Physics Teachers' Competencies In The Use Of Microsoft Excel In Private Secondary Schools In Port Harcourt City L.G.A. Of Rivers State

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Abstract
This study investigated Physics Teachers' Competencies in the use of Microsoft Excel in Private Secondary Schools. The study adopted a descriptive survey design. The population of the study was 90 physics teachers in 90 Government approved private secondary schools in Port Harcourt City Local Government Area of Rivers State. The Census sampling technique was used to draw 100% of the population as the sample for the study. The instrument used was a self-developed checklist and a questionnaire arranged on a 4-point Likert scale titled "Physics Teachers' Competencies in the use of some ICT Tools while the checklist covers the functionality of ICT facilities in the schools. Experts from Test and Measurement validated the instrument. The reliability of the instrument was determined using test-retest method with a reliability index of 0.87. Data were analyzed using the mean and percentage. The findings revealed that private secondary schools have ICT facilities that are being used by teachers and students but no standby generators in most schools. Also physics teachers are competent in the operation of computers but do not possess adequate competency in the use of MS Excel. The study recommends that, secondary school teachers should be exposed to more seminars, workshops and conferences on ICT competencies and be sponsored.

Keywords: Physics, Teachers, Competencies, Microsoft Excel.

Introduction
We are living in an information age when the level of development of a country and its citizenry depends to a great extent on the amount of information available to them. One of the aims of education in this 21st century is to keep students informed and acquainted with the trends of development. Olele and Abraham (2016) expressed that students of this age use different digital tools such as Smart phones, Tablet PCs, Personal digital assistants (PDAs), etc to communicate, assess information, and for entertainment purposes at any time anywhere. In that regard, technology ought to be utilized as a tool to help the educational objectives such as skills for searching and evaluating information, cooperation, communication and critical thinking which are vital for the readiness of students for the information society.

A 21st century teacher needs three kinds of knowledge to work successfully in the classroom and these kinds of learning were distinguished by the Educational Technology and Mobile Learning Team in Technological Pedagogical Content Knowledge (TPACK) structure as technological knowledge, pedagogical knowledge and content knowledge. This structure

takes a look at how this trio collaborates to increase students' motivation and make the content more accessible to them. TPACK is a system to comprehend and depict the types of information required by an instructor for fascinating educational practice in an innovation-improved learning condition. Teachers are noted to have content knowledge which is the knowledge of the subject matter and pedagogical knowledge which is the knowledge of the approaches to use for teaching, yet many do not have the technological knowledge that deals with the digital tools that they can use to make content available to students. This is because these teachers are digital immigrants who are attempting to be innovatively disposed of. On the other hand, the majority of the students who are digital natives have technological knowledge, but may not know how to utilize it for learning purposes. In this way, teachers require technological knowledge to enhance the students' content knowledge. Hence, TPACK is of the view that what teachers know about effective teaching, their subject matter and educational technology must be used together for them to be successful in their classrooms, supporting students' learning (Angeli & Valanides, 2013).

Harnessing the advantages of ICT in teaching relies upon teachers' understanding of when, how and where to utilize ICT, and what technology to use during teaching and learning. This has to do with ICT competency which is the acquisition of technological knowledge, aptitudes, and abilities at a level of expertise adequate to perform in a proper work setting. Hence, teachers' competency in the utilization of ICTs deals with the knowledge and abilities they require to incorporate ICTs in their teaching and which include knowledge of when, how and where to utilize ICTs in teaching and learning. Successful accomplishment of ICT targets in teaching and learning Physics depends to a great extent on the level to which Physics teachers can utilize ICT instruments. It is expected that each 21st century Physics teacher ought to have created abilities on ICT use in teaching and learning since teachers are the main key to how technological devices set in the classroom can be used, paying little attention to the quantity and the quality. Therefore, every 21st century professional teacher must be set to give technology-support learning opportunities to their students to help in their learning.

Reviews

Physics Teachers Competences in the use of Microsoft Excel

Competency is a term that is used both scientifically and in everyday language. It is a specialized system of abilities or individual characters that enable somebody to learn and accomplish something effectively. Cheryl (2015) defined competency as the quality possessed by competent people. It shows sufficiency of learning and abilities that empower somebody to act in a wide variety of job situations. Young (2002) linked competency and

competence to performance and identifies competency as a personal characteristic and how the individual behaves while competence is the required job activities or tasks.

A lot of scientific attention has been given to the ideas "key competence" and "meta competence" over the years. Key competencies are those abilities that can be utilized for accomplishing better performance over a wide range of situations. They include language skills, media abilities, scientific skills and capabilities, et cetera. While Meta competencies deals with the knowledge about the accessibility and utilization of one's own competencies to upgrade learning and problem solving behaviour. They likewise refer to knowledge and motivational attributions that enable intellectual abilities to be utilized most skilfully across various tasks, in various content areas, and for different purposes.

Kiymet (2010) saw teachers' competency as the knowledge and abilities expected of a teacher to teach in the school. These competencies include high levels of knowledge, values, aptitudes and individual dispositions, sensitiveness and capabilities and the capacity to appropriately put the combination into practice. A teacher's competency consequently involves both the ability to know and to put into correct use what is known. Successful accomplishment of ICT objectives in teaching and learning physics in this 21st century depend to a great extent on the degree to which physics teachers can utilize ICT tools like MS Excel.

The spreadsheet software is mostly used in physics classrooms for performing calculations using formulas thus; it is a document that stores information in a grid of horizontal rows and vertical columns. It is software that is becoming more pronounced in the field of education for effective teaching and learning, especially the science subjects. This spreadsheet software may be designed in a way to teach the students effectively and to make teaching methods more efficient especially in today's physics classroom (Fratesi & Vacher, 2012).

Mattetessich (2015) commented that Electronic spreadsheet programs were developed as business tools for bookkeeping and predicting, but they now have a usefulness that extends far beyond their original purpose. Therefore, integrating MS Excel into teaching and learning of physics will bring about active learning, improvement of collaborative learning, encouragement of greater student independence and task-based teaching. Therefore, teachers need to understand the affordances of every software package to use appropriate technological processes and resources (Francom, 2014). Just like every other study and concept, there are theories directing this study.

Theoretical Review

Two theories guided this study. These are Constructivism Learning theory and Engagement theory by Greg Kearley and Ben Schneiderman (1999). Constructivist learning theory propounded by Vygotsky (1980) stated that acquisition and participation were synergistic methodologies in learning situations. Constructivism learning theory is by Learner- Centered Education and forms the basis of what happens in a technological classroom. This theory supports this study because MS Excel enables students to construct their knowledge through interaction with the teacher, fellow students and their external environment. Engagement theory explains that Physics students are engaged when using MS Excel for learning. The fundamental idea underlying the theory is that learners must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. The theory is built on the premise that technology can facilitate the engagement of students in various ways that are difficult to achieve otherwise.

Statement of the Problem

Most 20th century teachers were trained with the traditional method of teaching which is regarded as "chalk-talk" method. This method looks so abstract, difficult and boring to a 21st century learner who is a digital native. The emphasis in 21st century education is on technology integration into teaching and learning, which the traditional teachers are not familiar with. This makes teachers at every level to be faced with the challenge of this ICT integration in their lessons. In the light of these, teachers are expected to acquire digital skills and work towards higher competencies in the use of ICT tools for teaching and learning. Hence, the problem of this study posed as a question is; what are the Physics teachers' competencies in the use of MS Excel?

Aim and Objectives of the Study

The aim of the study investigated physics teachers' competencies in the use of Microsoft excel in private secondary schools in Port Harcourt City L. G. A. of Rivers State. The objectives sought to:

1. ascertain if the ICT facilities in private schools are functional
2. find out the difference in the competencies of Physics teachers' in operation of computer based on gender; and
3. determine the difference in the competencies of Physics teachers' in the use of Microsoft (MS) Excel based on gender.

Research Questions

The following research questions guided the study;

1. To what extent are the ICT facilities in private schools functional?
2. find out the difference in the competencies of Physics teachers' in operation of computer based on gender; and
3. determine the difference in the competencies of Physics teachers' in the use of Microsoft (MS) Excel based on gender

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. There is no significant difference in the competencies of Physics teachers' in operation of computer based on gender
2. There is no significant difference in the competencies of Physics teachers' in the use of Microsoft (MS) Excel based on gender

Methodology

The study adopted a descriptive survey design. The population of the study was 90 physics teachers in 90 Government approved private secondary schools in Port Harcourt City Local Government Area of Rivers State. Census sampling technique was used to draw 90 teachers which represented 100% of the population as the sample for the study. The instrument used was a self-developed checklist and a questionnaire arranged on a 4-point Likert scale titled "Physics Teachers' Competencies in the use of some ICT Tools (PTCICTT) while the checklist covers the functionality of ICT facilities in the schools. The instrument was validated by experts from the Department of Measurement and Evaluation, Faculty of Education at the University of Port Harcourt.

The reliability of the instrument was determined using test-retest method with ten (10) physics teachers who are not part of the study. The two test results were correlated using Pearson Product Moment Correlation to obtain a reliability coefficient of 0.87. Data were analyzed using mean for research questions 2 and 3 and percentage for research question 1 with a percentage. A criterion mean of 2.50 was used to test the hypothesis at 0.05 level of significance.

Results

Research Question 1: To what extent are the ICT facilities in schools functional?

Table 1: Percentage Functionality of ICT facilities

S/N	ITEMS	FUNCTIONAL	NOT FUNCTIONAL
1. v.	The ICT facilities in my school are all in good condition	15(14.17%)	11(10.83%
2.	There is a good standby generator in my school	20 (20.83%)	4 (4.17%)
3.	ICT facilities in my school are connected to the internet	11 (10.83%)	15 (14.17%)
4. vi.	The ICT facilities are used by teachers and students in the classroom for teaching and learning	19 (20%)	5 (5%)
Total		65 (65.83%)	35 (34.17%)

Table 1 shows that 65.83 percent of the respondents agreed on the functionality of the ICT facilities and 34.17 percent said they are not functional. The percentage functionality of ICT facilities is said to be satisfactorily functional (65.83%). Evidently, more of the respondents agreed that the ICT facilities available in their schools are functional

Research Question 2: To what extent does gender influence the Physics teachers' competency in operation of computer?

Table 2: Mean and Standard Deviation on Operation of the computer

S/N	ITEMS	n	x	SD	REMARK
1.	I have the ability to turn on the computer	90	2.94	0.15	Significant
2.	I can Use Microsoft word to type documents	90	2.76	0.09	Significant
3.	I have the ability to organize and manage computer files.	90	2.51	0.01	Significant
4.	I can use storage devices (USB, flash Memory, etc) for storing and sharing files	90	2.71	0.07	Significant
5.	I can use the computer tool bar	90	2.73	0.08	Significant
6.	I have the ability to save document on the Computer	90	2.81	0.11	Significant
7.	I have the ability to retrieve save document in a file	90	2.77	0.09	Significant
8.	I have the ability to create a folder	90	2.62	0.04	Significant
9.	I can save files in a folder	90	2.64	0.05	Significant
10.	I have the ability to create a hyperlink in a text	90	1.91	0.2	Not Significant
11	I can insert pictures to my document	90	2.51	0.01	Significant
Average			**2.63**	**0.08**	

Table 2 shows that the mean scores of Physics teachers on the operation of computer were 2.63, SD=0.08. The range of participants' mean scores was between 2.94, SD=0.15, and 1.91, SD= 0.2. Physics teachers are competent in the operation of computer as almost all the items

scored above the mean score of 2.90 while only item 16 (I have the ability to create a hyperlink in a text) scored below the mean score of 2.90. This indicates that Physics teachers cannot create a hyperlink in a text but are competent in other aspect of computer operation.

Research Question 3: To what extent does gender influence the Physics teachers' competency in the use of MS Excel?

Table 3: Mean and Standard Deviation on the use of MS Excel.

S/N	ITEMS	n	x	SD	REMARKS
12	I have the ability to click the cursor into cells	90	2.74	0.08	Significant
13	I can type letters and numbers into cells	90	2.72	0.07	Significant
14	I can sum up the rows and column number in an Excel worksheet	90	2.56	0.02	Significant
15	I have the ability to Create a chart type for A graphical representation of data	90	2.11	0.13	Not Significant
16	I have the ability to add labels on a graph	90	1.91	0.2	Not Significant
17	I can perform logical operations like 'IF' 'AND', 'NAND', etc.	90	2.08	0.14	Not Significant
18	I can Evaluate formulas using BEDMAS (Bracket, Exponent, Division, Multiplication, Addition and Subtraction) operation.	90	1.50	0.25	Not Significant
19	I can Use Visual Basic macros to create basic data structure such as queue	90	1.42	0.35	Not Significant
Average			**2.16**	**0.16**	

Table 3 shows that the mean scores of Physics teachers on the use of MS Excel were 2.16, SD=0.16. The range of participants' mean scores was between 2.74, SD=0.08, and 1.42, SD= 0.35. The result shows that Physics teachers are competent in items 12, 13 and 14 which has mean score rating 2.74, 2.72 and 2.56 respectively above the criterion mean (2.90). While they show incompetency in items 15, 16, 17, 18 and 19 with mean scores of 2.11, 1.91, 2.08, 1.50 and 1.42 respectively which is below the criterion mean of 2.90.

Hypothesis 1: There is no significant difference between the mean scores of male and female Physics teachers on the operation of computer.

Table 4: Summary of Paired sample test on Physics teachers' competencies in the operation of computer with respect to gender.

		Mean (x)	N	Std. Deviation	Std. Error Mean
Pair 1	Male	42.64	50	8.512	2.566
	Female	14.45	40	6.729	2.029

Paired Sample Test

	Paired Differences 95% Confidence Interval of the Difference						
	Mean	Std Deviation	Error Mean	Lower	Upper	t	df
Pair 1 Male- Female	28.182	8.268	2.493	22.627	33.736	11.305	88

The mean difference is significant at the 0.05 level.

From the result in tables 4 is evident that the mean scores of male and female physics teachers on the operation of computer differ significantly. Evidently, the mean scores of male physics teachers were 42.64 while female physics teachers had a mean score of 14.45 and the overall mean score was 28.182. To confirm this, we see that the t-test result indicates that the t-value was 11.305 at five percent level of significance while the 2-tailed probability value was P<.001 which is less than the test significant level (i.e $p<0.05$). With this we reject the null hypothesis that there is no significant difference between the mean scores of male and female physics teachers on the operation of computer. Hence, the conclusion that there is a significant difference between the mean scores of male and female physics teachers on the operation of computer.

Hypothesis 2: There is no significant difference between the mean scores of male and female Physics teachers on the use of MS Excel.

Table 5: Summary of Paired sample test on Physics teachers' competencies in the use of MS Excel with respect to gender.

Paired Sample Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Male	48.38	50	2.615	0.92
	Female	15.62	40	4.689	1.658

Paired Sample Text

Paired Differences		95% Confidence Interval of the Difference						
		Mean	Std. Deviation	Std. Error	Lower	Upper	t	df
Pair 1	Male-Female	32.900	5.148	1.820	28.446	37.054	17.994	88

The mean difference is significant at the 0.05 level

From the result in tables 5 is evident that the mean scores of male and female physics teachers on the use of MS Excel differ significantly. Evidently, the mean score of female physics teachers was 15.62 while male physics teachers had a mean score of 48.38 and the overall mean score was 32.900. To confirm this, we see that the t-test result indicates that the t-value was 17.994 at five percent level of significance while the 2-tailed probability value was P<.001 which is less than the test significant level (i.e P< 0.05). With this result, we reject the null hypothesis that there is no significant difference between the mean scores of male and female physics teachers on the use of MS Excel. Hence, we conclude that there is a significant difference between the mean scores of male and female physics teachers on the use of MS Excel.

Discussion of Findings

The results from table 1 reveals that ICT facilities in private secondary schools are in good condition while both students and teachers use them for teaching and learning, but no standby generators in place. The findings also indicated that most of the ICT facilities in the schools have no internet connectivity. This is consistent with Ukpebor and Emwanta, (2012) in their study on availability and use of computer and internet by secondary schools in Benin City. The study shows that many private schools can boast of computer laboratories, but only few

can pride themselves on internet access. They identified that the level of internet access in schools is poor despite the schools having computer laboratories. Therefore, Internet availability should be considered as one of the most important scientific tools in secondary schools.

The findings in table 2 shows that physics teachers are competent in the operation of computer. This implies that physics teachers' competencies in the use of ICT tools especially operation of computers is high. The findings indicate that physics teachers are not competent in creating hyperlinks in a text so that students can be connected to the words, phrases, and websites similar to that of a hyperlinked word. The study agrees with Lamanauskas and Vilkonis, (2007) who stated that the use of internet in teaching physics is low as a result of lack of functional websites and computers. Therefore, secondary schools should make effort to connect their ICT facilities to internet to enable both the teachers and students assess information outside their environment using hyperlinks.

Table 3 indicates that physics teachers are not competent in the creation of charts, adding labels on graphs, performing logical operations and evaluating formulas using Bracket, Exponent, Division, Multiplication, Addition and Subtraction (BEDMAS) operation. This means that the competence level of physics teachers in the use of MS Excel is very low. This did not concur with UNESCO, (2008) ICT teacher competence framework which states that teachers must know when, where and how to use different ICT tools for classroom activities and presentations. Baker and Sugden, (2007) corroborated that most teachers and students are not using spreadsheet for teaching and learning despite its rising popularity in education hence, the need to train teachers on how to use this application software for teaching and learning.

The findings from table 4 reveals that the male physics teachers have higher mean of competence than female physics teachers in computer operation. When this is subjected to statistical test, a significant difference was observed. This implies that male and female physics teachers show different levels of competence in the operation of computer. The findings agree with Jean and Johan (2008) in their study on gender awareness on ICT with focus on education. The findings reported that male teachers responded more than female teachers which shows that female teachers may not have had either the prerequisite ICT skills.

Findings of the study in table 5, reveals that male physics teachers have a higher mean of competence than female physics teachers in the use of MS Excel. Hence, a significant difference was observed when subjected to statistical test. This implies that the male physics

teachers made significant use of MS Excel while female physics teachers do not make significant use of MS Excel. This finding is consistent with Jean and Johan, (2008) in their study on gender awareness in ICT with focus on education. The findings reported that male teachers responded more than female teachers which show that female teachers may not have had either the prerequisite ICT skills. Possibly, if Government and schools should organise an in-service training on the use of some ICT tools like MS Excel software especially for the female teachers, it will give them the opportunity to acquire the prerequisite skills they need to function effectively in this 21st century classroom.

Conclusion

The findings of this study showed that physics teachers are competent in the operation of computer but fairly competent in the use of MS Excel. Also, the findings indicated that there is a significant difference between male and female physics teachers in their competency levels on operation of computer and use of MS Excel as the mean scores rating by gender (male and female) shows that male teachers have higher mean score than their female counterpart. The findings support the need for in- service training for Physics teachers especially the female ones to enable them utilize the ICT facilities available in their schools for teaching and learning in order to enhance academic performance of Physics students.

Recommendations

Considering the findings of this study, the following recommendations are made:

1. Secondary School Physics teachers should be exposed to more seminars, workshops and conferences on ICT Competencies and be sponsored.
2. ICT qualification should be introduced in line with other educational qualifications as criteria for teachers' recruitment.
3. ICT competency should be made one of the compulsory requirements for teachers' promotion.

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