



Availability of data processing resources in senior secondary schools in Port Harcourt metropolis

Weli Bumia¹, Vikoo Baribor²

^{1,2} Department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt, Nigeria

Abstract

The study investigated the availability of Data Processing (DP) resources in senior secondary schools in Port Harcourt metropolis. Three research question and three hypotheses guided the study. Descriptive survey design was adopted for carrying the investigation in this study. A sample of fifty-one (51) Data Processing teachers consisting of fifteen (15) teachers from four public schools and thirty-six (36) teachers from fifteen (15) private schools were involved in the study. Data Processing Materials Observation Checklist (DPMOC) and Data Processing Resources Questionnaire (DPRQ) developed by the researcher were used for data collection. These instruments had reliability coefficients of 0.85 for the observation checklist, 0.72 for the part that deals with factors militating against the availability of resources and 0.82 for the availability of Data Processing teachers. Relevant data gathered were analyzed with simple percentage, mean, standard deviation, Chi-square and independent t-test statistics. The results of the study revealed that computer laboratory, computers, printers, flash memories, CDs, smartphones and Audio and Video Discs are the material resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis. In addition, there was no significant difference in the material resources available in teaching Data Processing (DP) between public and private secondary schools in Port Harcourt metropolis. Another result of the study was that Data Processing teachers are available in both public and private schools but they are not professionally trained Data Processing specialist. Furthermore, t-test analysis revealed that there was no significant difference in the resources (human) available in teaching Data Processing (DP) between public and private secondary schools in Port Harcourt metropolis. A third find of the study was that lack of finance to purchase computer and its accessories, absence of financial support from the authority that own the school, absence of support from NGOs, private donors, communities, PTA *et cetera* to provide ICT materials, absence of school-based policy on Data Processing, intermittent disruption of electricity, absence of internet connection in the school, lack of technical support staff in the school, lack of Data Processing teachers in the school, absence of instructional software in different subject areas, and lack of quality Data Processing teachers were all considered to be factors militating against the availability of resources (materials and human) in teaching Data Processing in secondary schools in Port Harcourt metropolis. These factors militating against the availability of resources (materials and human) in teaching Data Processing (DP) do not significantly differ between public and private secondary schools in Port Harcourt metropolis. Hence, based on these findings it was recommended among others that owners of schools such as the government should endeavour to provide adequate Data Processing resources (including infrastructural facilities such as the computer laboratory and computerized library) in the schools for effective teaching and learning of Data Processing.

Keywords: availability, data processing resources, Port Harcourt metropolis

Introduction

Education plays a very important role in the economic development of a country as it is aimed at supplying the economy with human capital that can convert effectively and efficiently other resources into the output of high value. Education is perceived as the cornerstone of economic and social development and a principal means of providing for the welfare of individuals. To this end, Educational organizations are established to help society enhance knowledge, attitudes and skills of students by harnessing both material and human resources (Akinpelu, 2005) ^[1].

In the school system, the teaching of any school subject requires the use of resources, to facilitate the teaching-learning process. In fact, the teaching of a subject like Data Processing (DP) requires great deal resources, in the realm of Information and Communication Technology (ICT) especially in this 21st century. In any educational system, the level of available resources, place a restriction on the degree to which any new subject can be introduced into the school curriculum, especially where only the most basic facilities have so far been provided. Investment the equipment is

necessary for the effective delivery of an ICT-based curriculum and should rank high in any set of government priorities (United Nations Educational Scientific Cultural Organization-UNESCO, 2018) ^[2].

Students can only come in contact or be actively centred if the resources (computers, printers, cameras, scanners, internet with subscription etc.) for teaching Data Processing are available and functional in the laboratory, which would also be done with the supervision of data processing teacher. Resources are people, tools, technologies, and materials designed to help learners. It can also include high-tech ICT systems, community resources such as libraries, zoos, museums, and people with special knowledge or expertise. Other kinds of resources include; digital media, such as CD-ROMs, websites, Web Quests, and electronic performance support system (EPSS), and they include analogue media, such as books, and other print materials (Januszewski & Molande, 2008) ^[3].

Data Processing (DP), the primary subject in this study is one of the 34 trade/entrepreneurship subjects approved for study at the senior secondary school level of the educational

system in recent times. Data processing is a subject designed to achieve the following objectives at the secondary school level:

1. To equip students with basic skills of data processing and management.
2. To enhance the competency of students' ICT applications that will promote the acquisition of entrepreneurial skills for everyday living in the global world.
3. To provide students with knowledge in the application of ICT in facilitating business transaction and education.
4. To prepare students for further studies in Data Processing and Management (Federal Republic of Nigeria, National Policy on Education 2014).

From the above objectives, it could be observed that the resources required for the teaching and learning of Data Processing are those of ICT.

The various ICT resources used in the teaching and learning process in schools according to Babajide and Bolaji (2003), Bryers (2004), Bamidele (2006), Ofodu (2007) and Olele and Abraham as cited in Williams and Avwiri (2016) ^[5] include;

Radio-television, computers, overhead projectors, optical fibres, fax machines, CD-Rom, internet, electronic notice board, slides, digital multimedia, video/VCD machine and so on. It appears some of these resources are not sufficiently provided for the teaching and learning process in the schools. This might account for why teachers are not making use of them in their teaching (Data Processing inclusive).

According to Ajayi (2008) ^[6], the use of these resources involves various methods which include systematized feedback system, computer-based operation/network, video conferencing and audio conferencing; internet/worldwide websites and computer-assisted instruction. Early-Face (2018) ^[7] listed the Facilities and major Equipment/Materials required for the teaching and learning of Data processing in senior secondary schools for a minimum class of fifty students;

1. Pictures/Charts showing different computing devices and other relevant information such as computers in a network.
2. Computer System with Graphical User Interface.
3. Standard Software packages such as Open Office, Microsoft Office etc. (Latest version desirable).
4. Multimedia systems and applications such as projector, speakers and
5. Graphical packages such as coral draw.

It appears some of these resources are not sufficiently provided for the teaching and learning process in the schools. This might account for why teachers are not making use of them in their teaching (Data Processing inclusive).

According to Ajayi (2008) ^[6], the use of these resources involves various methods which include systematized feedback system, computer-based operation/network, video conferencing and audio conferencing; internet/worldwide websites and computer-assisted instruction. It should be stressed that the effective use of the various methods of ICT in Data Processing teaching and learning depends on the availability of these resources, which will enable teachers'

to equip themselves with the necessary skills and improve on them and also motivate teachers while using them in teaching.

Data Processing is a compound word, "Data, and Processing" The word "Data" is the plural of datum, which means fact, observation, assumption or occurrence. More precisely, data are representations of facts pertaining to people, things, ideas and events. Data are represented by symbols such as letters of the alphabets, numerals or other special symbols. Data is the quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media. Data also refer to as numbers, words, sounds, and images.

Checkland and Holwell (1998) ^[8] defined "Data", as a representation of facts, concepts or instruction in a formalized manner suitable for communication, interpretation, or processing by humans or automated means. Spacy (2017) ^[9], defines Data processing as a series of operation that use the information to produce a result. Data Processing is a business application course that focuses on taking raw data such as sounds text and images and transforming them into meaningful and useful information. Thus, we have text information (reports, correspondence), sound information (voice, music, tones), and images (visual information such as charts, graphs, drawings and animated drawing), that can all be processed. This amounts to the fact that we have word processing, image processing, and voice processing. According to Senn 2004 ^[10], each of these goes through the cycle of; capturing, processing, generating, storing/retrieving, and transmitting.

The implication of the introduction of this trade/entrepreneurial subject (Data processing) by the Federal Government of Nigeria is that the federal government wants students to be economically independent. That is, the students are supposed to be equipped and earn a living with ICT employability skills which will be useful to those that do not intend to further (go to the University) or are not ready to further (do not have the finance or sponsorship) immediately. An added benefit to those in the University is that they can be schooling and utilizing this data processing skills and also earn a stipend from it. Students can be typing their work themselves and also do for their fellow students, they can do their project themselves and for others; and also do presentations with it. Therefore students cannot learn Data Processing in abstraction because it is a hands-on activity.

It is however common knowledge, that whenever a new curriculum of study is introduced, a corresponding array of challenges which hinge on resources requirement arise. Data Processing as a trade/entrepreneurial curriculum of study is not elusive to this truism. The teaching of any school subject at any level of educational system requires that the provision of resources that has the capacity to facilitate and enhance the teaching of the subject is made available. Despite these huge requirements, schools have gone ahead in teaching the subject in line with the new curriculum.

At this juncture present empirical works buttressing availability of resources for the teaching of school subjects and Data processing in particular. Osarenren-Osaghae and Irabor (2012) ^[14] carried out a study to access the availability and adequacy of human and material resources for the teaching and learning of skill-based courses in

Nigerian Public Universities, he found out that: the human and material resources on ground for the teaching and learning of skill-based courses in Nigerian Public Universities did not match the minimum standard requirement recommended by the National Universities Commission.

Accordingly, the following objectives, research question and hypotheses guided this study.

Objectives

1. Ascertain the availability of material resources in teaching Data Processing (DP) in secondary schools in Port Harcourt Metropolis.
2. Determine the availability of human resources in teaching Data Processing (DP) in secondary schools in Port Harcourt Metropolis.
3. Identify the factors militating against the availability of resources in teaching Data Processing (DP) in secondary schools in Port Harcourt Metropolis.

Research Questions

1. What are the material resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis?
2. What are the human resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis?
3. What are the factors militating against the availability of resources in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis?

Hypotheses

1. There is no significant difference between the material resources available in teaching Data Processing (DP) in public and private secondary schools in Port Harcourt metropolis.

2. There is no significant difference between the human resources available in teaching Data Processing (DP) in public and private secondary schools in Port Harcourt metropolis.
3. The factors militating against the availability of resources in teaching Data Processing (DP) do not significantly differ between public and private secondary schools in Port Harcourt metropolis.

Methodology

Descriptive survey design was adopted for carrying this study in Port Harcourt metropolis, the capital and largest city of Rivers State, Nigeria. A sample of fifty-one (51) Data Processing teachers consisting of fifteen (15) teachers from four public schools and thirty-six (36) teachers from fifteen (15) private schools were involved in the study. Data Processing Materials Observation Checklist (DPMOC) and Data Processing Resources Questionnaire (DPRQ) developed by the researcher were used for data collection. These instruments had reliability coefficients of 0.85 for the observation checklist, 0.72 for the part that deals with factors militating against the availability of resources and 0.82 for the availability of Data Processing teachers. Data Processing Materials Observation Checklist (DPMOC) was used personally by the researcher to observe and ascertain the availability, functional, non-functionality and non-availability of the materials in the schools visited. Data Processing Resources Questionnaire (DPRQ) was administered directly to the respondents by the researcher.

Results

Research Question 1: What are the material resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis?

Table 1: Frequencies and Percentages of material Resource Availability and Functionality for Teaching Data Processing (n = 19)

Materials	Availability/Functionality	Schools				Decision		
		Private		Public				
		f	%	f	%			
1 Computer laboratory	Available Functional	15	100	100	4	100	100	AVA FUN
2 Computers	Available Functional	15	100	100	4	100	100	AVA FUN
3 Scanner	Available Functional	3	20	13	0	0	0	N-AVA N-FUN
4 Printers	Available Functional	15	100	93	4	100	75	AVA FUN
5 Cameras	Available Functional	4	27	7	0	0	0	N-AVA N-FUN
6 Dedicated Image Machine	Available Functional	0	0	0	0	0	0	N-AVA N-FUN
7 Voice Processing Machine	Available Functional	0	0	0	0	0	0	N-AVA N-FUN
8 Audio and video discs	Available Functional	9	60	60	0	0	0	AVA FUN
9 Flash memories	Available Functional	15	100	93	4	100	100	AVA FUN
10 Multimedia (MM) Projector	Available Functional	5	33	33	0	0	0	N-AVA N-FUN
11 CDs	Available Functional	15	100	100	3	75	50	AVA FUN
12 Smart Phones	Available Functional	15	100	100	4	100	100	AVA FUN

On the table, the following shorthand represents the following:

AVA = Available; FUN = Functional; N-AVA = Not Available; N-FUN = Not Functional

Research Question 2: What are the human resources available in teaching Data Processing (DP) in secondary

schools in Port Harcourt metropolis?

Table 2: Mean and Standard Deviation Analysis on the availability of human resources in teaching Data Processing (Criterion $\bar{x} = 2.50$)

S/n	Item statement	Public(n)	\bar{x}	SD	Decision	Private (n)	\bar{x}	SD	Decision
1	The school lacks qualified teachers to teach Data Processing effectively.	15	3.27	.799	Agreed	36	2.53	.941	Agreed
2	Science teachers are borrowed to teach Data Processing subject.	15	2.80	1.014	Agreed	36	2.28	.974	Disagreed
3	Data Processing teachers are sourced from outside the school.	15	2.60	1.183	Agreed	36	2.31	.856	Disagreed
4	Data Processing teachers in this school are inadequate.	15	2.33	1.345	Disagreed	36	2.39	.964	Disagreed
5	The school invites part-time Data Processing teachers to teach the subject	15	2.47	1.125	Disagreed	36	2.03	.910	Disagreed
	Pooled Mean (\bar{x})	15	2.69	1.093	Agreed	36	2.31	.929	Disagreed

Research Question 3: What are the factors militating against the availability of resources in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis?

Table 3: Mean and Standard Deviation Analysis of the Factors Militating against the Availability of Resources in Teaching Data Processing (Criterion $\bar{x} = 2.50$)

	Item statement	Group	n	\bar{x}	SD	Decision
1	Lack of finance to purchase a computer and its accessories in the school	Public	15 36	3.53	.915	Agreed
		Private		3.00	.862	Agreed
2	Absence of financial support from the authority that owns the school	Public	15 36	3.60	.632	Agreed
		Private		2.92	.806	Agreed
3	Absence of support from NGOs, private donors, communities, PTA etc to provide ICT materials	Public	15 36	3.60	.910	Agreed
		Private		2.86	.762	Agreed
4	Lack of rooms for Data Processing material storage	Public	15 36	2.40	1.183	Disagreed
		Private		2.50	.878	Disagreed
5	Absence of school-based policy on Data Processing	Public	15 36	2.53	1.060	Agreed
		Private		2.75	.806	Agreed
6	Intermittent disruption of electricity	Public	15 36	3.13	.516	Agreed
		Private		3.11	.747	Agreed
7	Absence of internet connection in the school	Public	15 36	3.00	.756	Agreed
		Private		2.89	.785	Agreed
8	Lack of technical support staff in the school	Public	15 36	3.13	.516	Agreed
		Private		2.72	.779	Agreed
9	Lack of Data Processing Teachers in the school	Public	15 36	2.80	.862	Agreed
		Private		2.72	.779	Agreed
10	Absence of instructional software in different subject areas	Public	15 36	2.73	.884	Agreed
		Private		2.94	.754	Agreed
11	Lack of interest by teachers to use ICT facilities such as a computer, the internet, in the school	Public	15 36	1.60	.737	Disagreed
		Private		2.44	.909	Disagreed
12	Lack of interest by teachers to learn more about ICT facilities	Public	15 36	2.13	.990	Disagreed
		Private		2.36	.899	Disagreed
13	Principal's leadership is not strongly related to teachers use of computer-related subjects	Public	15 36	2.40	.737	Disagreed
		Private		2.58	.806	Agreed
14	Quality Data Processing teachers should be recruited by school owners	Public	15 36	3.13	.743	Agreed
		Private		3.03	.810	Agreed
15	Lack of Data Processing Students in the school	Public	15 36	1.47	.640	Disagreed
		Private		2.22	.898	Disagreed

Hypothesis 1: There is no significant difference between the material resources available in teaching Data Processing (DP) in public and private secondary schools in Port Harcourt metropolis.

Data gathered from 19 (Public = 4 and Private = 15) senior secondary schools by the researcher with the help of an observation checklist, were subjected to Chi-square (X^2) statistics and the result presented in Table 4.4.

Table 4: Summary of Chi-square Analysis on Material Resources Availability in both Public and Private Schools

School	n	Chi-square (X^2)	df	Sig	Decision
Public	4	5.462	11	.856	Not Significant
Private	15				

Hypothesis 2: There is no significant difference between the human resources available in teaching Data Processing (DP) in public and private secondary schools in Port Harcourt metropolis.

The tenability of this hypothesis was ascertained by subjecting the data gathered from both public and private schools DP teachers and thereafter, deploying the data to independent t-test statistic. The result is as presented in Table 4.5.

Table 5: t-test Analysis of the Mean Scores of Public and Private Schools on the availability of Data Processing Teachers

School	n	\bar{x}	Sd	t_{cal}	df	Sig.	Decision
Public	15	13.47	4.63				
				1.680	49	.099	NS
Private	36	11.53	3.34				

NS = Not Significant, $p (.099) > 0.05$ level of significance

From Table 4.11, the calculated $t (49) = 1.680$, $p (.099) > 0.05$ level of significance. That is from the data the P-value observed was 0.099 which is greater than 0.05 level of significance, hence, the calculated t-value is not statistically significant. Therefore, the stated null hypothesis is hereby

accepted (not rejected). The result is that there is no significant difference in the resources available in teaching Data Processing (DP) between public and private secondary schools in Port Harcourt metropolis.

Hypothesis 3: The factors militating against the availability of resources (materials and human) in teaching Data Processing (DP) do not significantly differ between public and private secondary schools in Port Harcourt metropolis. Data gathered from both public and private schools respondents on the factors militating against the availability of resources (materials and human) in teaching DP were subjected to independent t-test statistic. The result is as presented in Table 4.6.

Table 6: t-test Analysis of the Mean Scores of Public and Private Schools on the factors militating against the availability of Resources in teaching Data Processing

School	n	\bar{x}	Sd	t_{cal}	df	Sig.	Decision
Public	15	41.20	4.90				
				.082	49	.935	NS
Private	36	41.06	6.05				

NS = Not Significant, $p (.935) > 0.05$ level of significance

Discussion

Material resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis

It was found out that computer laboratory, computers, printers, flash memories, CDs, smartphones and Audio and Video Discs are the material resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis. In addition, there is no significant difference in the material resources available in teaching Data Processing (DP) between public and private secondary schools in Port Harcourt metropolis.

This means that both public and private schools have the same materials for the teaching of Data Processing (DP), the resources are more available in private schools when compared to their public school's counterpart. The outcome of the result is however not surprising when viewed against the background that public schools which are generally funded by the Government of the day are grossly neglected in terms of provision of instructional materials due to lack of political will on the part of the Government. On the other hand, private schools generally make efforts to procure some of the needed instructional materials including that of DP because they (Private schools) wish to attract students and are supervised by the Government periodically if they are to continuously stay in the business of education.

However, the present result is in agreement with some past research findings. For example, Nwana, Ofoegbu and Egbe (2017) ^[11], in a study of availability and utilization of ICT resources in the teaching of Computer Education among secondary school teachers in Anambra state found out that, ICT resources needed for the teaching of computer education are not adequately available especially in public schools. Similar results were found in related studies by Apagu and Wakili (2015) ^[12], Elisha and Ugochukwu (2015) ^[13] and Osarenren-Osaghae and Irabor (2012) ^[14].

Human resources available in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis

This objective was geared towards ascertaining whether or not there are DP teachers in secondary schools in Port

Harcourt metropolis. The result here showed that Data Processing teachers are available in both public and private schools but they are not professionally trained Data Processing specialist. Further analysis via t-test, revealed that there is no significant difference in the resources (human) available in teaching Data Processing (DP) between public and private secondary schools in Port Harcourt metropolis.

This outcome is however not surprising since DP is a relatively new subject in our secondary schools. Furthermore, the subject is not a course of professional study in our universities and so, teachers teaching the subject are not DP professionals per se. Rather we have teachers who are schooled in computer science (if they are available) and those with some form of computer-related skills teaching the subjects in our secondary schools. Nonetheless, in the perception of the researcher, the teaching of DP by computer science teachers is apt. This is because; Data processing skills are intensively part and parcel of computer science education as could be found in the curriculum of computer science and Data processing for senior secondary schools developed by the Nigerian Educational Research and Development Council (NERDC). The present result is in agreement with some past research findings. For instance, Osarenren-Osaghae and Irabor (2012) ^[14], in a study to access the availability and adequacy of human and material resources for the teaching and learning of skill-based courses in Nigerian Public Universities, found out that the human and material resources on ground for the teaching and learning of skill-based courses in Nigerian Public Universities did not match the minimum standard requirement recommended by the National Universities Commission. Related results were found in similar studies by Bizimana and Orodho (2014) ^[15], Akungu (2014) and Apagu and Wakili (2015) ^[12].

Factors militating against the availability of material resources in teaching Data Processing (DP) in secondary schools in Port Harcourt metropolis

The result here is that Lack of finance to purchase computer and its accessories, absence of financial support from the authority that own the school, absence of support from NGOs, private donors, communities, PTA *et cetera* to provide ICT materials, absence of school-based policy on Data Processing, intermittent disruption of electricity, absence of internet connection in the school, lack of technical support staff in the school, lack of Data Processing teachers in the school, absence of instructional software in different subject areas, and lack of quality Data Processing teachers were all considered to be factors militating against the availability of resources (materials and human) in teaching Data Processing in secondary schools in Port Harcourt metropolis.

However, while public school teachers disagreed that principal's leadership is not strongly related to teachers' use of computer-related subjects, private school teachers agrees that principal's leadership is not strongly related to teachers' use of computer-related subjects. Nevertheless, lack of rooms for Data Processing materials storage, lack of interest by teachers to use ICT facilities such as computer, internet, in the school, lack of interest by teachers to learn more about ICT facilities, and lack of Data Processing students in the schools were not considered to be factors militating against the availability of resources (materials and human)

in teaching Data Processing in secondary schools in Port Harcourt metropolis. In addition, the factors militating against the availability of resources (materials and human) in teaching Data Processing (DP) do not significantly differ between public and private secondary schools in Port Harcourt metropolis.

The outcome of the present finding is in agreement with those of Apagu and Wakili (2015)^[12], Bizimana and Orodho (2014)^[15] and Andambi and Kariuki (2013) who in their separate but similar studies also found out that lack of funds; absence of support from NGOs, private individuals, communities, PTA et cetera; absence of school-based policies on various school subjects; intermittent disruption of electricity; absence of internet connections and lack of technical support has some of the factors militating against the availability of instructional materials in schools.

Conclusion

In the basis of the findings of this study, human and some material resources for the teaching of Data Processing are available in both public and private senior secondary schools in Port Harcourt metropolis but not in proportion to the number of students learning Data Processing. Also, lack of finance to purchase computer and its accessories, absence of financial support from the authority that owns the school, absence of support from NGOs, private donors, communities, PTA etc. to provide ICT materials, absence of school-based policy on Data Processing, intermittent disruption of electricity, absence of internet connection in the school, lack of technical support staff in the school, lack of Data Processing teachers in the school, absence of instructional software in different subject areas, and lack of quality Data Processing teachers are some of the factors militating against the availability of resources (materials and human) in teaching Data Processing in secondary schools in Port Harcourt metropolis. This scenario is for both public and private schools in Port Harcourt metropolis.

Recommendations

The following recommendations are made in line with the findings of this study.

1. The owners of schools such as the government should provide adequate Data Processing resources (including infrastructural facilities such as the computer laboratory and computerized library) in the schools for effective teaching and learning of Data Processing.
2. The owners of schools especially public schools should embark on training and retraining of teachers through short-term courses, seminars, workshops and conferences interested in teaching Data Processing so as to increase the number of professionally trained DP teachers.
3. Factors militating against the availability of resources in teaching Data Processing (DP) in schools should be addressed by the relevant by both public and private school owners in order to make them readily available for the teaching of Data Processing.

References

1. Akinpelu AB. *Essays in Philosophy and Education*. Ibadan: Stirling Horden Publishers Nigeria Ltd, 2005.
2. UNESCO. *ICT Competency Standards for Teachers: Policy framework*, 2018. Retrieved on the 15th August 2018 from, <http://unesco.org/image/0015/001561E.pdf>

3. Januszewski, Molande. *Educational Technology: A Definition with Commentary*. Lawrence Erlbaum Associates. London, 2008.
4. Federal Republic of Nigeria National Policy on Education. 6th Edition. NERDC Press Lagos, 2014.
5. Williams C, Avwiri E. Editors in the Modern Classroom: Information and Communication Technology in Education: A New Learning Portal. Port Harcourt: Pearl Publishers International Ltd, 2016.
6. Ajayi IA. Towards effective use of information and communication technology for teaching in Nigeria colleges of education. *Asian Journal of Information Technolgy*. 2008; 7(5):210-214.
7. Early-Face. *Data Processing WEAC Syllabus*, 2018. Retrieved on the 2nd August 2019 from <http://www.earlyface.com.ng/online-reading-and-lectures/data-processing-waec-syllabus/>
8. Checkland, Holwell. *Definition of Data*, 1998. Retrieved on the 7th July 2, 2019, from <http://repository.up.ac.za>
9. Spacy J. 8 Examples of Data Processing, 2017. Retrieved on 17 June 2019 from www.google.com
10. Senn AJ. *Information Technology: Principles, Practices, Opportunities*. Pearson Educational Ltd. New Jersey, 2004.
11. Nwana SE, Ofoegbu TO, Egbe CI. Availability and Utilization of ICT Resources in Teaching Computer Education in Secondary School in Anambra State, Nigeria. *Mediterranean Journal of Social Sciences*. 2017; 8(5):111-116. Doi: 10.1515/mjss-2017-0029.
12. Apagu VV, Wakili BA. Availability and Utilization of ICT Facilities for Teaching and Learning of Vocational and Technical Education in Yobe State Technical Colleges. *American Journal of Engineering Research (AJER)*. 2015; 04(02):113-118.
13. Elisha NE, Ugochukwu CO. Impediments to Effective Teaching and Learning of Basic Technology in Nigerian Public Secondary Schools. *Journal of Research & Method in Education (IOSR-JRME)*. 2015; 4(3):45-51. Retrieved on the 2nd August 2019 from, www.iosrjournals.org
14. Osarenren-Osaghae RI, Irabor QO. Availability and adequacy of human and material resources for the teaching and learning of Skill-based Courses in Nigeria Public Universities. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)*. 2012; 4(1):157-163.
15. Bizimana B, Orodho JA. Teaching and Learning Resource Availability and Teachers' Effective Classroom Management and Content Delivery in Secondary Schools in Huye District, Rwanda. *Journal of Education and Practice*. 2014; 5(9):111-145. Retrieved from, www.iiste.org