females.

Table 2: ***Percentage Distribution of Respondents based on Qualification***

Qualification	Frequency	Percentage (%)
NCE	29	14.29
HND	16	7.88
B.Sc.	27	13.30
B.Ed.	78	38.42
B.Sc. (Ed.)	22	10.84
M.Ed.	13	6.40
M.Sc.	11	5.42
Others	7	3.45
Total	**203**	**100.00**

Table 2 presented the distribution of the respondents based on their qualifications as follows:29 (14.29 %) teachers were Nigerian Certificate of Education (NCE) holders, 16 (7.88%) teachers were Higher National Diploma (HND) holders, 27 (13.30%) teachers had Bachelor of Science (B.Sc.), 78 (38.42%) teachers had Bachelor of Education (B.Ed.), 22 (10.84%) teachers had Bachelor of Science Education (B.Sc.(Ed.)), 13 (6.40%) teachers were Master of Education (M.Ed.) holders, 11 (5.42%) teachers were Master of Science (M.Sc.) holders and 7 (3.45%) teachers had other qualifications.

Table 3: ***Distributions of the Respondents based on Years of Teaching Experience***

Years of Experience	Frequency	Percentage (%)
1 to 5 Years	68	33.50
6 to 10 Years	41	20.20
11 to 15 Years	39	19.21
16 to 20 Years	35	17.24
20 Years and above	20	9.85
Total	**203**	**100.00**

Table 3 displays the distribution of respondents by years of teaching experience as follows: those with1 to 5 years experience were 68(33.50%), between 6 to 10 years were 41 (20.20%), teachers with11 to 15 years of teaching experience were 39 (19.21%), teachers with 16 to 20 years experience were 35(17.24%), while 20 (9.85%) of the respondents have above 20 years experiences in teaching.

Research Questions 1: Are there adequate and functional computer facilities for teaching and learning at the Junior Secondary Schools in Ibadan North Local Government Area, Oyo State?

Table 4: ***Availability, Functional and Adequacy of Computer Facilities for Teaching and Learning at the Junior Secondary Schools in Ibadan North Local Government Area, Oyo State***

S/N	Item	AFA	AFNA	ANF	NA	Mean	Decision
1	Mobile handset	191	12	0	0	3.94	Accept
2	Computer desktop	137	42	10	14	3.49	Accept
3	Computer keyboard	130	51	19	3	3.52	Accept
4	Computer mouse	130	50	20	3	3.51	Accept
5	Modem	87	80	22	14	3.18	Accept
6	Computer Printer	50	125	12	16	3.03	Accept
7	Compact Disc (CD)	65	80	32	26	2.91	Accept
8	Flash drive	73	59	44	27	2.88	Accept
9	Projector	12	38	68	85	1.89	Reject
10	Electronic board	0	0	24	179	1.11	Reject
11	Laptop	71	57	52	23	2.87	Accept
12	Central Processing Unit (CPU)/Computer System	137	42	9	15	3.48	Accept
13	i-pad	39	26	0	138	1.83	Reject
14	Interactive screen	0	0	0	203	1.00	Reject
15	Uninterrupted Power Supply (UPS)	80	89	33	4	3.24	Accept
16	Computer laboratory	16	12	50	98	1.47	Reject
	Grand Mean					**2.71**	**Accept**

Key: Available, functional and adequate (AFA), Available, functional but not adequate (AFNA), Available but not functional (ANF), Not available (NA)

In table 4 the analysis of the availability and adequacy of computer facilities in Ibadan North Local Government Area of Oyo State was displayed. The mean values of item 1, 2, 3, 4, 5, 6, 7, 8, 11, 12 and 15 were shown to be greater than 2.71 which was the grand mean computed for table 4 and the decision on each of the items was accepted, while items 9, 10, 13,14 and 16had mean values of less than 2.71 and the decisions were rejected. This implies that there were adequate numbers of computers devices for teaching at the Junior Secondary Schools in Ibadan North Local Government Area, Oyo State.

Research Question 2: What is the level of teachers' computer literacy in Ibadan North Local Government Area, Oyo State?

Table 5: ***Teachers' Levels of Computer Literacy***

S/N	Item	VW	NVW	NAA	NIA	Mean	Decision
17	I attended computer training to help me in my teaching profession	86	84	33	0	3.26	Accept
18	I can use the message app to send assignment to my students	145	48	10	0	3.67	Accept
19	I can use my mobile phone to connect to the internet	55	95	50	3	2.99	Reject
20	I can communicate with my students through the social network (e.g whatsapp, facebook) application	69	76	58	0	3.05	Reject
21	I can send and receive information through the email	73	72	58	0	3.07	Reject
22	I can download online materials for my teaching activities	56	86	61	0	2.98	Reject
23	I can submit my lesson plan to my school head through the internet	56	86	61	0	2.98	Reject
24	I can use the presentation package (e.g Microsoft power point) to teach my lessons through the projector on a screen	40	78	67	18	2.69	Reject
25	I can transfer my lesson plan and notes to my HOD through xender application	53	97	45	8	2.96	Reject
26	I can use the spreadsheet package e.g Microsoft excel to analyze my students' results	65	101	30	7	3.10	Accept
27	I can access audio-visual and other instructional materials on the internet	98	48	55	2	3.19	Accept
28	I can print document from my computer system	95	65	43	0	3.26	Accept
	Grand Mean					**3.10**	**Accept**

Key: Very Well (VW), Not Very Well (NVW), Not At All (NAA), No Idea of the Application (NIA)

In table 5 the analysis of Mathematics and Science teachers' levels of computer literacy in Ibadan North Local Government Area, Oyo State was shown. The mean values of item 17, 18, 26, 27, and 28 were respectively equal to or greater than 3.10 which was the grand mean calculated for table 5 and were accepted, while item 19, 20, 21, 22, 23, 24 and 25 with a mean values less than 3.10 were rejected. This implied that Mathematics and Science teachers' levels of computer literacy were below average in Ibadan North Local Government Area, Oyo State.

Research Question 3: What are Mathematics and Science teachers' perceptions of the use of computer facilities in teaching and learning in Ibadan North Local Government Area, Oyo State?

Table 6: ***Teachers' Perceptions on the Use of Computer Facilities in Teaching and Learning***

S/N	Item	SA	A	D	SD	Mean	Decision
29	The knowledge of computer increases my interest in teaching	100	58	28	17	3.05	Reject
30	Idon't mind the cost of training in computer toimprove my teaching job	102	52	30	19	3.17	Accept
31	I enjoy browsing on the internet to get more instructional materials for my teaching	82	80	31	10	3.15	Accept
32	I don't mind giving assignments to my students online	132	41	11	19	3.41	Accept
33	I don't mind submitting my lesson plans to my HOD online	128	43	18	14	3.40	Accept
34	I prefer sending my students' reports to my school manager online	106	50	32	15	3.29	Accept
35	I prefer working with computer to working with papers in writing my lesson notes	82	36	38	47	2.75	Reject
36	I find it very easy to read on computer and handset than to read from papers	80	81	26	16	3.11	Reject
37	Computer devices will facilitate students' learning experiences if available	121	52	30	0	3.45	Accept
38	It is easy for me to disseminate information through computer devices than through the notice board	80	60	40	23	2.97	Reject
39	Using computer devices in the classroom will increase student learning experiences	121	52	30	0	3.45	Accept
40	The knowledge of computer helps me to simplify my lesson activities for my students	92	55	33	23	3.06	Accept
41	I find it convenient to get online audio-visual materials for my teaching	68	39	40	66	2.64	Reject
	Grand Mean					**3.15**	**Accept**

Key: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD)

Table 6 revealed Mathematics and science teachers' perceptions on the use of computers facilities in teaching and learning in Oyo State. The mean values of item 30, 31, 32, 33, 34, 37, 39 and 40 were respectively equal to or greater than 3.15which was the grand mean obtained for table 6 and were accepted, while item 29, 35, 36, 38 and 41 with mean values less than 3.15 were rejected. This implied that Mathematics and science teachers in Ibadan North Local Government Area, Oyo State perceptions on the use of computer facilities in teaching and learning is positive and the use of computer in teaching and learning is relevant and could be encouraged.

Discussion of Findings

Table 4 summarizes the response on Research Question 1. The result of finding showed that there are adequate computer facilities or teaching in secondary schools in Ibadan Metropolis. The result supports the findings of Deniz (2007) that the modalities and the strategies for achieving the stated objectives of using computer facilities in teaching and learning. These include, procurement of hardware facilities, training teachers and associated personnel, software developments and evaluation as well as maintenance of hardware and peripherals. It is therefore necessary to note that creative and adaptable strategies are needed to upset the likely risk of not achieving these stated objectives. The improvement on using computer devices must be matched with adequate funding, instructional facilities, appropriate teaching methodology and human resources required for teaching and learning of mathematics and sciences. Adequate funding is expedient for ensuring regular equipping and maintaining the computer devices at primary and post primary schools in Nigeria. Ayogu (2008) also supports that computer devices could be costly and as a result, many strategies have to be put in place to finance computer equipment for schools. The world is growing so complicated in science and technology that it is necessary to work towards meeting up with the challenges in this digital age.

Table 5 displayed the response to Research Question 2. The result of the findings showed that the levels of computer literacy among secondary school teachers in Ibadan Metropolis were below average. This result supports the views of Oladunjoye and Benwari (2014) who classified computer literacy according to the type of user. Computer literacy is viewed as the ability to use computers to perform a variety of tasks. It was also viewed as the comfort level someone has with using computer programs and other applications associated with the computer. A valuable component of computer literacy is knowledge of how computer is being operated. To have basic computer skills is a significant asset to teachers and the students. Computer literacy entails the ability to operate a computer and to understand the language used in working with specific computer

system. The result is also in line with Emwanta and Nwalo (2013) who reported that computer literacy helps to discover the ability of learners and achieve desired outcome through the computer interactive packages they were exposed to. The tasks comprising computer literacy vary in different environments. According to Emwanta and Nwalo, (2013), computer literacy helped in the discoveries of inherent traits of individuals from three angles which are: understanding of basic computing principles, knowing how to use the computer, and being proficient with specific software programmes.

Table 6 displayed response Research Question 3. The result of the finding showed that there were positive teachers' perceptions towards the use of computer in teaching and learning of Mathematics and the sciences. This result supports the view of Obineli (2008) that computer takes the place of the guidance counselor in Computer Assisted Instructions while in Computer Managed Instruction, the guidance counselor manages the teaching learning process with the aid of the computer. The computer brings different teaching methodology into learning. This teaching methodology could be in form of tutorial, drill and practices, games and different types of demonstration methods. Teaching method for the information age should integrated different approaches to learning. According to him, teaching-learning process in the classroom should be activity centered than conveying fact to learning and forcing them to internalize them. Hence learners are exposed to the learning environment (computer) and allowed to discover things for themselves. He concluded that activity-dominated lessons enable the learners to develop problem solving skills which will help them to cope with the constantly changing society.

The result was also in line with Ayogu (2008) that challenges of preparing a scientifically literate citizen lie on the professional development of the teachers. Professional development is essential in helping instructors to improve their knowledge of the subject being taught and the methodology used in teaching. To be effective, teachers must engage learners in active learning skills which involve the use of computer related materials in the classroom. This will

provide an engaging opportunity to build teachers' knowledge and assist them to improve on their methods of instruction in the classroom. The result also supported the Ozigi (2007) study on influence of computer on teachers' effectiveness in secondary schools that teachers exposed to workshops and seminars on the use of computer systems were more effective in secondary schools. Most of the teaching jobs could be easily done with the use of computer system. In fact, fatigue and other factors could be reduced to the barest minimum. Some objectives that have been identified whose achievement could lead to computer literacy include the knowledge of the history of computers, knowledge of the components of a computer and how they interact, knowledge of the issues surrounding computer technology such as privacy and artificial intelligence, and skills needed in using the computer to program and perform simple tasks. Others objectives include: Skills in drawing flowchart, recognition of the computer as a valuable tool, and skills in hardware and software maintenance. Onasanya, Sheu, Oduwaiye and Sheu (2010) submits that computer education could be used for instruction and teachers need to be computer literate before they can use computer in their instruction. An efficient and effective teacher is a teacher with certain innate dispositions such as talent, aptitude, ability to empathize and establish rapport with students in other to help them to achieve the stated learning objectives (Adodo, 2014).

Conclusion

The study revealed that there were positive teachers' perceptions towards the use of computer among secondary school teachers in Ibadan North Local Government Area, Oyo state. Also, a high level of computer literacy was displayed among secondary school teachers towards the use of computer facilities in teaching and learning in Ibadan North Local Government Area, Oyo State. Base on the findings of this study, it is concluded that the availability of computer facilities could aid the smooth running of Mathematics and Science class activities as potent tool needed for both qualitative and quantitative education. Also, the need for the provision of adequate

computer facilities and other associated devices for the teaching and learning of mathematics and the sciences in secondary schools cannot be over-emphasized.

Recommendations

The following recommendations are made based on the outcomes of this study:

1. Government and Stakeholders should provide computer facilities for schools to interact with learning content, laboratory specimen and materials to develop scientific attitudes such as objectivity, critical thinking, carefulness, open mindedness,
2. Teachers should make effort to improve on their literacy levels in computers in order to meet up with the technological trend in the society.
3. Human resource management, administrators and policymakers must ensure that comprehensive strategies as well as programs to recruit, train and retrain teachers is in place for teachers to be well equipped for the use of computer devices in schools.

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