Accessing ICT for Science Teaching in Nigerian Schools: Whither the Role of School Library Media Centre?

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Authors' contributions

This work was carried out in collaboration between both authors. Author KAA designed the study, collected data, performed part of the statistical analyses, wrote the protocol and the first draft of the manuscript. Author FOO supervised the study and managed the literature review. Both authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Aim: This study investigated ICT usage and the role of SLMCs in Federal Unity Schools in Nigeria in facilitating the usage of ICT by science teachers in Nigeria.
Study Design: Survey research design was adopted for the study. Four instruments were used.
Methodology: Multistage sampling technique was adopted. Systematic sampling technique was used in selecting the schools for the study while the census technique was used in selecting the respondents. Four research instruments viz: ICT Availability scale (r=0.72), ICT Accessibility scale (r=0.83), ICT Usage (r=0.89) and Role of SLMC Scale (0.75) were used in collecting data. These were complemented with observation checklist. Three research questions were answered.
Location of the Study: Science teachers in selected 25 Federal Unity Schools in Nigeria were chosen for the study.
Findings: The study revealed low usage of science-based ICT facilities, low level of science-based ICT availability and accessibility as well as poor role of SLMCs in facilitating ICT usage among

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science teachers in FUSs in Nigeria.

Recommendations: The SLMC should be adequately equipped so as to function effectively in providing support efficient ICT usage by science teachers in Nigeria.

1. INTRODUCTION

The relevance and importance of ICT in the teaching of science has been discussed and advanced at relevant fora. [1,2] recommended the use of ICT in the teaching of science subjects, as a result of observation that reveals that science teachers are not using ICT for teaching and learning of science. Studies (for example [3] on academic achievement of students in science subjects revealed that there is need for teachers to change their mode and style of teaching. [3] Suggested that the introduction of ICT resources in the teaching of science may bring about the required change in style and of teaching science in schools.

1.1 ICT Usage in Teaching

Information communication technology provides access to a huge range of resources that are of high quality and relevant to scientific learning [4]. In some instances, the multimedia resources available enable visualization and manipulation of complex models, three dimensional images and movement to enhance understanding of scientific ideas. Also, [5] reiterated the capability of ICT in widening the range of materials that can be used in teaching and learning to include text, still and moving images and sound and increase the variety of ways that the material can be used for whole class and individual learning. Therefore, science teachers have the opportunity of meeting the needs of students with different learning styles as well as being creative in their teaching through the use of ICT.

The potentials of information and communication technology (ICT) to improve teaching and enhance institutional administration had been established in literature (for example [6,7]. Thus, the use of ICT as a tool for enhancing teachers' instruction and as a catalyst for improving access to quality education in formal and non-formal settings has become a necessity.

While the role of ICT in teaching is rapidly becoming one of the most important and widely discussed issues in contemporary education policy, it should be noted that the basis of discussion should be based on its effective use in teaching to achieve the desired goals. The demand for quality teaching from stakeholders in education (learners, employers et cetera) has created a need to re-define teaching in schools in such a way that teaching is no longer restricted to scheduled classroom (same place and same time) where the teacher imparts knowledge to learners but has become flexible, asynchronous and controlled by the learner (any place and anytime). Thus, proper use of ICT would encourage flexibility in teaching by removing the rigidity in the traditional teaching and learning process and also encourage critical thinking that cultivates deep learning where learners learn independently.

In addition, studies (for example, [8,9]) have revealed that ICT can have a positive measurable impact on teachers' delivery of content and instructions while [10] emphasized the relevance of ICT in accelerating, enriching and deepening of basic skills in teaching as well as in motivating and encouraging students for independent and responsible learning. The school library media centre has been considered as a major centre for accessing ICT facilities by teachers.

1.2 School library Media Centre and ICT Provision for Teaching and Learning

The roles of SLMC in providing access learning resources including ICT resources as well as in provision of support to facilitate the use of learning resources have been established in literature. However, the extent to which the SLMCs in many schools have been able to live up to these roles is still in question as observations have revealed that many SLMCs may not be playing their roles effectively. These roles of the school library media centre were described as one which rubs on all the activities that take place within the school environment [11]. The school library media centre is described as a positive teaching and learning environment that supports teaching and learning activities where both teachers and students feel comfortable and can pursue their information, ICT use and recreational interests. While many

teachers have provided examples of how the school library media centre supported their teaching in the digital age, some others reflected on longer term support provided by the school library media centre, including the provision of ICT facilities, provision of physical facility, as well as the support provided by library staff as key to effective teaching in schools [12] Commenting further on the role of school library media centre in facilitating ICT-enabled teaching, [13] reiterated school library media centre's support that may be given towards facilitating ICT use in teaching to include; ICT resourcing and technical assistance on how to maximise the use of ICT in teaching by teachers.

However, the adequacy and relevance of ICT facilities provided by the school library media centre may also determine the extent at which teachers would use the facilities for teaching. While quantity and level of ICT continue to improve in many schools, provision of equipment alone is likely to be of limited value unless more is understood about the interactions and processes engendered by using the technologies in different settings, and how teaching strategies to enhance students' learning might be developed effectively through them.

The findings of this study would provide a basis for making recommendations on ICT facilities to be made available and location of access for the teaching of science in secondary schools. Moreover, findings would provide insight on the roles of the school library media centres in the provision of ICT facilities to support teaching in the Nigerian education sector.

1.3 Objectives of the Study

1. Ascertain the pattern of use of ICT by science teachers in FUSs in Nigeria.
2. Ascertain the level of ICT resources availability and accessibility in school library media centres (SLMCs) in FUSs in Nigeria.
3. Investigate the role of school library media centre (SLMC) in facilitating ICT use by science teachers in FUSs in Nigeria.

1.4 Research Questions

The following research questions were answered in the study-

1. What is the pattern of ICT usage among science teachers in FUSs in Nigeria?

2. What is the level of ICT availability and accessibility in SLMCs in FUSs in Nigeria?
3. What roles are being played by SLMC in facilitating ICT usage among science teachers in FUSs in Nigeria?

2. Research Methodology

2.1 Research Design and Population

This study adopted the descriptive research design. The population of the study comprises all the one thousand, seven hundred and sixty one (1761) science teachers and one hundred and four (104) School Library Media Specialists (SLMSs) in all the Federal Unity Schools (FUSs) spread across the six geopolitical zones and thirty six states including Federal capital territory, Abuja, in Nigeria. There are one hundred and four (104) unity schools distributed across Nigeria (See Appendix 3 for the distribution).

Out of the figure for the science teachers, Six hundred and sixteen (616) representing about thirty eight percent (37.9%) teach mathematics, three hundred and seventy nine (379) representing about twenty two percent (21.6%) teach biology, three hundred and sixty one (361) representing about twenty one percent (20.6%) teach physics, while four hundred and five (405) representing about twenty three percent (22.9%) teach chemistry (See Appendix 4). These science teachers are very relevant to this study as they are the one that can offer valuable information as far as ICT facilities accessibility and use in teaching science subjects is concerned.

2.2 Sampling Technique and Sample Size

The multi-stage sampling technique was adopted in selecting the sample size for the study. At the first stage of selecting the sample, the systematic sampling technique was used in selecting twenty-five FUSs for the study as follows: North West (4), North Central (3), North East (5), South West (5), South East (2), South South (5), and FCT (1). At the second stage of the sampling procedure, the total enumeration method was adopted in view of the fact that the total population of the science teachers and the school library media specialists in the selected FUSs is not much. In this case the totality of the science teachers' population and school library media specialists in selected FUSs was

considered for the study. Therefore, a total of 464 science teachers, comprising 103 biology teachers, 101 chemistry teachers, 154 mathematics teachers, 106 physics teachers and 25 school library media specialists (SLMCs) were selected for the study. Table 1 presents the distribution of science teachers and school library media specialists selected for the study.

Also, the school library media specialists (25) in the selected FUSs formed part of the respondents.

2.3 Instrumentation

Two sets of questionnaire were adopted for this study. The first set of questionnaire adopted for this study was named "ICT Use by Science Teachers Questionnaire" (IUSTQ) and designed to gather information of pattern of use of ICT resources in teaching and learning by science teachers in FUSs as well as the role of SLMC in facilitating ICT use for teaching. The purpose of use of ICT resources contains 14 items, frequency of use has 17 items and was measured using a four point scale of "Highly Used", 'Used", "Fairly Used" and 'Not Used', It comprises statements to which the respondents indicate the option that best apply to them. The role of SLMC in facilitating ICT use was measured using a four point likert scale of Strongly Agree, Agree, Disagree and Strongly Disagree. It contains 16 items.

The second set of questionnaire tagged "School Library and ICT Usage Questionnaire (SLIUQ)" was designed to gather information on the role of school library media centres in ensuring provision, access and use of ICT facilities by science teachers in FUSs in Nigeria. It comprises three sections. Section A aimed at gathering data on the personal information of the school library media specialists (SLMSs) such as name of school, age, sex, highest educational qualification et cetera while Section B of the questionnaire is designed to establish the availability, functionality and accessibility of ICT facilities at FUSs in Nigeria. Section C of the questionnaire was designed to gather information on the role of school library media centre in the provision of and use of ICT facilities by teachers.

Table 1. Federal unity schools selected and population of science teachers

S/N	State code	State	Name of FUS	No of teachers				
				Bio	Chem	Maths	Phy	SLMC
1	02	Adamawa	FGC, Ganye	6	4	5	3	1
2	03	Akwa-Ibom	FGGC, Ikot-Obio-Ibong	4	3	5	6	1
3	04	Anambra	FSTC, Awka	7	6	8	5	1
4	06	Benue	FGGC, Gboko	3	4	12	6	1
5	07	Borno	FGGC, Monguno	2	2	5	3	-
6	09	Delta	FGC, Warri	5	6	4	8	1
7	10	Edo	FSTC, Uromi	2	3	6	4	1
8	12	Imo	FGGC, Owerri	6	6	5	5	1
9	14	Kaduna	FGGC, Zaria	5	6	7	4	1
10	16	Katsina	FGC, Daura	7	5	9	6	1
11	17	Kebbi	FGGC, Gwandu	4	4	7	3	1
12	19	Kwara	FGC, Ilorin	4	5	9	5	1
13	20	Lagos	Queens College, Lagos	5	6	8	6	1
14	21	Niger	FGGC, New Bussa	4	2	6	4	1
15	22	Ogun	FSTC, Ijebu Mushin	3	4	5	4	1
16	24	Osun	FGC, Ikirun	5	3	6	3	1
17	25	Oyo	FGGC, Oyo	3	5	7	4	1
18	27	Rivers	FGGC, Abuloma	5	2	5	4	1
19	29	Taraba	FGGC, Wukari	2	2	9	2	1
20	30	Yobe	FGGC, Potiskum	4	5	4	5	1
21	31	Abuja	FGBC, Apo-Garki, Abuja	3	5	6	5	1
22	32	Bayelsa	FGGC, Imiringi	3	3	4	3	1
23	34	Ekiti	FGC, Ido Ani	3	4	4	2	1
24	35	Gombe	FGGC, Bajoga	3	2	3	3	1
25	37	Zamfara	FGGC, Gusau	5	4	5	3	1
			Total	103	101	154	106	24

Source: Preliminary Survey, 2011, Key: FGC, Federal Government College; FGGC, Federal Government Girls College; FSTC, Federal Science Technical College, FGBC, Federal Government Boys College

2.4 Validation and Reliability of the Research Instrument

The drafts of the two sets of questionnaire were given to experts in the fields of educational technology and library and information studies including school media for their inputs on the adequacy and appropriateness of the items in the instruments. Based on their suggestions and criticisms, some items on the questionnaires were modified. The two sets of the questionnaires IUSTQ and SLIUQ were trial-tested on fifty science teachers and two school library media specialists selected from two FUSs in Oyo (i.e FGC, Ogbomoso and Osun (i.e FGC Ipetumodu) states that were not part of the main study. The data collected were subjected to Cronbach Alpha reliability coefficient variable by variable with results as follows. The result is presented in Table 2.

The descriptive methods of analysis such as frequency, percentage, mean and standard deviation and inferential statistics such as Pearson Product Moment Correlation and regression analysis in the Statistical Package for the Social Sciences (SPSS) software were used in analyzing the data collected for the study.

3. PRESENTATION OF FINDINGS

A total of 464 copies of science teachers' questionnaire were administered on the science teachers out of which only 353 were returned with useful responses giving a response rate of 76.1%. On the other hand, 24 out of the 25 copies of school library media specialists' questionnaire were returned with useful responses. These response rates were considered adequate for this study.

3.1 Research Question 1: What is the Pattern of ICT Usage among Science Teachers in FUSs in Nigeria Use ICT Facilities?

The pattern of use was measured by the purpose of use and level/extent of use of ICT resources. Information from Table 3 on the purpose of ICT usage facilities by the respondents revealed collaborative learning in which students can work together on a project with the aid of Internet facilities (94,26.6%), enrichment activities in

which teachers make use of resources that makes learning real (91, 25.8%) and multimedia application (89, 25.2%) and tutorials (85, 24.1%) as topping the list of purposes for which science teachers use ICT facilities. The purposes for which the science teachers make least use of ICT resources include presentation of new materials (74, 21.0%), remediation and simulation (65, 18.4%) and experimentation and simulation. Also, Table 3 showed that less than one-third of the respondents affirmed the use of ICT resources for one purpose of the other. The implication to be drawn from this is that there is low or poor use of ICT resources among the science teachers studied. It can also be inferred from information supplied in the table that science teachers use ICT facilities more for classroom-based activities such as collaborative learning, enrichment activities and tutorials than laboratory based activities such as experimentation and simulation activities which is a major element of science teaching.

Information on the extent/level of ICT use by science teachers in FUSs as presented in Table 4 revealed that majority of the respondents affirmed the high use of e-mail and communication tool for communication between teachers and students (208 or 58.9%), presentation software for presentation of new materials (187, 53.0%), CD ROMs and Internet for information access (182, 51.6%) and word processing for preparation of lesson notes. On the other hand, the non-use of database to access science based content online (252, 71.4%), virtual laboratory facilities (218, 61.8%), data collection probes for data collection (213 or 60.3%), computer-based testing facility (205, 58.1%), online discussion board (200, 56.7%), use of online problem solving application such as simulations (196, 55.5%), video and simulations for enrichment activities (193, 54.7%), recreational and educational games (187, 53.0%) was affirmed by the respondents.

Also, the overall weighted mean of science teachers' level of ICT usage was found to be 2.17 which is lower than the criterion mean of 2.50 set for high level of ICT usage by science teachers. Hence, the inference can be drawn that there is a low and irregular use of ICT facilities for teaching activities by science teachers in FUSs in Nigeria.

Table 2. Reliability coefficients of study variables

Sections	ICT Usage by Science Teachers Questionnaire (IUSTQ)		School Library and ICT Usage (SLIUQ)	
	Number of items	Reliability coefficient	Number of items	Reliability coefficient
ICT availability			18	0.72
ICT accessibility	18	0.83	18	0.82
Role of SLMC	18	0.75	14	0.76
ICT usage	17	0.89		

Table 3. Purpose of use of ICT facilities by science teachers

Purpose of use	Frequency	Percentage
Collaborative learning	94	26.6
Enrichment activities	91	25.8
Multimedia application	89	25.2
Tutorials	85	24.1
Information access via CD-ROM	80	22.7
Testing	81	22.9
Problem solving	80	22.7
Drill and practice	82	23.2
Recreational and educational games	79	22.4
Presentation of new materials	74	21.0
Remediation and acceleration	65	18.4
Experimentation/ Simulations	63	17.8
Authoring	59	16.7

3.2 Research Question 2: What is the Level of ICT Availability and Accessibility in SLMCs in FUSs in Nigeria?

Table 5 presents information on ICT resources availability within the SLMCs. In the context of this study availability is measured by availability and functionality. Therefore, information from the table showed that the most commonly available ICT resources in SLMCs are computers (18, 75.0%; χ = 2.42), multimedia projectors (14, 58.3%; χ = 2.08, SD = 0.97), word processor (12, 50.0%; χ = 2.00), e-mail facility (12, 50.0%; χ = 2.00) and online databases (12, 50.0%; χ = 2.00) while the least commonly available ICT resources include; simulation programmes (11, 45.9%, χ = 1.75), instructional video tapes (11, 45.9%, χ = 1.67), graphical visualising tools (6, 25.0%; χ = 1.58), concept mapping software (2, 8.3%; χ = 1.50), computer aided instructional software ((6, 25.0%; χ = 1.42) and models/modelling software (5, 20.8%; χ = 1.42). Furthermore, the overall weighted mean of ICT availability in SLMC in FUSs in Nigeria was

found to be 1.84 which is lower than the criterion mean of 2.0 set for high level of ICT availability. It can therefore be inferred that there is dearth of science-based ICT resources and applications in SLMCs in FUSs in Nigeria. Models/modeling software, computer aided instruction software, graphic visualizing tools, web-based internet laboratories and concept mapping software were found to be the least commonly available ICT facilities to support science teaching in SLMCs in FUSs.

On the level of ICT accessibility in SLMCs in FUSs, information from Table 6 revealed that only word processing facility and computers are easily accessible in SLMCs in FUSs as attested to by 17 or 70.8% and 13 or 54.2% respondents respectively. Other ICT facilities were found to be accessible on occasional basis. This, therefore, implies that there is a low level of access to ICT facilities through SLMCs in FUSs in Nigeria. Also, the overall weighted mean of ICT accessibility in SLMCs which was found to be 1.87 which is lower than the criterion mean of 2.50 set for high level of ICT accessibility through SLMCs. Hence, the inference can be drawn that there is a low level of ICT accessibility in SLMCs in FUSs in Nigeria.

3.3 Research Question 3: What Roles are being Played by School Library Media Centre (SLMC) in Facilitating ICT Usage among Science Teachers' in FUSs in Nigeria?

Table 7 presents information on the role of SLMCs as perceived by the science teachers and it revealed access to and use of the internet (324, 91.8%), provision of access to use of computers (322, 91.2%), access to and use of printing facilities as (322 ,91.2%), subscription on the web-based electronic resource (229, 79.0%) and web-access to in-house developed library database (282, 79.9%) as the only roles being played by the SLMC in facilitating ICT use by science teachers. These roles can be

categorized under the provision of ICT facilities and resourcing/infrastructural roles of SLMCs. Therefore, the SLMCs are found to be lacking in other important roles aimed at providing technical and human/training support for the science teachers. It may be inferred from this result that the SLMCs are lacking in playing fully the role that would aid the use of ICT facilities by science teachers' in FUSs.

Table 8 shows the response of the school library media specialists on the role of SLMCs in ICT use by science teachers, it can be inferred from

result of analysis that web access to in-house developed library database (22, 91.6%), subscription to web-based electronic resource (22, 91.6%), provision of access to and use of computers (22 or 91.6%), provision of instructional support (22, 91.6%) and provision of ICT information sources such as CD-ROM, internet, and database (22, 91.6%) are major roles being played by the SLMC in facilitating ICT use based on the responses of the school library media specialists. This is in support of the science teachers' responses.

Table 4. Extent of use of ICT facilities by science teachers

Statement	Response				Mean	S.D
	HU	U	FU	NU		
I use online database to access science based content online	163 46.2%	71 20.1%	18 5.1%	101 28.6%	2.84	1.30
Use of data collection probes is to collect data online	47 13.3%	69 19.5%	24 6.8%	213 60.3%	2.78	1.28
Use of ICT for information access (CD-ROMs, Internet, databases in finding and accessing information and educational resources)	182 51.6%	37 10.5%	20 5.7%	114 32.3%	2.24	1.37
Use of ICT such as word processing in preparation of lesson notes	179 50.7%	47 13.3%	25 7.1%	102 28.9%	2.20	1.33
Use of ICT for tutorials, word processing, instructional video/audio tapes	87 24.6%	60 17.0%	30 8.5%	176 49.9%	2.16	1.28
Problem solving (simulations, virtual laboratory, discussion lists/newsgroup, graphical visualization)	101 28.6%	40 11.3%	16 4.5%	196 55.5%	2.13	1.34
ICT use for presentation of new materials (use of presentation software)	187 53.0%	38 10.8%	32 9.1%	96 27.2%	2.12	1.31
Use of recreational and educational games	90 25.5%	45 12.7%	31 8.8%	187 53.0%	2.11	1.29
Use of ICT for remediation/Acceleration of instruction	93 26.3%	42 11.9%	27 7.6%	191 54.1%	2.10	1.31
Online discussion board is used in facilitating discussion between the teacher and students	100 28.3%	37 10.5%	16 4.5%	200 56.7%	2.10	1.33
Enrichment activities (Video and simulations, model, databases)	99 28.0%	28 7.9%	33 9.3%	193 54.7%	2.09	1.32
Use of ICT for drill and practice	84 23.8%	43 12.2%	38 10.8%	188 53.3%	2.07	1.27
I use online communication tool such as e-mail to facilitate communication between the teacher and students	208 58.9%	41 11.6%	10 2.8%	94 26.6%	2.06	1.33
Use of ICT for testing (Computer based testing, drill and practice, etc)	81 22.9%	55 15.6%	12 3.4%	205 58.1%	2.03	1.29
Collaborative learning (Internet, wikis)	94 26.6%	26 7.4%	31 8.8%	202 57.2%	2.03	1.31
Use of ICT for experimentation/simulation models, virtual laboratory	87 24.6%	34 9.6%	14 4.0%	218 61.8%	1.97	1.31
I use Web cam to monitor distant location	87 24.6%	30 8.5%	22 6.2%	214 60.6%	1.97	1.30
Weighted average mean					2.17	

Key: HU = Highly Used, U = used, FU = Fairly Used, NU = Not Used

Table 5. Available ICT facilities in SLMCs in FUSs in Nigeria

Statement	Response				Mean	S.D
	AV	AV & F	AV & NF	NR		
Computers	16	2	6	0	2.42	0.881
	66.7%	8.3%	25.0%	0.0%		
Multimedia projectors	12	2	10	0	2.08	0.974
	50.0%	8.3%	41.7%	0.0%		
Word processor	12	0	12	0	2.00	0.022
	50.0%	0.0%	50.0%	0.0%		
E-mail (for Online communication with students)	12	0	12	0	2.00	0.022
	50.0%	0.0%	50.0%	0.0%		
Online databases	12	0	0	12	2.00	0.022
	50.0%	0.0%	0.0%	50.0%		
Interactive whiteboard/Smart board	9	5	10	0	1.96	0.908
	37.5%	20.8%	41.7%	0.0%		
Presentation software(Power Point, KidPix)	0	0	11	13	1.96	0.955
	0.0%	0.0%	45.8%	54.2%		
Multimedia resources	9	5	10	0	1.96	0.908
	37.5%	20.8%	41.7%	0.0%		
Discussion list/Newsgroup	3	0	0	21	1.88	0.947
	12.5%	0.0%	0.0%	87.5%		
Web-based Internet laboratories	3	0	0	21	1.88	0.947
	12.5%	0.0%	0.0%	087.5%		
Spreadsheet program (Excel etc)	9	3	12	0	1.88	0.947
	37.5%	12.5%	50.0%	0.0%		
Individualized instruction tutorials (e.g) Science for student	0	0	2	22	1.75	0.944
	0.0%	0.0%	8.3%	91.6%		
Simulation programmes and Games	7	4	13	0	1.75	0.897
	29.2%	16.7%	54.2%	0.0%		
Instructional video/audio tapes	5	6	13	0	1.67	0.816
	20.8%	25.0%	54.2%	0.0%		
Graphical visualizing tools	5	1	0	18	1.58	0.830
	20.8%	4.2%	0.0%	75.0%		
Concept mapping software	0	2	0	22	1.50	0.834
	0.0%	8.3%	0.0%	91.6%		
Computer aided instructional software	4	2	18	0	1.42	0.776
	16.7%	8.3%	75.0%	0.0%		
Models/Modeling software	5	0	19	0	1.42	0.830
	20.8%	0.0%	79.2%	0.0%		
Weighted mean average					1.84	

Key: AV = Availability; AV&F = Available and Functioning; AV & NF = Available and Not Functioning; NR = No Response)

4. DISCUSSION OF FINDINGS

4.1 Level of ICT Availability and Accessibility in SLMCs in FUSs in Nigeria

From the findings, it was observed that there is a low level of ICT availability and accessibility in SLMCs in FUSs in Nigeria. This finding corroborates [15] results which revealed unavailability of relevant ICT facilities in secondary school libraries in Ekiti State, Nigeria. There is no doubt that the SLMCs in FUSs has not lived up to the expectation of making available and providing access to ICT resources in supporting the use of ICT facilities by science teachers in FUSs in Nigeria. The low level of ICT availability and accessibility in FUSs in Nigeria may be the major reason why the SLMCs in FUSs are unable to effectively play the roles in supporting effective and efficient use of ICT resources by the science teachers.

Table 6. ICT Accessibility in SLMCs in FUSs in Nigeria

Statement	Response				Mean	S.D
	VEA	EA	OA	NA		
Computers	10	3	0	11	2.38	1.44
	41.7%	12.5%	0.0%	45.8%		
E-mail (for Online communication with students)	7	2	0	15	2.04	1.40
	29.2%	8.3%	0.0%	62.5%		
Presentation software(Power Point, KidPix)	7	0	2	15	1.96	1.37
	29.2%	0.0%	8.3%	62.5%		
Word Processor	15	2	0	7	1.96	1.37
	62.5%	8.3%	0.0%	29.2%		
Interactive whiteboard/Smart board	7	0	2	15	1.96	1.37
	29.2%	0.0%	8.3%	62.5%		
Simulation programmes and Games	7	0	2	15	1.96	1.37
	29.2%	0.0%	8.3%	62.5%		
Spreadsheet program (Excel etc)	7	0	0	17	1.88	1.39
	29.2%	0.0%	0.0%	70.8%		
Online databases	7	0	0	17	1.88	1.39
	29.2%	0.0%	0.0%	70.8%		
Graphical visualizing tools	7	0	0	17	1.88	1.39
	29.2%	0.0%	0.0%	70.8%		
Multimedia resources	7	0	0	17	1.88	1.39
	29.2%	0.0%	0.0%	70.8%		
Discussion list/Newsgroup	5	2	0	17	1.88	1.39
	20.8%	8.3%	0.0%	70.8%		
Web-based Internet laboratories	7	0	0	17	1.88	1.39
	29.2%	0.0%	0.0%	70.8%		
Computer Aided Instructional Software	6	0	3	15	1.88	1.30
	25.0%	0.0%	12.5%	62.5%		
Multimedia projectors	5	0	6	13	1.88	1.19
	20.8%	0.0%	25.0%	54.2%		
Concept mapping software	5	2	0	17	1.79	1.29
	20.8%	8.3%	0.0%	70.8%		
Models/Modeling software	5	0	0	19	1.62	1.25
	20.8%	0.0%	0.0&	79.2%		
Individualized instruction tutorials (e.g Science for Student)	0	3	6	15	1.50	0.72
	0.0%	12.5%	25.0%	62.5%		
Instructional video/audio tapes	0	3	6	15	1.50	0.72
	0.0%	12.5%	25.0%	62.5%		
Weighted mean average					1.87	

Key: VEA = Very Easily Accessible (EA) Easily Accessible (OA) Occasionally Accessible, (NA) Not Accessible

4.2 Role of SLMC in Supporting ICT Use by Science Teachers in FUSs

The findings from the study on the role of SLMCs in supporting ICT use for teaching and learning revealed that SLMCs in FUSs are lacking in the areas of provision of materials, infrastructure, technical and human support. The provision of access to and use of computer facilities, printing facilities, internet and software to support science teaching by some SLMCs are in the area of material and infrastructural support for ICT use. Analysis of the interview with the some Principals also affirmed inadequate provision of ICT for teaching and learning in SLMCs in FUSs in Nigeria. This finding negates [15] findings which emphasised the primary role of SLMC as that of supporting the application of technology in education through provision of expertise, facilitation of the adoption of technology in education, planning and carrying out research activities in the area of educational technology, adoption, diffusion and dissemination of instructional innovations and carrying out technology audit which will help the school library media specialist to determine the needs of the school and how best to satisfy the needs. The inability of the SLMCs in carrying out these roles effectively implies that the science teachers would not be able to depend on the SLMCs in meeting their ICT needs which would ultimately affects their use of ICT in teaching.

Table 7. Science teachers' response on role of school library media centre in ICT use

Statement	Response			
	SA	A	D	SD
Provision of access to and use of computers	199	123	3	28
	56.4%	34.8%	0.8%	7.8%
Access to and use of printing facilities	28	3	178	144
	7.9%	0.8%	50.4%	40.8%
Access to suite of software programs	35	6	191	121
	9.9%	1.7%	54.1%	34.3%
Help in facilitating websites for research	29	11	184	129
	8.2%	3.1%	52.1%	36.5%
Access to and use of internet	158	166	15	14
	44.8%	47.0%	4.2%	4.0%
Help in using search engines for research	34	5	177	137
	9.6%	1.4%	50.1%	38.8%
Help in using presentation software	14	7	131	201
	4.0%	2.0%	37.1%	56.9%
Provision of support staff to assist in the use of ICT for teaching	66	4	171	112
	18.7%	1.1%	48.4%	31.7%
Training and capacity building for teachers	15	58	113	162
	4.2%	16.4%	32.0%	47.3%
Provision of technical support	65	0	163	125
	18.4%	0.0%	46.5%	35.4%
Maintenance of ICT facilities	62	13	165	113
	17.6%	3.7%	46.7%	32.0%
Subscription to software to support science teaching	164	119	3	67
	46.5%	33.7%	0.8%	19.0%
Subscription to online databases	67	6	163	117
	19.0%	1.7%	46.2%	33.1%
Web access to in-house developed library databases/Online catalogue	157	125	3	68
	44.5%	35.4%	0.8%	19.3%
Subscription to web-based electronic resources, electronic books, databases et cetera	161	118	5	69
	45.6%	33.4%	1.4%	19.5%
Maintaining an organized access to free science based information gateways	71	4	151	127
	20.1%	1.1%	42.8%	36.0%

Key: SA: Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

4.3 ICT Use by Science Teacher in FUSs

The findings of the study revealed a low level of ICT use among the science teacher in FUSs in Nigeria. This is evident from the fact that less than one-third ($^1/_3$) of the science teachers affirmed the use of ICT facilities for one purpose or the other. The study further revealed a low level of use of ICT facilities for experimentation/simulation activities which is core to science teaching. Majority of the science teachers make use of ICT facilities basically for classroom-based activities (i.e tutorial, enhancement activities, multimedia application use in classroom, and collaborative learning) at the expense of laboratory-based activities (i.e experimentation/simulation). This is in contrast to [16] findings that affirmed high use of simulations and models among Jordanian and Australian teachers. According to [16] simulations and models have great potential value in the teaching of science as it can improve students' understanding of science more effectively compared to use of non-ICT teaching activities. However, the lack of use of science-based applications such as simulations and models may be traced to the unavailability and lack of access to these resources by the teachers as well as lack of knowledge and skills in the use of these facilities by teachers.

Table 8. School Library Media Specialists' response on the role of SLMCs in ICT use

Statement	Response			
	SA	A	D	SD
Acquisition of ICT facilities	6	0	13	5
	25.0%	0.0%	54.2%	20.8%
Maintenance of ICT facilities	6	0	15	3
	25.0%	0.0%	62.5%	12.5%
Provision of technical support	4	0	16	2
	16.7%	0.0%	66.7%	8.3%
Subscription to online databases	2	2	13	7
	8.3%	8.3%	54.2%	29.2%
Provision of support staff to assist in the use of ICT for teaching	4	0	16	4
	16.7%	0.0%	66.7%	16.7%
Development and maintenance of in-house computer-based teaching resources	2	2	14	6
	8.3%	8.3%	58.3%	25.0%
Training and capacity building for teachers	4	0	18	2
	16.7%	0.0%	75.0%	8.3%
Web access to in-house developed library databases/Online catalogue	14	8	0	2
	58.3%	33.3%	0.0%	8.3%
Subscription to web-based electronic resources, electronic books, databases et cetera	16	6	0	2
	66.7%	25.0%	0.0%	0.0%
Provision of instructional support	20	2	0	2
	83.3%	8.3%	0.0%	8.3%
Provision of ICT information sources such as CD-ROM, Internet, and databases	1	0	2	21
	4.1%	0.0%	8.3%	87.5%
Provision of access to and use of computers	1	2	20	1
	4.1%	8.3%	80.0%	4.1%
Disseminating useful information on ICT facilities relevant subject teaching	22	0	0	2
	91.7%	0.0%	0.0%	8.3%
Coordinating the use of ICT facilities	22	0	0	2
	91.7%	0.0%	0.0%	8.3%

Key: SA: Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

Moreover, findings from the study on the extent of use of ICT facilities among the science teachers revealed that they make regular use of ICT basically for tutorial, presentation of new materials, information access via CD ROM, internet and database, and online communication via e-mail at the expense of laboratory-based activities which happens to be the backbone of science teaching in schools. This result corroborates [17] and [18] which reported the regular use of ICT for preparation of lesson notes, searching of teaching and learning materials, preparation of examinations and preparation of presentation by teachers. This implies that the regular use of ICT facilities for laboratory based activities is very low among the science teachers in FUSs in Nigeria is very low. However, there is the need for science teachers to go beyond these simple uses in order to transform the teaching and learning of science in schools.

5. RECOMMENDATIONS

The following recommendations were made based on the findings of the study:

The school library media centre needed to be stocked with relevant and adequate ICT facilities for the use of the teachers. Access to learning resources is a key ingredient in ensuring effective teaching and learning in schools and one major place of accessing learning resources is the SLMC, therefore provision should be made for relevant science-based ICT resources in SLMC to guarantee easy access and usage by teachers. The availability and ease of accessibility of these facilities would attract the teachers and students to the SLMC. The school library media centre should endeavour to provide the necessary human, material, technical, and infrastructure support needed for effective access and use of ICT facilities by teachers.

Government should also make provision for science-based ICT applications such as simulations, modeling, and graphic visualizing tools that do make teaching meaningful and real. Science-based ICT applications ensure the replacement of the abstract nature of teaching that characterized traditional teaching with meaningful and real teaching, therefore, science teachers should endeavour to use ICT facilities for laboratory-based and experimentation activities.

To ensure usage of science-based ICT resources among science teachers, there is need for training and retraining of teachers on usage of ICT resources to make teaching more interesting and real which will ultimately have a positive impact on the academic achievement of the students in science subjects.

6. CONCLUSION

This study concludes that there is a low level of access to ICT facilities through the SLMC which has consequently resulted in low usage of ICT resources for teaching by science teachers in FUSs in Nigeria. Therefore, provision of ICT facilities in adequate quantity should be ensured in SLMCs in FUSs in and by extension in secondary schools in Nigeria. This provision would ensure regular usage of ICT in teaching and learning among teachers and students.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. BECTA. What the Research says about using ICT in Maths. U.K: BECTA ICT Research. 2003;15.
2. International Society for Technology Education. National education technology standards for teachers. Eugene OR. International Society for Technology in Education Projects; 2000. Accessed on 15 June, 2012. Available:http://onets.iste.org/index3.html
3. Jenkins DR. Computer literacy, access, and use of technology in the family and consumer sciences classroom. A Master's Theses submitted to University of Kentucky; 2008.

Available:http://uknowledge.uky.edu/grads_school_theses/515
4. Lua B, Sim C. Exploring the Extent of ICT Adoption among Secondary School Teachers in Malaysia. International Journal of Computing and ICT Research. 2008;2(2):19-36.
5. Czerniewicz L, Brown C. Information and communication technology (ICT) use in teaching and learning practices in Western Cape higher education institutions. Perspectives in Education. 2005;23.4:1-18.
6. Lance KC, Rodney MJ, Hamilton-Pennell, C. Powerful Libraries make Powerful Learners: The Illinois Study, Illinois School Library Media Association, Canton, ILL; 2005. Accessed on 25th February 2012. Available:http://www.alliancelibrarysystem.com/illinoisstudy/TheStudy.pdf
7. Hay L. School Libraries as Flexible and Dynamic Learning Laboratories. That's What Aussie Kids Want' in SCAN. 2006;25.2:18-27.
8. Kalejaye OJ, Fabunmi AF, Adeoye AJ. Role of school media centres in technology integration in Nigerian schools: An exploration. Annals of Library and Information Studies. 2011;58(3):211-218. Accessed on 6/01/2014. Available:nopr.niscair.res.in/bitsream/123456789/12841/4/ALIS.58(3) 211-218.pdf
9. Kiptalam GK, Rodrigues AJ. Accessibility and utilization of ICT's among secondary school teachers in Kenya; 2011. Accessed on 6/01/2014. Available:cit.mak.ac.ug/iccir/downloads/ICCIr_10/KIPTALA_G.K_Rodriques_AJ_10plf
10. Mwalongo A. Teachers' perception about ICT for teaching, and personal use. International Journal of Education and Development Using Information and Communication Technology. 2011;7(3):36-49.
11. Hew KF, Brush T. Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. Educational Technology Research and Development. 2007;55:223-252
12. Eugene OR. International Society for Technology Education. National education technology standards for teachers. International Society for Technology in Education Projects; 2000. Accessed on 15 June, 2012. Available:http://onets.iste.org/index3.html

13. Keengwe J, Onchwari G. Computer technology integration and student learning: Barriers and promise. Journal of Science Education and Technology. 2008;17:560-565.

14. Ramayah T. Course website usage: Does prior experience matter. WSEAS Transactions on Information Science & Applications. 2006;2(2):299-306.

15. Khvilon E, Patru M. Information and communication technologies in teacher education. A planning guide, UNESCO Division of Higher Education. Paris: UNESCO; 2008.

16. Kumar PR, Subramaniam T, Mukherjee TK. Issues in physics practicals in an open and distance learning environment. Asian Journal of Distance Education. 2005;3(1):1.5. Accessed on 16 April 2013. Available:www.AsianJDE.org

17. La Velle LB, Mc Farlance A, Brown R. Knowledge transformation through ICT in science education: A case study in teacher-driven curriculum development; 2012. Accessed on 12 April, 2013. Available:www.ex.ac.uk/ESRC-TLRP

18. Lai K, Pratt K. Positive to a Degree: The Effects of ICT Use in New Zealand Schools. Computers in Schools. 2007;24(3&4):95-109.

Appendix 3

List of Federal Government Colleges

State	Code	Name of college	State	Code	Name of college
Abia	01	FGGC, Umuahia FGC, Ohafia FSTC, Ohanso	Lagos	20	Kings' College, Lagos FGC, Lagos Queens College, Lagos FSTC, Yaba
Adamawa	02	FGC, Ganye FGGC, Yola FSTC, Michika	Niger	21	FGC, Minna FGGC, Bida FGGC, New Bussa FSTC, Shiroro
Akwa-Ibom	03	FGC, Ikot-Ekpene FGGC, Ikot-Ibio-Itong	Ogun	22	FGC, Odogbolu FGGC, Shagamu FSTC, Ijebu Mushin
Anambra	04	FGC, Nise FGGC, Onitsha FSTC, Awka	Ondo	23	FGC, Ibo Ani FGGC, Akure FSTC, Ikare Akoko
Bauchi	05	FGC, Azare FGGC, Bauchi	Osun	24	FGC, Ikirun FGGC, Ipetu Mode FSTC, Ilesa
Benue	06	FGGC, Gboko FGC, Otobi FSTC, Otukpo	Oyo	25	FGC, Ogbomoso FGGC, Oyo
Borno	07	FGC, Maiduguri FGGC, Monguno FSTC, Lassa	Plateau	26	FGC, Jos FGGC, Langtang
Cross-River	08	FGC, Ikom FGGC, Calabar	Rivers	27	FGC, Port Harcourt FGGC, Abuloma FSCTC, Ahoada
Delta	09	FGC, Warri FGGC, Ibusa	Sokoto	28	FGC, Sokoto FGGC, Tambuwal
Edo	10	FGC, Ibillo FGGC, Benin FSTC, Uromi	Taraba	29	FGC, Wukari FGGC, Jalingo FSTC, Jalingo
Enugu	11	FGC, Enugu FGGC, Lejia	Yobe	30	FGC, Buni-Yadi FGGC, Potiskum
Imo	12	FGC, Okigwe FGGC, Owerri	FCT	31	FGC, Kwali FGGC, Bwari FGBC, Garki FGC, Rubochi FSTC, Orozo
Jigawa	13	FGC, Kiyawa FGGC, Kazaure	Bayelsa	32	FGC, Odi FGGC, Imiringi FSTC, Tumgbo
Kaduna	14	FGC, Kaduna FGGC, Zaria FSTC, Kafanchan	Ebonyi	33	FGC, Okposi FGGC, Ezamgbo

State	Code	Name of college	State	Code	Name of college
Kano	15	FGC, Kano FGGC, Minjibir	Ekiti	34	FGC, Ikole Ekiti FGGC, Efon Alaye FSTC, Usi Ekiti
Katsina	16	FGC, Daura FGGC, Bakori FSTC, Dayi	Gombe	35	FGC, Biliri FGGC, Bajoga
Kebbi	17	FGC, Birnin-Kebbi FGGC, Gwandu FSTC, Zuru	Nasarawa	36	FGC, Keffi FGGC, Keana FSTC, Doma
Kogi	18	FGC, Ugwolawo FGGC, Kabba	Zamfara	37	FGGC, Gusau FGC, Anka
Kwara	19	FGC, Iloring FGGC, Omu Aran			

Appendix 4

Subject Distribution of Science Teachers in Federal Government Unity Schools in Nigeria

South-South Zone

S/N	Name of school	State	No of teacher				
			Bio	Phy	Chem.	Maths	Total
1	Federal Government College, Calabar	Cross River	3	5	2	5	15
2	Federal Government College, Warri	Delta	5	8	6	4	23
3	Federal Government College, Odi	Bayelsa	2	2	2	3	09
4	Federal Science Technical College, Tungbo	Bayelsa	3	1	3	7	14
5	Federal Science Technical College, Uyo	Akwa Ibom	2	3	3	4	12
6	Federal Government College, Ikot Ekpon	Akwa Ibom	2	2	2	6	12
7	Federal Government College, Benin	Edo State	3	3	3	7	16
8	Federal Science College, Ogoja	Cross River	1	4	2	3	10
9	Federal Science Tech. College, Ahoada	Ebonyi	2	3	3	9	17
10	Federal Govt. Girls College, Abuloma	Rivers	5	4	2	5	16
11	Federal Govt. Girls College, Imiringi	Bayelsa	3	3	3	4	13
12	Federal Science Technical College, Uromi	Edo	2	4	3	6	15
13	Federal Govt. College, Port Harcourt	Rivers	6	5	5	5	21
14	Federal Govt. College, Ikom	Cross Rivers	5	3	2	8	18
15	Federal Govt. College, Ibillo	Edo	2	2	3	6	13
16	Federal Govt. Girls College, Ibusa	Delta	4	4	4	6	18
17	Federal Govt. Girls College, Ikot Obon Itong	Akwa Ibom	4	6	3	5	18
	Total		**54**	**62**	**51**	**93**	**260**

South-West Zone

S/N	Name of school	State	No of teachers				
			Maths	Bio	Phy	Chem	Total
18	Federal Science Tech. Coll., Ikere Akoko	Ondo	7	3	4	2	16
19	Federal Government Girls College, Akure	Ondo	5	5	3	3	16
20	Federal Government Girls College, Sagamu	Ogun	7	4	4	3	18
21	Federal Govt. College, Ikole	Ekiti	4	3	2	4	13
22	Federal Govt. College, Ikirun	Osun	6	5	3	3	17
23	Federal Science Tech. College, Yaba	Lagos	10	8	5	4	27
24	Federal Govt. College, Ijamkin	Lagos	14	5	3	4	26
25	Federal Science Technical College, Ilesa	Osun	8	4	5	3	20
26	Federal Science Technical College, Usi Ekiti	Ekiti	6	2	2	2	12
27	Federal Science Tech. Coll. Ijebu Mushin	Ogun	5	3	4	4	16
28	Federal Government Girls Coll. Efon Alaaye	Ondo	6	3	5	3	17
29	Kings College, Lagos.	Lagos	13	12	13	10	48
30	Queens College, Lagos	Lagos	8	5	6	6	25
31	Federal Government, Coll., Odogbolu	Ogun	10	4	5	4	23
32	Federal Government College, Idoani	Ondo	4	3	2	4	13
33	Federal Government Girls College, Ipetumodu	Osun	7	4	3	4	18
34	Federal Govt. Girls College, Oyo	Oyo	7	3	4	5	19
35	Federal Govt. Coll., Ogbomoso	Oyo	8	5	3	4	20
	Total		**135**	**81**	**76**	**72**	**364**

North Central Zone

S/N	Name of school	State	No. of teachers				
			Maths	Bio	Phy	Chem	Total
36	Federal Science Technical College, Orozo	Abuja	9	3	3	3	18
37	Federal Govt. Girls College, Bwari	Abuja	7	4	2	2	15
38	Federal Government College, Keffi	Nassarawa	6	2	3	2	13
39	Federal Govt. Girls College, Keana	Nassarawa	5	1	2	4	12
40	Federal Science Technical College, Doma	Nassarawa	4	3	3	1	11
41	Federal Govt. Girls College, Langtang	Plateau	11	2	3	4	20
42	Federal Govt. Girls College, Kabba	Kogi	6	2	3	5	16
43	Federal Govt. Coll. Ilorin	Kwara	9	4	5	5	23
44	Federal Govt. Coll. Suleja	Niger	10	5	4	3	22
45	Federal Science Tech. Coll., Shinoro	Niger	8	3	6	4	21
46	Federal Govt. Boys Coll., Garki	Abuja	6	3	5	5	19
47	Federal Govt. College, Ugbolawo	Kogi	8	2	4	4	18
1048	Federal Govt. Girls Coll. Gboko	Benue	12	3	6	4	25
49	Federal Govt. Girls Coll., Omu Aran	Kwara	10	4	5	5	24
50	Federal Govt. Coll. Jos	Plateau	13	5	7	2	27
51	Federal Govt. Coll., Bida	Niger	7	6	5	3	21
52	Federal Govt. Coll. Kwali	Abuja	12	4	5	5	26
53	Federal Govt. Coll. Robochi	Abuja	9	3	5	4	21
54	Federal Govt. Girls Coll. Abaji	Abuja	8	4	4	4	20
55	Federal Govt. Girls Coll. Yandeikya	Plateau	7	3	2	2	14
56	Federal Govt. Coll. Otobi	Benue	5	2	1	3	11
57	Federal Science Technical Coll. Otukpo	Benue	7	4	3	2	16
58	Federal Govt. Girls, New Bussa	Niger	6	4	4	2	16
	Total		**186**	**76**	**90**	**78**	**431**

North-West Zone

S/N	Name of school	State	No. of teachers				
			Maths	Bio	Phy	Chem	Total
59	Federal Science Technical College, Zuru	Kebbi	7	2	3	2	14
60	Federal Govt. Girls College, Gwandu	Kebbi	7	4	3	4	18
61	Federal Govt. College, Kano	Kano	8	4	5	5	22
62	Federal Science Technical College, Dayi	Kaduna	6	2	1	5	14
63	Federal Govt. College, Kaduna	Kaduna	6	3	5	5	19
64	Federal Govt. Girls College, Gusau	Zamfara	5	5	3	4	17
65	Federal Govt. Girls College, Bakori		4	2	2	3	11
66	Federal Govt. Girls College, Tambuwal	Sokoto	3	6	3	4	16
67	Federal Govt. Girls College, Kazaura		6	3	3	4	16
68	Federal Govt. College, B/yauri		4	4	4	4	16
69	Federal Govt. Girls College, Zaria	Kaduna	5	4	3	5	17
70	Federal Govt. College, Sokoto	Sokoto	5	3	1	4	13
71	Federal Govt. Girls College, Minjibir	Kano	7	2	1	2	12
72	Federal Govt. College, Anka	Zamfara	4	1	1	1	07
73	Federal Govt. College, Daura	Katsina	9	7	6	5	27
74	Federal Govt. College, Kuyawa	Jigawa	6	2	1	4	13
75	Federal Science College, Sokoto	Sokoto	5	4	3	3	15
76	Federal Science Tech. College, Kafanchan		6	2	3	5	16
77	Federal Govt. Girls College, Kazaure	Jigawa	9	2	1	3	15
	Total		**112**	**62**	**52**	**72**	**298**

South-East Zone

S/N	Name of school	State	No. of teachers				
			Maths	Bio	Phy	Chem	Total
78	Federal Science Technical Coll. Awka	Anambra	8	7	5	6	26
79	Federal Govt. College, Okposi	Ebonyi	4	2	2	3	11
80	Federal Govt. Girls College, Umuahia	Abia	6	6	6	3	21
81	Federal Govt. College, Ohafia	Abia	5	4	2	4	15
82	Federal Science Technical College, Ohanso	Abia	6	3	2	5	16
83	Federal Govt. Girls College, Ezeamgbo	Ebonyi	6	3	4	1	14
84	Federal Govt. College Nise	Anambra	6	4	4	5	19
85	Federal Govt. Girls College, Owerri	Imo	5	6	5	6	22
86	Federal Govt. Girls College Onitsha	Anambra	5	5	6	4	20
87	Federal Govt. College, Okigwe		3	7	6	4	20
88	Federal Govt. Girls College, Legia, Nsukka	Enugu	5	3	4	2	14
89	Federal Govt. College, Enugu	Enugu	7	5	5	5	22
	Total		**66**	**55**	**51**	**48**	**220**

North-East Zone

S/N	Name of School	State	Name of teachers				
			Maths	Bio	Phy	Chem	Total
91	Federal Science Tech. Coll. Jalingo	Taraba	4	2	2	3	11
92	Federal Govt. College, Ganye	Adamawa	5	6	3	4	18
93	Federal Govt. Girl College, Bajoga	Gombe	3	3	3	2	11
94	Federal Science Tech. Coll. Lassa	Borno	4	3	3	3	13
95	Federal Govt. Girls College, Yola	Adamawa	4	4	3	3	14
96	Federal Govt. College, Azare	Bauchi	3	2	3	4	12
97	Federal Govt. College, Buni Yadi	Yobe	5	4	4	4	17
98	Federal Govt. College, Biliri	Gombe	4	4	4	3	15
99	Federal Govt. College, Maiduguri	Benue	5	2	2	1	10
100	Federal Govt. Girls College, Bauchi	Bauchi	3	1	2	2	08
101	Federal Govt. College Wukari	Taraba	9	2	2	2	15
102	Federal Science Tech. Coll. Michika	Taraba	3	1	1	2	07
103	Federal Govt. Girls College, Jalingo	Taraba	2	3	1	2	08
104	Federal Govt. Girls College, Potiskum	Yobe	4	4	5	5	18
105	Federal Govt. Girls College, Monguno	Borno	5	2	3	2	12
	Total		**63**	**43**	**41**	**42**	**189**
	Grand total		**616**	**379**	**361**	**405**	**1761**

Peer-review history:
The peer review history for this paper can be accessed here:
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