



Towards the acquisition of digital instructional resources for effective teaching in the 21st century classroom in Public Secondary Schools in Cross River State

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Abstract

The study was on the influence of acquisition of digital instructional resources on the teaching effectiveness of mathematics teachers in public senior secondary schools in Cross River State. To achieve this, a hypothesis was drawn from the stated research question to guide the study. Literature review was carried out according to the variable in the study and the survey design was used for the study. Two sets of structured questionnaires, titled; 'Teacher Effectiveness Questionnaire' (TEQ) and 'Digital Instructional Resource Evaluation Test Questionnaire' (DIRCETQ) were designed by the researcher. Data were analysed using the Analysis of Variance (ANOVA) statistic. The hypothesis was tested at .05 levels of significance. The results of the findings was that acquisition of digital instruction resources has no significant influence on mathematics teachers' effectiveness in public senior secondary schools in Cross River State. Based on the findings, it was recommended among other things that basic training on the needed skills and knowledge on how best they can deploy and utilize these resources in the classroom.

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Keywords: Teachers' Teaching effectiveness, Digital instructional resources ; Resource acquisition

1. Introduction

The Digitalization and resources acquisition for effective teaching and learning has recently become a tropical area of concern both educators and students in recent times, this is because it global educational concerns have actually shifted to e- teaching and e-learning as sure way of reengaging and reactivating the falling standards in our school systems. Academic gains and successes should be on key variables as hindering the

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impact of digitalization of Nigeria secondary schools and all such necessary digital tools to actualize a sound educational system must be provided even in the midst of other issues like; search skills, epileptic power supply, expensive hardware and software facilities and the huge amount of money involved providing alternative power supply system.

Yusuf (2005) found that ICT provides a variety of tools to support and facilitate teachers' professional competence and teaching effectiveness. Digital innovations transforms teaching and makes the teacher more effective, efficient and also increase their interest in the teaching profession. Access to Digital resources and having the right skills to use them can allows the teacher organize and structure his work plan, promote re-thinking and revision of the curriculum content and instructional strategies. It also allows him to place more emphasis on individualized instruction with emphasis on carrying out personal projects and assignment in Science. It allows the teachers the opportunity to handle higher concepts in the Science with his/her students. What percentage of teachers can acquire these resources for both private and school use remain a point of discourse or if they are eventually provided, can these be used effectively by teachers in the classroom at this point of emerging technologies. Funds is required to acquire modern Digital resources (computer, servers, scanners, photocopiers, computer software, e-journals, etc.) for teacher's use in any given school system, no matter the level. Most of these facilities are very capital intensive and can only be purchased from developed countries with funding equally dependent on some of these foreign supporting partners. When the inputs from supporting countries depreciate due to variation in fiscal and money policies of nations and if there are both internal and external shakeups in the economy, some of the funds are often diverted, leaving the schools and teachers worse off.

2. Review of Literature

Already in the literature banks for current and future researchers are both empirical and non-empirical studies relating to the topic under consideration.

Using a sample size of 22 respondents in a 40-sized respondent population in the study of the effects of constraints to acquisition of digital resources in academic Libraries in Southern Nigeria, Christopher (2013) reported that gift and purchase were the best means of resource acquisition in the libraries 54.5% with lack of funds as the major acquisition problems amounting to 54.5%. In a related study involving students and faculty members of library science department at the Covenant University Library, Opeola (2013) noted that the university have several computers and internet connection for use by both students and staff, but highlighted that the lowest digital usage of educational resources was in the area of electronics database. The faculty respondents with the highest frequency of 40 (representing 80%) used the internet to update

knowledge, while the highest student respondents of 177 (76.7%) used the internet to complete projects. Electronic databases could not be individually acquired by students and faculty staff members of the faculty, couple with the needed training of library staff as well as students on the use of computer software.

Further, Krubu and Osawaru's (2011) identified Digital resources and their utilization at John Harris Benson Idahosa University as search engine, internet, CD-ROM, Online database, World Wide Web. These facilities are used to acquire, store, process, retrieve and disseminate information. Insufficient funding was one of the major findings from a study carried out on the problems militating against the application of Digital resources in Nigeria secondary schools up to other higher institutions of learning owned and operated by both public and private authorities; this is responsible for up to 33.3% of the problems facing schools. The funding problem is closely followed by the epileptic power supply of 29.2%, lack of search skills of 12.5%, automation at infancy level 10.4%, and technical know-how of 8.3 %

Kruba & Osawaru, (2011) found out that only a few public libraries in South South Nigeria are computerized and do make effective use of the internet. He added that the institutions are not adequately funded as computers are not available and the libraries lacking developed man power due largely to insufficient funds to acquire and activate the facilities where they exist. He identified availability of computers, internet, CD-ROM, e-mails, Microfilm, Microfiche, Videotapes and slid projectors as facilities available in few schools but concluded that the facilities are used mostly for exhibitions and technical training during workshops and seminars. In addition, Ojedekun, Ayoku and Okafor, (2015) asserted that many teachers do have the knowledge on the use of e-mail and word processing and skills in general computer operation but lack the knowledge of search engine utilization, web-site development and designing and also do not possess the needed skills of accessing specialized websites for critical information that help influence their effectiveness. Specialized Science site cannot be accessed by these teachers for meaningful information reporting and programming, the authors concluded. Keith, (2000) reported that cost is a major challenge in most states against the acquisition of ICTs, both in terms of hardware and software and also in knowledge acquisition in secondary schools in Nigeria just as in many other societies. Initial attempts to introduce computer-based technologies into secondary for effective teaching were hampered by cost constraints on information processing and lack of connectivity. Even though these challenges have been addressed in developed societies, where private ownership of internet services have dominated the ownership of most these services, developing countries are still seriously battling with these challenges

Collaborating further, to assess the utilization level of digital facilities among Universities lecturers in Nigeria with focus on Cross River and Akwa Ibom States, Akuegwu, Ntukidem and Ntukidem (2011) undertook a study involving 400 lecturers -

with a population t- test and independent t-test separately, tested and analysed the data. The result showed that there was low access to Digital resources for both the teachers and students use and that the situation cannot guarantee a quality instructional process to take place in the two states. The researchers however maintained that there was ICT availability in the area of internet connected desktops computers and instructional cyber cafes. Lecturers' utilization of ICT was very low especially among the university lecturers.

Also, Okon and Jacob (2002) conducted a study on the use of Digital resources in selected schools in Nigeria, the authors found that 161.3% of the respondents professed to use computers in their teaching and research works, showing that the extent of computer use was very high, but the findings further indicated that the usage was more in statistical analysis than in teaching. This in effect implies that even though ICT utilization was found to have existed in most schools, it has been of more benefits to areas like research than in the actual teaching and learning of Science Okon and Jacob concludes. In a similar study on ICT utilization among teachers, Ramboll, (2004) reported that while the level of integrating ICT in teaching has increased greatly, considerable variations still exist between schools in the areas of accessibility. He noted that while most schools in the urban may have basic ICT infrastructural facilities, such as computers, internet access and projectors to use, schools in the rural areas have very little or nothing in this direction.

In their contribution, Ntukidem and Ashi (2009) discovered that persons with visual impairment have variously benefitted from the use of electronic devices such as screen readers, which the blind or low vision computer users use to listen to textual materials that appear on their computer screens. They added that the more popular screen for readers are Windots and Job Access with Speech for Windows (JASW), both of which pass information to Braille display or speech synthesizer. Emmanuel and Sife, (2008) concluded that when funding is poor to secondary schools, Digital resources acquisition may not necessarily remain the priority of the authority as other conflicting needs of the school may always be considered. Teacher needs computer and information literacy skills to effectively use and move with the rapidly changing and growing information resources. The knowing of keyboard and mouse operations are not enough to make the teacher effective in the utilization of electronic information resources. ICT literacy involves the efficient and effective use of information sources to obtain the required information. This will in turn enhance capacity and developments in our educational advancements.

2.1. Purpose of the study

The main purpose of this study is to establish the influence of digital resources on teaching effectiveness of Science teachers in secondary school teachers in Cross River State. Specifically, the study seeks to determine:

The influence of Digital resources acquisition on the teaching effectiveness of Science teachers in public secondary schools in Cross River State

2.2. Research Questions

The following are formulated as a research question to guide the researcher in the investigations.

How does acquisition of digital resources by science teachers influence their teaching effectiveness in public secondary schools in Cross River State.

2.3. Statement of hypothesis

The following hypotheses are tested in the study:

There is no significant influence of digital resource acquisition on teachers' teaching effectiveness in senior secondary school Science.

3. Method

This section describes the method and procedures used in the study under the following;

The survey inferential design was used and the research area being Cross River State, Nigeria. The study population is made up of 375 public senior secondary school Science teachers in the state. A census of Science teachers in public senior secondary schools in Cross River State was adopted. All the Science teachers (both professionals and non-professionals) in the sampled schools were used for the study. Using the random sampling technique, each of the 375 Science teachers involved in the study were further evaluated by four students on their teaching effectiveness. The sample consisted 375 teachers and 1,500 students from the public senior secondary schools in Cross River State. Of the 375 teachers, 150 were female and 225 were male teachers. 263 were trained Science teachers while 112 were not professionally trained in Science, but were science incline and could teach the subject due to the shortage of Science teachers in their schools as arranged by the schools.

On instrumentation, two instruments were used for data collection (from teachers and students respectively). The first questionnaire titled "Digital Evaluative Test Questionnaire" (DETQ) was administered to teachers to evaluate their digital skills of teachers and related variables while the second instrument titled "Teaching Effectiveness Questionnaire" (TEQ) was administered to students to assess their teachers' teaching effectiveness in Science. On the other hand, the TEQ contained 35 items that measured teaching effectiveness in Science. These instruments were vetted and double-barrelled and ambiguous items were reframed, while additional items were

introduced to take care of the various dimensions of teaching effectiveness. The views of these experts were used to modify and review some of the items in the instrument. Reliability was conducted on the instruments and found reliable for the study with an approximate index of 0.070 and above

3.1. Hypothesis testing

It There is no significant influence of acquisition of Digital resources on Science teachers' effectiveness in secondary schools. The independent variable is acquisition of digital resources while the dependent variable is teaching effectiveness which had five sub-variables and the overall teaching effectiveness. Acquisition of Digital resources were classified into three groups based on the scores of teacher's acquisition of Digital resources. Teachers that scored above the mean were classified as high level acquisition of Digital resources, those that scored within the mean were classified as average level acquisition of Digital resources and those that score below the mean were classified as low level acquisition of Digital resources. Based on this classification, 160 teachers were classified as low in their acquisition of Digital resources, 27 teachers was classified as average in their acquisition of Digital resources and 188 teachers were classified as high in their acquisition of Digital resources.

The means and standard deviations of these categories for their teaching effectiveness indices were first computed and compared using the One-Way Analysis of Variance (ANOVA). Thus, the hypothesis was tested on each of the five sub-variables of knowledge of subject matter, ability to motivate students, communication skills, teaching method, and method of evaluation. The group size, mean and standard deviations are shown in Table 1, while the actual result of ANOVA is shown in Table 2. The result of the analysis presented in Table 11 on page 72 showed the summary of the descriptive statistics of the influence of acquisition of Digital resources on teacher's effectiveness. The result revealed that teachers' average perception in the acquisition of Digital resources had the highest mean teacher's effectiveness in terms of knowledge of subject matter (\bar{X})=19.37), followed by teachers who were low in the acquisition of Digital resources (\bar{X})=19.13) and lastly by teachers who were high in the acquisition of Digital resources (\bar{X})=18.77).

When teachers' effectiveness in terms of ability to motivate students was considered, teachers who were average in the acquisition of Digital resources had the highest mean teachers effectiveness in terms of ability to motivate students (\bar{X})=19.56), followed by teachers who were low in the acquisition of Digital resources (\bar{X})=19.44) and lastly by teachers who were high in the acquisition of Digital resources (\bar{X})=19.13). When teachers' effectiveness in terms of communication skills was considered, teachers who were average in the acquisition of Digital resources had the highest mean of teacher effectiveness in terms of communication skills (\bar{X})=19.37), followed by teachers who

were low in acquisition of Digital resources (\bar{X} = 19.14) and lastly by teachers who were high in the acquisition of Digital resources (\bar{X} = 18.78).

TABLE 1
Summary of the descriptive statistics of influence of acquisition of Digital resources

Teaching effectiveness	Influence of acquisition of Digital resources	N	Mean	SD
Knowledge of subject matter	Low	160	19.13	3.38
	Average	27	19.37	2.94
	High	188	18.77	3.14
	Total	375	18.96	3.23
Ability to motivate students	Low	160	19.44	3.07
	Average	27	19.56	3.36
	High	188	19.13	3.34
	Total	375	19.29	3.23
Communication skills	Low	160	19.14	3.40
	Average	27	19.37	2.94
	High	188	18.77	3.11
	Total	375	18.97	3.22
Teaching method	Low	160	19.14	3.41
	Average	27	19.37	2.94
	High	188	18.81	3.14
	Total	375	18.99	3.24
Method of evaluation	Low	160	19.12	3.38
	Average	27	19.37	2.94
	High	188	18.77	3.14
	Total	375	18.96	3.23
Overall teaching effectiveness	Low	160	96.71	16.78
	Average	27	97.33	12.12
	High	188	94.52	12.76
	Total	375	95.66	14.58

When teachers' effectiveness in terms of teaching method was considered, teachers who were average in the acquisition of Digital resources had the highest mean teachers' effectiveness (\bar{X} = 19.37), followed by teachers who were low in the acquisition of Digital resources (\bar{X} = 19.14) and lastly by teachers who high in the acquisition of Digital resources (\bar{X} = 18.81). When teachers' effectiveness in terms of method of evaluation was considered, teachers who were average in the acquisition of Digital resources had the highest mean teachers' effectiveness in terms of method of evaluation (\bar{X} = 19.37), followed by teachers who were low in the acquisition of Digital resources (\bar{X} = 19.12) and lastly by teachers who were high in the acquisition of Digital resources (\bar{X} = 18.77). When the overall teachers' effectiveness was considered, teachers who were average in the acquisition of Digital resources had the highest mean overall teachers effectiveness (\bar{X} = 97.33), followed by teachers who were low in the acquisition of Digital resources (\bar{X} = 96.71) and lastly by teachers who were high in the accessibility of Digital resources (\bar{X} = 94.52). To test this hypothesis a One-Way Analysis of Variance was used. The result of the analysis is presented in Table 12. The result of the analysis presented in Table 12 shows that there is no significant influence of acquisition of Digital resources on teachers effectiveness in terms of knowledge of subject matter ($F = .755$; $p > .05$); ability to motivate students ($F = .510$; $p > .05$); communication skills ($F = .753$; $p > .05$); teaching method ($F = .651$; $p > .05$); method of evaluation ($F = .757$; $p > .05$); and overall teacher effectiveness ($F = .1164$; $p > .05$). The null hypothesis was retained.

TABLE 2
Analysis of variance of influence of acquisition of Digital resources on teachers' effectiveness

Teaching effectiveness	Source of variation	Sum squares	of Df	Mean Square	f-value	Sig
KSM	Between Groups	15.783	2	7.891	.755	.471
	Within Groups	3885.981	372	10.446		
	Total	3901.764	374			
AMS	Between Groups	10.637	2	5.318	.510	.601
	Within Groups	3881.097	372	10.433		
	Total	3891.733	374			
CS	Between Groups	15.649	2	7.824	.753	.472
	Within Groups	3866.360	372	10.393		
	Total	3882.009	374			
TM	Between Groups	13.697	2	6.848	.651	.522
	Within Groups	3916.037	372	10.527		
	Total	3929.733	374			
MOE	Between Groups	15.817	2	7.909	.757	.470

	Within Groups	3887.372	372	10.450		
	Total	3903.189	374			
OTE	Between Groups	494.515	2	247.258	1.164	.314
	Within Groups	79054.109	372	212.511		
	Total	79548.624	374			

Significant at .05 level; critical $F = 3.17$; $df = 2,372$

Where: KSM= Knowledge of the subject matter, AMS= Ability to motivate students, CS= Communication skills, TM= Teaching methods, MOE= Method of evaluation and OTE= Overall teaching effectiveness. This is because the calculated F-ratios of .755, .510, .753, .651, .757 and 1.164 were found to be less than the critical F. ratio of 3.02 given .05 levels of significant and with 2 and 372 degrees of freedom. This finding implies that acquisition of Digital resources does not significantly influence teachers' effectiveness in terms of knowledge of subject matter, ability to motivate students, communication skills, teaching method, method of evaluation and overall teachers' effectiveness.

4. Discussion

Acquisition of Digital resources and Science teachers' effectiveness in secondary schools. The findings of this hypothesis showed that there is no significant influence of ICT-facilities acquisition on the teaching effectiveness of Science teachers in public secondary schools in Cross River State. Consequently, the null hypothesis was retained and the alternate rejected. Acquiring Digital resources by teachers may be due to the desire to own the facilities and most times teachers finds it difficult to acquire them due to lack of sufficient income and incentives. They may have to either rely on the school facilities, acquire the facilities they cannot put to use or may not even have the resources to acquire them at all. The result therefore shows a situation where mere acquisition of Digital resources cannot guarantee an influence on teaching effectiveness Science teachers.

Affirming the position of the fourth hypothesis result, Opeola (2013) noted that both teachers and students can acquire Digital resources for use, but that most teachers had no technical capacity to apply the needed skills and man- power in operating the electronics database for students, thus rendering them ineffective in using the facilities for pedagogical purposes. Additionally, the findings of this hypothesis collaborated Kuba and Osawaru (2011), who saw Digital resources acquisition as a variable that cannot works independent of other fundamental ICT- related fundamentals like inadequate searching skills, epileptic power supply, expensive hardware, hardware tools and generator maintenance cost as major constraints towards effective teaching and not

Digital resources acquisition which according to the author is more of economic than an academic challenge.

The result of the hypothesis confirmed the views of Dirisu, B. M. (2009), who jointly asserted that most teachers' knowledge of ICT usage is usually limited to e-mailing and word processing skills. They affirmed that most secondary school teachers lack the knowledge of search engine utilization, web-site design and development and names and addresses of useful databases which are to serve as links to critical information to the advantage of the teacher and applies to Science teachers as well. To them acquisition of Digital resources can most times be viewed as assets rather than a resource for educational advancement and classroom instructional material. Furthermore, These findings supported the views of Ramboll (2004), who asserted that in most cases, Digital resources are deployed to other areas like research and e-business instead of academic concerns or for the teaching and learning of Science in secondary schools. To the author, Digital resources acquisition by teachers has little or nothing to do with teacher effectiveness. The author added that Digital resources are often more accessible in urban schools than in rural schools and this situation has not change teachers' teaching effectiveness in Science for the better in the urban schools.

On the contrary, the findings of the study did not conform with the views of Akuegwu, Ntukidem and Ntukidem (2011), who believed that the in-ability of teachers to acquire Digital resources has the tendency of limiting their facilities application for pedagogical purposes and hampering on their teaching effectiveness. In the same vain, the findings do not agree with the views of Ashi and Ntukidem (2009), whose position on Digital resources acquisition and teacher effectiveness deviates from the result of this hypothesis especially as it affects the visually impaired. The authors believed that when such Digital resources like screen readers are used with computers by the visually impaired teachers, their level of effectiveness among others will always change. Again, the result of this hypothesis deviates from that of Emmanuel and Sife (2008), who in their study reported that Digital resources acquisition does not influence teacher effectiveness in a significant way. They noted that teachers need Digital resources, e.g. computers and general information literacy skills to effectively use and move with the rapidly changing and growing information resources. From the reviews under this hypothesis, the researcher wish to add that acquisition of Digital resources by Science teachers is necessary and justifiable as it makes the teachers disposed to modern tools with which they can use to enhance their teaching effectiveness if properly deployed. Teachers should be exposed to the operational skills and given the guide lines on how these facilities can be used in their various areas of specialization and teaching to avoid abuse and misapplication.

5. Conclusions

Based on the findings obtained it can be concluded as follows: Digital instructional resources acquisition have no significant influence on Mathematics teachers' effectiveness in secondary schools in Cross River State.

6. REcommendations

From the findings it is recommended that for the acquisition of digital instructional resources to be impactful, teachers need to be motivated with other incentives, allowances and grants by the both the school, government and foreign partners to enable them acquire these essential facilities (both hardware and software) and be given the needed technical training and exposure on their utilization. This when done would assist teachers in both private and public with the ultimate result being that teachers' effectiveness would be influenced positively.

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