

Assessment of the Influence of ICT Facilities for Sustainability of Modern Teaching Excellence in Education

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Abstract—The advents of information and communication technology (ICT) have induced tremendous changes in the present education system. These interactive technological gadgets have affected the very nature of teaching and learning. Most teachers as well as students are not aware of the influence of ICT in the developing nations. Therefore the aim of this study is to determine the types of ICT facilities that could be affordable for the students and teachers, the extent of use of the ICT facilities among teachers of Secondary Schools (senior) in Potiskum Local Government, the influence of ICT facilities among students in secondary schools in Potiskum, the influence of ICT facilities among teachers in secondary school in Potiskum, as well as the problems affecting the use of ICT in teaching, learning and research in Potiskum. Findings of this study reveals that ICT gadgets are considered to be used in teaching and learning primary education but not affordable to teachers and students, students and teachers also do stay on computers but not for so long. ICT is also considered to have influenced teaching and learning in secondary schools. Therefore it is concluded that, students and teachers in secondary schools use ICT instruments in the process of teaching and learning, although the tools are not very much affordable to them. The study has also revealed that students and teachers do stay on computers a little period of time due to lack of ICT facilities in their schools. We therefore concluded that ICT gadgets should be considered of paramount priorities in schools as it influence teaching and learning and school authorities should find ways to make ICT gadgets available for use to both students and teachers to facilitate academic activities and to influence learning at large.

Keywords— Information Technology, Communication Technology, Gadget, Teaching, Learning, School.

I. INTRODUCTION

The exponential growth of information and communication technology (ICT) brings about several changes in the contemporary educational systems across the world. These interactive technologies have transformed the nature of teaching and learning [1]. Those technologies have ease the problems noted in traditional teaching and learning, when such gadgets are utilized in the classroom a lot will be achieved and the required knowledge will be obtained, these technological equipment's ranges from computers, projectors, printers, scanners, digital camera, white board, interactive smart board, video, television, film, pictures etc. Groff and Mouza [1] further observed that, the fast breakthrough in the new ICT is changing

the traditional approach of knowledge is acquisition and delivery. The new technologies offers an innovative opportunities on course content, teaching methods as well as a broader access to higher learning.

It was also pointed out that technology in the form of computers and internet has become a major focus of education policy and reform in recent years [1, 2]. These shows that, computers and internet have a great influence in our education system today, which when properly and adequately utilized will transform and develop our education for better nation. The internet which is an important aspect of ICT that is used to provide quality teaching learning and research in an academic set up [3], have been influencing education so adequately there by making such concepts as e-teaching, e-learning, visual teaching/learning, e-training etc. all developed around the

internet application in education.

The potentials of ICT have been hugely exploited most by developed nations as an instrument of education transformation landscape at every level, especially the instructional process [4]. ICT boost pedagogical transform methods in expanding access to quality education systems [5]. Hence, it is essential for Nigeria as a developing nation to frequently maximize and evaluate its utilization of ICT as an aid in the teaching and learning process. The often utilized evolution in the classification and appraisal of subject of concern in the wide range of human enterprises is an essential instrument for determining where Nigeria stands among the developing nations worldwide, is the effective exploitation of the potentials benefits of ICT in the transformation of educational sector of the country. It is believed to help improve the degree of values of a program or an organization. There are various purposes for evaluation, although the key aim is to enable the reflection and assist in the identification of future change or “purpose of a program evaluation can be used to determine the quality of a program by formulating a judgment” [6].

On the other hand, as a representation of the concept of survival and continued life on earth, the term sustainability is a word that has fallen fate to misrepresentation, fragmented meaning and even ridicule. According to United Nations (UN), “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” [7]. It is important to acknowledge that different perspectives sustainability exist, and some interpret the concepts as a threat to ‘successful’ components of the modern world. Many aspects of the modern world use education and economics as a metric to gauge success of sustainable practice and stability [8]. Meanwhile, a stable social system should achieve equitable distribution of resources and social facilities including health, education, gender equality, political accountability and participation [8, 9].

There is much talk currently about sustainability and, more specifically, about the need to encourage a sustainable, societal conscience. There is a strong call by many for organisations and educational institutions as well as researchers to play a strong role in achieving this global sustainability vision [10, 11].

II. RELATED WORKS

In the educational system, teaching and learning activities are the main act that is carried out. Teaching can be defined as an act of building an environment for impacting knowledge. It involves the informing, instructing, and demonstrating activities in order to make someone understand concepts for the purpose of learning. Effective teaching brings about the envisioned learning outcome.

Meanwhile, the act of learning could happen through the individual’s activity or his own doing. The advent of new concept of learning prompts teachers ability to disseminate knowledge and make it more interesting, rather than just providing abstract skills and knowledge [12]. Modern approach of teaching professions have been provided through new technologies. However, these have placed more demands on teachers to learn the use of these technologies in their teaching profession.

These challenges make teachers reskill themselves and acquire new knowledge and skills while maintaining their job [13]. In spite of the national educational objects, which focus on making an impact in this area of technological education. This is necessary in ensuring that the growing needs of the country’s economy met. Many countries were still lacking in terms of utilization of ICT in achieving educational aims when compared to other countries as well as the reality of the great achievements offered by ICT remains a mirage in the technical colleges.

Despite the prevalent utilization and impact of ICT facilities in teaching and learning, it is essential to observe how committed Nigerian Schools are, what is their position and how are they using ICT and the challenges posed by the ICT based applications to their operations. The answers to these questions are not farfetched. As analyzed within the context of global competitiveness of the information age, the current state of ICT facilities in Nigerian schools shows that there is a slow mode of development [14].

Looking at the importance of the government on the effect and relevance of technical vocational education to the country’s growth and the fashion of development experienced in the developed countries based on their application as well as utilization of ICT to the teaching and learning. It has been revealed that this has leads to great change and development in developing countries such as China and Japan which are leading the world in ICT.

The fact that most techniques have been proven suitable for supporting instruction even outside the classroom, that does not necessarily entails that a specific technique for teaching is best suited for every lesson. The increasing need for higher efficiency in teaching and learning process has remained a matter of concern to many people that have a stake in educational sector [15, 16]. Therefore, when ICT is properly integrated into the education system at the technical level, it entails an improved and effective pedagogy in the country.

A. Statement of the Problem

Most students as well as teachers are not aware of the effects of information and communication technology gadgets towards enhancing education in the developing nations [17]. There are phenomenal increases in the number of schools as well as in student enrolments. These increases, however, have leads to worsen the perennial problems of shortage of qualified teachers, physical facilities instructional aids in Nigeria [18]. In Nigeria today, most of the teachers lack moderate knowledge about (ICT) and its influences in teaching and learning. Moreover, most of the gadgets used in ICT are also expensive to acquire but when acquired, it provides tremendous changes in the amount of knowledge gained, experience acquired and the time saved in educational research, teaching and learning.

B. Purpose of the Study

The main aim of this study, is to assess the influence of information and communication technology (ICT) gadgets in teaching and learning. This is in order to determine the level of knowledge acquisition of ICT among educators, level of availability of ICT gadgets and how effective are the educative in utilizing ICT gadgets in teaching in the government secondary schools in Potiskum Yobe State.

C. Research Questions

For the purpose of carrying study, five research questions were formulated to guide the study.

1. What is the level of availability of ICT facilities to the secondary schools in Potiskum, Yobe State?
2. What is the extent of use of ICT for teaching and learning to the secondary schools in Potiskum?
3. To what extent ICT have influenced teaching and learning in Potiskum?
4. What are the advantages of using ICT for sustainable teaching and learning for the secondary schools in Potiskum?
5. What are the challenges affecting the use of ICT for teaching and learning in government secondary schools?

III. METHODOLOGY

This research adopts the ex-post facto research, which involves utilizing survey research design that used questionnaires to collect the required data. The design is considered appropriate for this study because it permits the use of questionnaires to collect data concerning the opinion of the students and educators (teachers) in relation to their level of ICT-based literacy, availability and utilization of ICT resources in teaching and learning at secondary school level. Also, survey research method is regarded as one of the best methods of describing a population that is too large to observe directly [19, 20].

A. Population and Sample

The target population of this study is made of the five senior school students in Potiskum Yobe State, namely:

1. Fecoet demonsation secondary school Potiskum Yobe State
2. Government Day secondary school Potiskum Yobe State
3. Fika Government secondary school Potiskum Yobe State
4. Government Girls Technical College Potiskum Yobe State

5. IPS Comprehensive secondary school Potiskum Yobe State

We used simple random sampling technique to select a population of five hundred and sixty seven (567) from these five senior secondary school students. The selection represents 10% of the total population of the senior secondary school students, which is regarded as best sample to describe a large population. The total population of teachers of the senior secondary schools stood at three hundred and thirty six (336). A sample of thirty-four teachers (34) was drawn from each schools, representing 10% of the total population of teachers in the schools. This is to have a fair representation of all the students and teachers in the schools.

B. Sample Techniques

The sampling technique that was adopted in this research work, was the random sampling technique. Random sampling technique is a procedure intended to produce a comprehensive sampling. Random sampling according to [20], limits the probability that a biased sample be chosen, and it was the best method of drawing sample from the target population as it allows equal opportunities for the respondents.

C. Research Instrument

The research instrument used in collecting the required data for the research work was questionnaire. The questionnaire was developed and prepared by the researcher with the guidance of the supervisor. The questionnaire formulated was comprehensive and covers all the research questions. Eighteen (18) structured items were used in the questionnaire, all based on two point scale. The questionnaire has alternative responses as:

- i) Yes
- ii) No

D. Instrument Validation

The questionnaire drafted was given to educational technology experts who are computer literate. The experts went through the questions and offer necessary corrections to ensure suitability of the language as well as appropriateness of the options used.

E. Data Collection Procedure

To administer the questionnaire, the research personally distributed the copies of the questionnaire to the respondents sampled for the study, after obtaining permission from the school authorities. The questionnaires are distributed to both the students and the teachers randomly where a direct contact was utilized and the researcher had the opportunity to explain and answer questions arising from the respondents.

Furthermore, the method avoided respondents from influencing one another in answering the questionnaire. All the copies of the questionnaire were collected after duly completed by the respondents and use them for analysing the data.

F. Method of Data Analysis

The Data collected for the study was analyzed based on the percentage of frequency distribution. The percentage was determined by number of responses obtained (NRO) by the total number of the respondent (TNR) multiplied by hundred (100) it is given as:

$$\text{Percentage Score} = \text{NRO/TNR} * 100\%$$

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IV. RESULTS

Research Question 1: What is the level of availability of ICT facilities to secondary schools in Potiskum, Yobe State?

In answering this question, data on the availability of Information Communication and Technology (ICT) facilities were collected from the teachers and students of the sample schools using questionnaire. In this study, the facilities refers to computers systems, internet services, laptop, projector-screen, scanning machine, printer, projector, electronic board and mobile phone. The data were collated and analyzed using frequency counts and percentages. Table 1 presents the findings.

TABLE I FREQUENCY DISTRIBUTION OF AVAILABILITY LEVEL OF ICT FACILITIES IN POTISKUM SECONDARY SCHOOLS

ITEM	STATEMENT	YES	NO
1	Do you have access to ICT facilities at school for teaching and learning?	550 (61%)	353 (39%)
2	Do you have access to ICT facilities at home?	361 (40%)	542 (60%)
3	Are ICT facilities affordable for use by teachers?	316 (35%)	587 (65%)
4	Are ICT facilities affordable for use by students?	226 (25%)	677 (75%)

As shown in Table 1, the findings revealed that majority

of the respondent (61%) agreed that, they have access to ICT facilities at school for teaching and learning, while (39%) of the respondents disagreed with the statements. Although most schools have ICT facilities as demonstrated, but only four types of the ICT facilities are said to be available. It has been revealed that, mobile phones, computers systems, printers, and laptops with 35%, 31%, 25%, and 14% of entire ICT facilities respectively. However, almost all the schools did not have, internet services, projector screen, projector, scanning machine, and electronic board. This is an indication that ICT facilities are not adequately provided for the schools.

In Item 2, (60%) of the respondents disagreed with the statement that says; Do you have access to ICT facilities at home, while (40%) of them agreed with the statement. Similarly, (65%) of the respondents disagreed with the third statement (Item 3), are ICT facilities affordable for use by teachers, while (35%) of the respondents agreed to the statement.

Responding to item 4, majority of the respondents (75%) disagreed with the statement saying, Are ICT facilities affordable for use by students, while only (25%) of them agreed to the statement. Figure 1 shows the overall participant response distribution on the availability of ICT facilities in Potiskum secondary schools.

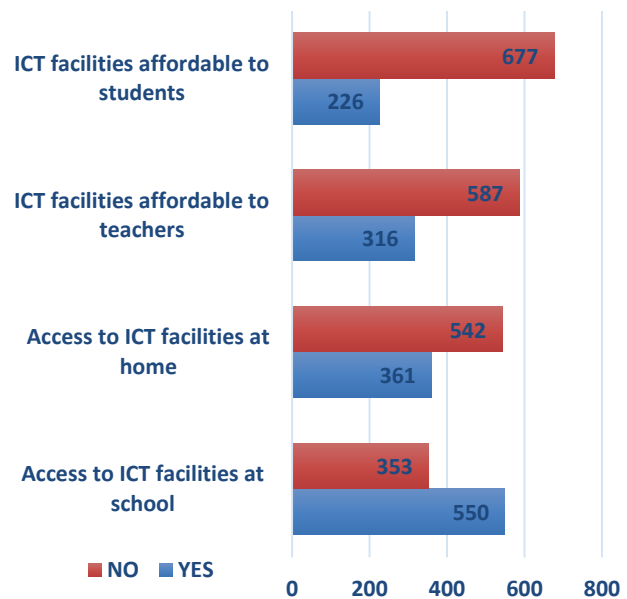


Fig. 1 Distribution of Participants' Responses on Availability of ICT Facilities in Potiskum Secondary Schools

Research Question 2: What is the extent of the use of ICT for teaching and learning?

TABLE II. RESPONSES ON THE EXTENT OF THE USE OF ICT FOR TEACHING AND LEARNING

ITEM	STATEMENT	YES	NO
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5	How long do you stay on ICT facilities 1 - 2 hours (week)?	686 (76%)	217 (24%)
6	Did your school operate internet cafe?	172 (19%)	371 (81%)
7	Do lesson carried out using ICT facilities?	90 (10%)	813 (90%)
8	Do your school have an ICT laboratory?	117 (13%)	786 (87%)

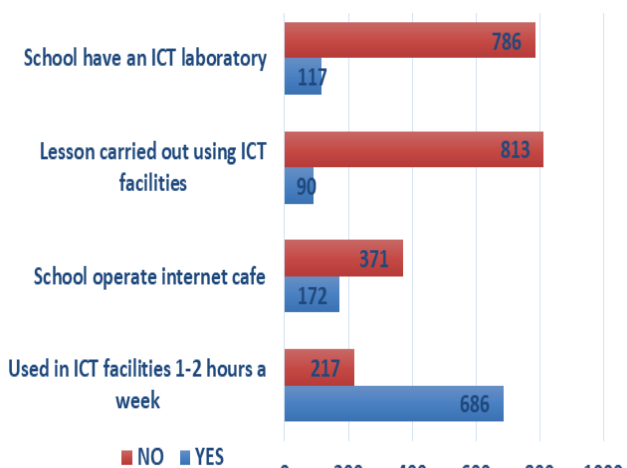


Fig. 2 Distribution of Participants' Responses on extent of the use of ICT for teaching and learning

To answer the question, on the extent of the use of ICT for teaching and learning, Table 2 presents the result systematically. Item 5, in the table indicate 76% of the respondent agreed to the statement that, they stay on ICT facilities for as long as 1- 2 hours per week, while only 24% of them disagreed.

In item 6, (81%) of the respondents disagreed to the statement that, their school operates internet cafe while only (19%) of the respondents agreed with the statement. Similarly, in the item 7, (90%) of the respondent disagreed with the statement which says, do lesson carried out using ICT facilities, while (10%) of them agreed with the statement. Also, in item 8, (87%) of the respondent disagreed to the statement that, do your school have an ICT laboratory, while (13%) of the respondent agreed to the statement. The distribution of participants' responses on extent of the use of ICT for teaching and learning could be seen on Figure 2.

Fig. 2 Distribution of Participants' Responses on extent of the use of ICT for teaching and learning

Research Question 3: To what extent ICT have influenced teaching and learning?

TABLE III. ANALYSIS OF RESPONSES ON THE LEVEL OF ICT INFLUENCE IN TEACHING AND LEARNING.

ITEM	STATEMENT	YES	NO
9	ICT brings exciting curricular on real world problems into classroom	497 (55%)	406 (45%)
10	ICT tools enhance learning	542 (60%)	361 (40%)
11	ICT gives both students and teachers opportunities for feedback and revision	632 (70%)	271 (30%)
12	ICT pinpoint academic problem and improve students' performance	587 (65%)	316 (35%)

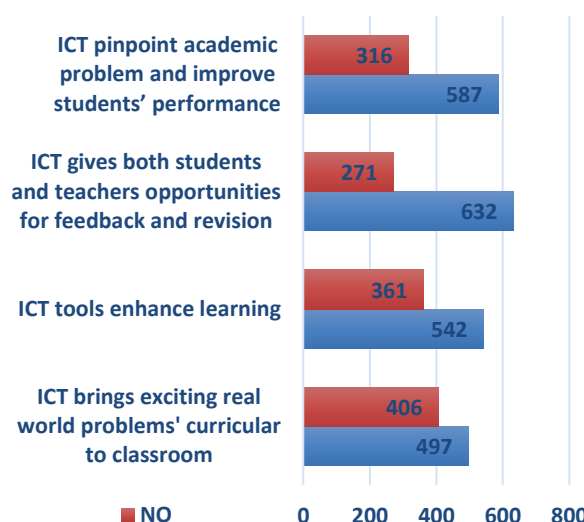


Fig. 3 Distribution of Participants' Responses on the extent ICT have influenced teaching and learning

In response of this question, four statements were posed to the respondent as shown in Table 3. Item 9 indicates that 55% of the respondents agreed to the statement that, ICT has brings existing curricular on real world problems into classrooms, while, 45% of the respondents disagreed.

In item 10, revealed that 60% of the respondents agreed with the statement which says; ICT provide tools to enhance learning, while 40% of them disagreed with the statement. Similarly, in item 11, 70% claimed that ICT gives both students and teachers the opportunities for feedback and revision, while 30% of the respondent disagreed with the claim. Responding to item 12, 65% of the respondents indicated that ICT pinpoint problem and improve students' performance, while 35% disagreed. Figure 3 presents the distribution of participants' responses on the extent ICT have influenced teaching and learning.

Research question 4: What are the advantages of using

ICT for sustainable teaching and learning of secondary schools in Potiskum?

In answering this question, data were collected from respondents using the questionnaire on the advantages of using ICT for sustainable teaching and learning of secondary schools in Potiskum. This data were collated and analyzed using frequency counts and Percentages. Table 4 presents the findings.

In Table 4, (870) of the respondents (96.3%) agreed that the usage of ICT for sustainable teaching and learning in the government secondary schools in Potiskum could aid teachers and the schools management’s functions. Also, (790) of the respondents (i.e 87.5%) claimed that using ICT could provide opportunities for students, staffs and school management to easily communicate through e-mail, social networks and have easier access to relevant information. (897) of the respondents agreed that ICT could improve teaching and learning which represents (99.3%).

The usage of ICT was said to be capable of contributing essential and effective changes in the way the schools are managed by (815) respondents (i.e 90.2%). While (854) respondents (94.6%) agreed that ICT can the make schools more productive and effective by simplifying the school management and less cumbersome. Details on the distribution of participants’ responses on advantages of using ICT for sustainable teaching and learning of secondary schools in Potiskum were shown on Figure 4.

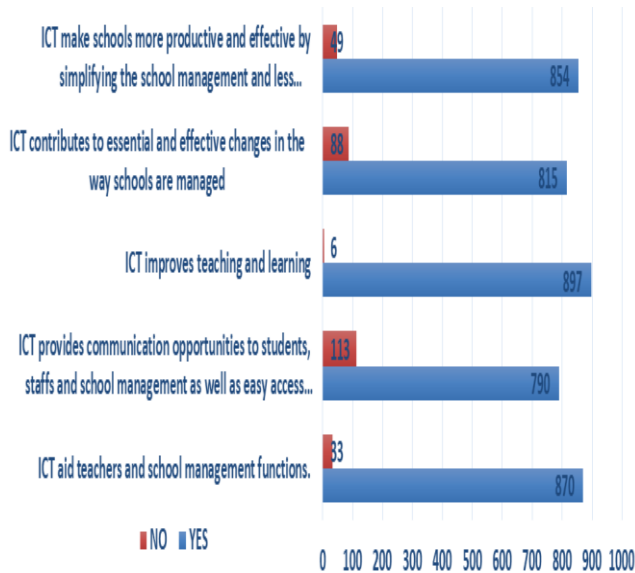


Fig. 4 Distribution of Participants’ Responses on advantages of using ICT for sustainable teaching and learning of secondary schools in Potiskum

TABLE IV. ADVANTAGES OF USING ICT FOR SUSTAINABLE TEACHING AND LEARNING

ITEM	STATEMENT	YES	NO
13	It could aid teacher’s and the schools management’s functions	870 (96.3%)	33 (3.7)

14	It could provide opportunities for students, staffs and school management to easily communicate through e-mail, social networks and have easier access to relevant information.	790 (87.5%)	113 (12.5)
15	It could improve teaching and learning	897 (99.3%)	6 (0.7%)
16	The usage of ICT could contributes to essential and effective changes in the way the schools are managed	815 (90.3%)	88 (9.7%)
17	It can make schools more productive and effective by simplifying the school management and less cumbersome	854 (94.6%)	49 (5.4%)

Research question 5: What are the challenges affecting the use of ICT for teaching and learning in government secondary schools?

In examining this question, data on the challenges affecting the use of ICT for teaching and learning in government secondary Potiskum were collected from the responses of the students and teachers in the schools through the questionnaire. The findings are shown in Table 5.

TABLE V. CHALLENGES AFFECTING THE USE OF ICT IN GOVERNMENT SECONDARY SCHOOLS POTISKUM

ITEM	STATEMENT	YES	NO
18	Lack of trained personnel on the use of ICT facilities	608 (67%)	298 (33%)
19	Lack of adequate ICT facilities for the teaching and learning	677 (75%)	226 (25%)
20	Problems of internet connectivity in the schools	695 (77%)	208 (23%)
21	Inadequate electric power supply in the schools	777 (86%)	126 (14%)

In item 18, (67%) of the respondents agreed with the statement which says, lack of trained personnel affects the use of ICT in teaching and learning, while (33%) of the respondents disagreed. Similarly, in item 19, majority of the respondents (75%) agreed with the statement that, lack of adequate ICT facilities affects teaching and learning while (25%) disagreed. Responding to the item 20, (77%) of the respondents claimed that problems of internet connectivity in the schools affects the use of ICT. This by implication reduced teaching and learning activities, while (23%) of the respondents disagreed with the statements. Also in item 21, (86%) of the respondents agreed that inadequate electric power supply in the

schools affects the use of ICT, while (14%) of the respondents disagreed with the statement. We further present the participants' distribution responses on challenges affecting the use of ICT for teaching and learning in government secondary schools in Potiskum.

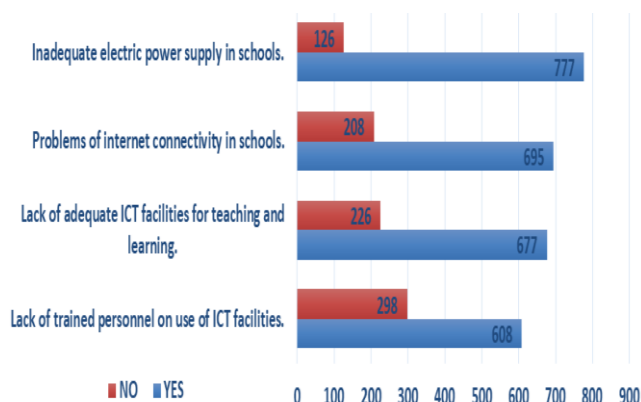


Fig. 5 Distribution of Participants' Responses on challenges affecting the use of ICT for teaching and learning in government secondary Schools in Potiskum

V. DISCUSSION

In the foregoing sections, the data collected for this study were carefully analyzed. It was revealed that most of the government secondary schools in Potiskum are deficient in the ICT availability facilities. Even though most schools have printers, computers, mobile phones, and laptops. While almost all the schools did not have internet services, projector screen, projector, scanning machine, and electronic board. This could be an indication that ICT facilities are not adequately provided for the schools and it suggest that, Potiskum local government are (LGA) is partially ready to integrate information communication and technology. This finding of this study was consistent with the findings presented by [21-23] which indicated that information communication and technology (ICT) facilities for effective teaching and learning are lacking in schools. The findings is also consistent with those of other researchers [24, 25] all of which shows that ICT facilities for sustainable teaching and learning are deficient in Nigeria schools.

The findings demonstrating government and schools' management negligence in Potiskum might have been connected with the problem of shortage of ICT facilities, and a number of respondents (61%) claimed that they do not have access to ICT facilities for effective teaching and learning in their schools. This finding is in line with the findings made by [16, 26] indicating that ICT facilities are deficient in most secondary schools in south-west Nigeria. Similarly, the findings agreed with the findings made by [27] which shows that ICT facilities and equipment are inadequate in many schools.

The finding signifying a low level of ICT facilities usage might have been connected with the shortage of such facilities in the schools as well as poverty at individual

capacity (i.e among teachers and the students). This is evident in the findings revealing that ICT facilities such as internet services, projector screen, projector, scanning machine, and electronic board were not used for teaching and learning in most of the schools. The findings indicated that, the usage of the 4 available ICT facilities in the schools was at a low level with mobile phone (25%), computer systems (31%), printer (25%) and laptop (14%). This also supported the findings made by [28, 29] which revealed a low usage of ICT facilities in secondary schools.

The essential relationship discovered in this study between the extent of ICT usage and its influence for effective teaching and learning in the Potiskum, implies that the more the usage of ICT facilities the better would be the influence to effective and comprehensive teaching and learning in the schools. Also, can influence through bringing exciting base curricular on real world problems into classroom, and gives the opportunity for timely feedback and revision. This finding was in consonance with the findings made by other researchers [30, 31] which demonstrated a strong relationship between the usage of ICT and its influence to a better teaching and learning activities of schools.

This finding revealed that ICT facilities are essential for effective and sustainable teaching and learning of secondary schools in Potiskum. It further shows the perceived advantages of using ICT facilities in the schools was consistent with the findings from [32] which revealed the advantages of using ICT for sustainable teaching and learning of the schools.

On the other hand, the problem of inadequate supply of electricity found in this study appears to be a general and national problem. This finding goes in line with the findings proposed by [33, 34] which showed that the usage of ICT facilities was been handicapped by inadequate supply of electricity to the schools. Also lack of personnel training, internet connectivity and inadequate ICT facilities in the schools, are discovered to be another set of challenges that crippled efforts of achieving effective and sustainable teaching and learning environment. This challenges are found to be directly proportional to inadequate funding by government, which in accordance with the findings made by [23, 35] which reported that financial allocation to Nigerian schools is significantly low.

VI. CONCLUSION

The study has revealed that both students and teachers in secondary schools use ICT facilities in the process of teaching and learning, although most of the facilities are not very much affordable to them. The study has also revealed that students and teachers do stay on computers a little period of time and this is due to lack of

adequate ICT facilities in their schools. The study similarly revealed that ICT has influence on teaching and learning opportunities for feedback and revision finally, the outcome of the study, identifies that there are problems affecting the use of ICT facilities, but there is still room for further improvement.

A. Recommendation

Based on the findings of the study, the following recommendations were made:

1. Since the use of ICT facilities is considered to influence teaching and learning, school authorities should find ways to the facilities available for use to both students and teachers.
2. Government should provide ICT facilities to schools such as cyber cafe, and ICT laboratory so as the students and teachers could stay long on computers and also make teaching and learning easy for them.
3. Government should include ICT into the school curricular and it should be compulsory on every class level in secondary schools.
4. Government should employ trained and experienced ICT teachers to the schools as such will really enhance teaching and learning.
5. Government should encourage staff training through sponsoring them for workshop, seminar, and in-service training.
6. Government should provide adequate funding, internet connectivity as well as uninterrupted power supply to schools for an effective and sustainable learning environment.

Taking in to account these recommendations could be considered as feasible future research opportunities, to order to ensure the desired improvement and sustainability in teaching and learning needed in the State in Potiskum in consonance with the provisions of the national policy on education [36].

ACKNOWLEDGMENT

Authors are grateful to Faculty of Information Sciences and Engineering, Management and Science University, Malaysia for their support.

REFERENCES

- [1] J. Groff and C. Mouza, "A framework for addressing challenges to classroom technology use," *AACe Journal*, vol. 16, pp. 21-46, 2008.
- [2] B. Moges, "The role of information and communication technology (ICT) in enhancing the quality education of Ethiopian universities: A review of literature," *Journal of Education Research and Behavioral Sciences*, vol. 3, pp. 246-258, 2013.
- [3] M. D. Lytras, A. Visvizi, L. Daniela, A. Sarirete, and P. Ordonez De Pablos, "Social networks research for sustainable smart education," *Sustainability*, vol. 10, p. 2974, 2018.
- [4] A. K. Akuoma, "A Comparative study of computer literacy in urban and rural primary schools in Rivers State of Nigeria," *Journal of Sociological Research*, vol. 536, 2012.
- [5] W. B. Information, C. Technologies, and infoDev, *Information and communications for development 2012: Maximizing mobile: World Bank Publications*, 2012.
- [6] M. Hurteau, S. Houle, and S. Mongiat, "How legitimate and justified are judgments in program evaluation?," *Evaluation*, vol. 15, pp. 307-319, 2009.
- [7] S. Imperatives, "Report of the World Commission on Environment and Development: Our common future," Accessed Feb, vol. 10, 1987.
- [8] M. Azadnia, S. Zahedi, and M. Pourabedy, "Analysis of the impact of ICT on sustainable development using sustainability indicators," *International Journal of Computer Applications*, vol. 169, pp. 975-8887, 2017.
- [9] A. E. Wals, "Shaping the education of tomorrow: 2012 full-length report on the UN decade of education for sustainable development," *Unesco2012*.
- [10] S. Mann, L. Smith, and L. Muller, "Computing education for sustainability," *ACM SIGCSE Bulletin*, vol. 40, pp. 183-193, 2008.
- [11] J. Blewitt and C. Cullingford, "The sustainability curriculum," *Earthscan, London*, 2004.
- [12] D. Laurillard, *Rethinking university teaching: A conversational framework for the effective use of learning technologies: Routledge*, 2013.
- [13] O. A. Adelabu and E. O. Adu, "An investigation into teacher's competence on information communication and technologies (ICT) and availability of e-learning resources in the teaching of Mathematics in secondary schools," in *EdMedia+ Innovate Learning*, 2015, pp. 882-889.
- [14] G. Walsham, "Development informatics in a changing world: Reflections from ICTD2010/2012," *Information Technologies & International Development*, vol. 9, pp. pp. 49-54, 2013.
- [15] I. S. Gibson, C. O'Reilly, and M. Hughes, "Integration of ICT within a project-based learning environment," *European Journal of Engineering Education*, vol. 27, pp. 21-30, 2002.
- [16] T. Adeyemi, "Impact of information and communication technology (ICT) on the effective management of universities in South-West Nigeria," *American Journal of Social Management Science*, vol. 2, pp. 248-257, 2011.
- [17] A. A. Ojedokun and E. O. Owolabi, "Internet access competence and the use of the Internet for teaching and research activities by University of Botswana academic staff," *African Journal of Library, Archives and Information Science*, vol. 13, pp. 43-53, 2003.
- [18] N. P. Ololube, "The impact of professional and non-professional teachers' ICT competencies in secondary schools in Nigeria," *Journal of Information Technology Impact*, vol. 6, pp. 101-118, 2006.
- [19] N. P. Ololube, "Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy," *International Journal of Education and Development Using ICT*, vol. 2, pp. 70-85, 2006.
- [20] A. K. Alderman and B. Salem, "Survey research," *Plastic and reconstructive surgery*, vol. 126, pp. 1381-1389, 2010.
- [21] C. Kolawole, "Availability and Utilization of Audio-visual Materials for the Teaching of English Language in some Nursery/Primary Schools in Ibadan," *Journal of Educational Studies*, vol. 1, pp. 122-127, 1997.
- [22] E. Afolabi, P. Jegede, and B. Popoola, "Mandatory computer education in Nigeria secondary schools: Prospects and problems," *Journal of Educational Research and Evaluation*, vol. 3, pp. 32-38, 1999.

- [23] T. Adeyemi and F. Olaleye, "Information communication and technology (ICT) for the effective management of secondary schools for sustainable development in Ekiti State, Nigeria," *American-Eurasian Journal of Scientific Research*, vol. 5, pp. 106-113, 2010.
- [24] K. Alebiosu, "Effects of two instructional methods on senior secondary school student's perceptions of the difficulty in learning some chemical concepts and their achievement gains," *Journal of Educational Foundations and Management*, vol. 1, pp. 55-64, 2000.
- [25] O. Adeosun, "Relative effects of three multi-media packages on students' achievement and retention in social studies," *Unpublished Ph. D Thesis*, 2002.
- [26] A. O. Bolanle, "Principals' Leadership Skills and School Effectiveness: The Case of South Western Nigeria," *World Journal of Education*, vol. 3, pp. 26-33, 2013.
- [27] G. Adejumo, "Essentials of Communication in Business," ed: Ibadan Adio Publishers, 2000.
- [28] P. Seiden, "Where have all the patrons of ICT gone," *Reference and User Services Quarterly*, vol. 39, pp. 2-10, 2000.
- [29] A. N. Uhegbu, "The information user: Issues and themes," *Okigwe: Whytem Publishers*, 2007.
- [30] J. Sybil, O. Isaac, and S. Oludayo, "Introduction to communication for business and organization," *Ibadan: Spectrum Books Ltd*, 2000.
- [31] S. Igberadja, "Assessment of Teachers' and Principals' Opinion on Causes of Low Enrollment of Students in Technical Colleges: A Delta State Study," *Journal of Educational Policy and Entrepreneurial Research*, vol. 1, pp. 238-250, 2014.
- [32] F. Bamire, "Influence of compliance with inspection principles on students' academic performance in public secondary schools in Osun State, Nigeria," *Journal of Emerging Trends in Educational Research and Policy Studies*, vol. 9, pp. 148-154, 2018.
- [33] S. L. Hodge-Hardin, "Interactive television in the classroom: a comparison of student math achievement among three instructional settings," 1995.
- [34] D. S. Knupp, "Visual programming instruction using integrated diagrams as a strategy for reducing cognitive load," 1997.
- [35] E. Shava and T. C. Maramura, "Assessing the Implementation of Information Communication Technology (ICT) for Sustainable Development in NGOs in Zimbabwe," *Journal of Communication*, vol. 7, pp. 208-215, 2016.
- [36] F. O. Aladekomo, "Nigeria educational policy and entrepreneurship," *Journal of social sciences*, vol. 9, pp. 75-83, 2004.