



(RESEARCH ARTICLE)



Impact of teacher competency in ICT on students' learning interest and achievement in science in public senior secondary schools of the FCT, Abuja

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Abstract

The study examined the impact of teacher competency in ICT on students' learning interest and achievement in science in public senior secondary schools of the FCT, Abuja. The population for the study comprised of 17,729 SS2 science students in public senior secondary schools in the FCT, Abuja. A sample of 380 students were selected using Krejcie and Morgan table for selecting sample size. Data was collected using a self-developed questionnaires tagged Questionnaire on Impact of Teacher Competency in Use of ICT on Learning Interest and Academic Achievement (QOITECOLAC). In addition, Physics Achievement Test and Chemistry Achievement Test were developed for the study for the purpose assessing students' academic achievement. To ensure validity of the instrument used, they were given to experts in educational research and measurement and evaluation for face and content validity. The experts subjected them to critical appraisal. Scores from the appraisal of experts were used to obtain consensus logical validity indices of 0.80, 0.72 and 0.76. The instruments were pilot tested on 30 students; the respondents were part of the population but not part of the sample for this study. Even though the instruments were standardized, they were still subjected to reliability in order to ascertain their degree of consistency. The data obtained from the pilot test was used to compute the internal consistency of the instrument using Cronbach's Alpha reliability method. The analyses of the responses yielded reliability indices of 0.75, 0.78 and 0.74. Mean and standard deviation was used to answer the research questions developed for the study while t-test statistics was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that: there is a significant impact of teacher competency in ICT on students' learning interest in public senior secondary school of the FCT, Abuja and there is a significant impact of teacher competency in ICT on students' academic achievement in public senior secondary school of the FCT, Abuja. Based on the findings, recommendations were made which among others include: conducting workshops and seminars in schools in order to train teachers in the use of ICT facilities to enhance students learning interest and supplying senior secondary schools with ICT facilities that can enhance students' achievement in Public Senior Secondary Schools.

Keywords: Teacher competency; ICT; Achievement; Learning interest

1. Introduction

Education improves the development of any society and the youths who occupy significant positions in that country should be properly educated in order to improve their society. Education, in the present day context, is possibly the only most significant means for individuals to develop his potentials and personal endowments, build capability levels, overcome constraints and, in the process, enlarge their available set of opportunities and choices for a sustained improvement and well-being (Agbede and Haruna, 2024). It is not only a way to enhance human capital and efficiency but it is equally vital for enabling the process of acquisition, assimilation and communication of information and knowledge, all of which augments a person's quality of life. Thus, it is a serious invasive instrument for bringing about social, economic and political inclusion and a durable integration of people. It therefore plays a crucial role in shaping

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the citizens of tomorrow, citizens who are responsible, accountable, honest, healthy, emotionally strong and irrepressible. Over the years there have been reports of low achievement in secondary school students as shown by poor performances in WAEC results which have been confirmed by the standard measurement of academic achievement. Despite the claimed huge government investments towards enhancing the quality of education in the Federal Capital Territory, students' academic achievement has continued to decline at an alarming rate. According to WAEC report (2024), students' failures in Mathematics and English Language including physics and chemistry was 51.39%, 57.84% and 55.71%. respectively in Nov/Dec Senior School Certificate Examination. This trend in achievement is worrisome due to the fact that science subjects such as Physics, Chemistry and Biology are required to be combined with compulsory subjects such as English Language and Mathematics for science students to be offered for admission into the universities in Nigeria. The results show a low trend in achievement. and failure to make up those subjects effectively shuts candidates out of university admissions. This situation has unpleasant implications for the youths and the future of the country. These results have shown a steady drop in achievement and this trend has continued despite efforts by educationists and all concerned to effect change. Coupled with this decline in achievement of learners in science subjects is a downward trend in students' learning interest.

Agbede (2016) defined students' learning interest as the assessment of a learners' level of like or dislike for a subject. Learning interest is a tendency and high enthusiasm or a great desire for something in the learning process. Learning Interest can give strength and guidance in the learning process, so it is one of the important factors in achieving learning success. Hence, learners' interest in science subjects such as physics and chemistry refers to the assessment of their level of like or dislike for the subjects. Hence, despite concerted efforts on the part of the government in improving the teaching and learning of science subjects, students' learning interest and achievement has not attained the desired trend and development has raised concerns among stakeholders within the education system. With the development of Information and Communication Technology (ICT), many studies tried to emphasize and demonstrate the beneficial roles of ICT in enhancing students' learning and academic achievement (Chiao & Chiu, 2018). Educationists have therefore suggested that the use of ICT goes a long way in determining the learning outcomes of the school system in terms of academic achievement. Megha (2024) defined ICT as the technology that supports activities involving information. Such activities include gathering, processing, storing and presenting data. Increasingly these activities also involve collaboration and communication. ICT is also used to refer to the convergence of audiovisuals and telephone networks with computer networks through a single cabling or link system. There are large economic incentives to merge the telephone networks with the computer network system using a single unified system of cabling, signal distribution, and management. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliances with them such as video conferencing and distance learning. ICT also includes analog technology, such as paper communication, and any mode that transmits communication (Ozdamli and Ozdal, 2015). In order to effectively use ICT to facilitate students learning and achievement in science, teacher competency in the use of ICT facilities is however crucial.

Teachers' competence in use of ICT refers to the overall ability and authority of teachers in employing their knowledge of E-learning facilities for the purpose of improving students learning. It refers to the essential knowledge, skills, and abilities that educators must possess in the use of ICT facilities in order to effectively navigate various professional and personal situations. This competence is crucial for teachers' success in educational settings and impacts their values, behaviors, communication, aims, and practices in schools (Selvi, 2010).

Megha (2024) defined ICT as the technology that supports activities involving information. Such activities include gathering, processing, storing and presenting data. Increasingly these activities also involve collaboration and communication. ICT is also used to refer to the convergence of audiovisuals and telephone networks with computer networks through a single cabling or link system. There are large economic incentives to merge the telephone networks with the computer network system using a single unified system of cabling, signal distribution, and management. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliances with them such as video conferencing and distance learning. ICT also includes analog technology, such as paper communication, and any mode that transmits communication (Ozdamli and Ozdal, 2015).

1.1. Research Questions

The following research questions guided the study:

- What is the impact of teacher competency in ICT on students learning interest in public senior secondary school of the FCT, Abuja?

- What is the impact of teacher competency in ICT on students' academic achievement in public senior secondary school of the FCT, Abuja?

1.2. Research Hypotheses

The following null hypotheses guided this study and will be tested at 0.05 level of significance:

- There is no significant impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja.
- There is no significant impact of teacher competency in ICT on students' achievement public senior secondary students' achievement in science in public senior secondary school of the FCT, Abuja.

2. Review of Literature

Onyeka et al (2024) examined the impact of Information and Communication Technology (ICT) on students' academic achievement of science in senior secondary schools in Awka South local government area of Anambra State. Two research questions were raised and answered to achieve the purpose of this study. A descriptive survey research design was used to carry out this study. The population for this study consisted of all the 116 science teachers in 19 public senior secondary schools in Awka South local government of Anambra. The total population sampling method was used for the study which gave a sample size of 116 science teachers. The instrument used for collection of data is a structured questionnaire developed by the researchers. The questionnaire contained thirteen (13) item questions. The instrument was validated by three (3) lecturers from the Department of Science Education, Nnamdi Azikiwe University, Awka. To determine the internal consistency of the instrument, Cronbach alpha method was used and a reliability coefficient of 0.89 was obtained. The researchers with the aid of 5 research assistants went to the sample public senior secondary schools and administered the questionnaire to the respondents on the spot. Data collected were analyzed using mean. Results revealed that ICT has a positive impact on the academic achievement of students in science. The result of the study also revealed that information and communication technology equipment are not readily available or complete in schools. It was recommended among others that government should provide funding and adequate ICT equipment for schools to use in order to aid learning.

Obodo, Ani Mercy & Okolo (2021) investigated the effect of digital technology innovational approach in enhancing students' interest and achievements in basic science among secondary school students in Ebonyi State. Two research questions were raised to achieve the objectives of the study. A quasi-experimental design of the non-equivalent control group was used for the study. The population of the study comprised of 6211 JSS students. 121 students comprised of 59 experimental students and 62 control group students participated in the study. Data were generated through the Basic Science concept test (BSCT) and Basic Science and Technology interest scale (BSTIS). the instruments were subjected to face and content validation. The reliability coefficient of the BSCT was found to be 0.75 using kuder Richardson estimate while 0,85 was obtained for BSTIS using Cronbach Alpha technique. These showed that the instruments were reliable. The data obtained were analyzed using Mean and Standard deviation to answer the research questions raised while analysis of covariance (ANCOVA) was used to test the formulated hypotheses at $p < 0.05$ level of significance. The findings of the study revealed that the experimental group achieved higher than the control group. Further findings also showed that the experimental group had higher interest than the control group. Based on the findings of the study some recommendations were made.

3. Method

Descriptive survey research design was used in this study. The population of the study comprises 17,729 SS2 science students in public senior secondary schools in the FCT, Abuja. A Sample size of 380 SS2 students were selected for the study through Research Advisors Table (2006). The instruments used for the study was Questionnaire on Impact of Teacher Competency in Use of ICT on Learning Interest and Academic Achievement (QOITECOLAC). In addition, Physics Achievement Test and Chemistry Achievement Test were developed for the study for the purpose assessing students' academic achievement. To ensure validity of the instruments used, they were given to experts in educational research and Measurement and Evaluation for face and content validity. The experts subjected them to critical appraisal. Scores from the appraisal of experts were used to obtain consensus logical validity indices of 0.80, 0.77 and 0.72 respectively. The instruments were pilot tested on 30 students; the respondents were part of the population but not part of the sample for this study. Even though the instruments were standardized, they were still subjected to reliability in order to ascertain their degree of consistency. The data obtained from the pilot test was used to compute the internal consistency of the instrument using Cronbach's Alpha reliability method. The analyses of the responses yielded

reliability indices of 0.75, 0.78 and 0.74. Mean and standard deviation was used to answer the research questions developed for the study while t-test statistics was used to test the hypotheses at 0.05 level of significance

4. Results

4.1. Research Questions 1: What is the impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja?

Table 1 Mean and Standard Showing Impact of Teacher competency in ICT on Students Learning Interest in Science in Public Senior Secondary School of the FCT, Abuja

S/N	Items	SA	A	D	SD	Mean	Std. Dev	Remarks
1	The use of projectors during science lessons encourages me to participate during classroom instruction	114	88	89	89	2.60	1.15	Agreed
2	I feel excited each time video clips are shown to us during science lessons	63	203	88	26	2.80	0.80	Agreed
3	my mates and I are allowed to use our smart phones to respond to questions during science lessons and this helps us to pay more attention	75	206	74	25	2.87	0.80	Agreed
4	The use of computers and laptops is responsible for why my friends and I love attending science lessons	207	49	62	62	3.06	1.17	Agreed
5	The exposure of my class mates and I to online laboratory experiments has enhanced our interest in learning science subjects	100	89	103	88	2.53	1.14	Agreed
	Average Mean/Standard Deviations					2.77	1.01	

Table 1 shows the impact teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja. Results based on the table indicate that based on items 1 to 5, the average mean was given as 2.77. This value is higher than the mean value of 2.50 for a four-point likert scaled instrument. Hence, teacher competency in ICT has a high impact on students' learning interest in science in public senior secondary school of the FCT, Abuja

4.2. Research Questions :2 What is the impact of teacher competency in ICT on students' achievement in science in public senior secondary school of the FCT, Abuja?

Table 2 Mean and Standard Showing Impact of Teacher competency in ICT on Students Achievement in Science in Public Senior Secondary School of the FCT, Abuja

S/N	Items	SA	A	D	SD	Mean	Std. Dev	Remarks
6	The use projectors during science lessons enhanced my grades in science subjects	100	89	74	25	2.87	0.80	
7	The use of video clips is shown to us during science lessons has helped my mates and I in learning science better	75	206	88	26	2.80	0.80	
8	The use of smart phones in responding to questions during science lessons has helped in improving my scores.	202	49	62	62	3.06	0.80	
9	The use of computers and laptops during science lessons is responsible for why I learn better during science lessons.	207	49	62	62	3.06	1.17	

10	The exposure of my class mates and I to online laboratory experiments has motivated us to perform better in tests and examinations	100	89	103	88	2.53	1.14	
Average Mean/Standard Deviations						2.86	0.94	

Table 2 shows the impact teacher competency in ICT on students' achievement in science in public senior secondary school of the FCT, Abuja. Results based on the table indicate that based on items 6 to 10, the average mean was given as 2.86. This value is higher than the mean value of 2.50 for a four-point likert-scaled instrument. Hence, teacher competency in ICT has a high impact on students' achievement in science in public senior secondary school of the FCT, Abuja.

4.3. Test of Hypotheses

4.4. Hypothesis 1: There is no significant impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja

Table 3 T-test Statistics showing the impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja

Variables	N	Mean	Std Dev	t-cal	p-value	Decision	Conclusion
Teacher competency	380	2.77	1.01	25.00	0.024	Reject H ₀₁	Significant
Students Learning Interest	380	60.24	7.76				

Table 3 indicates the impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja. It is observed from the table that when the calculated value of t was given as 25.00 was, the p-value of 0.024 was found to be less than 0.05. The hypothesis 1 is therefore rejected. Hence, the result reveals that there is a significant impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja.

Hypothesis 2: There is no significant impact of teacher competency in ICT on students' academic achievement in science in public senior secondary school of the FCT, Abuja.

Table 4 T-test Statistics showing the Impact of teacher competency in ICT on Students' Academic Achievement in Science in Public senior secondary school of the FCT, Abuja

Variables	N	Mean	Std Dev	t-cal	p-value	Decision	Conclusion
Teacher competency	380	2.81	1.01	14.22	0.020	Reject H ₀₁	Significant
Academic Achievement	380	60.24	7.76				

Table 4 indicates the impact of teacher competency in ICT on students' academic achievement in science in public senior secondary school of the FCT, Abuja. It is observed from the table that when the calculated value of t was given as 14.22 was, the p-value of 0.020 was found to be less than 0.05. The hypothesis 1 is therefore rejected. Hence, the result reveals that there is a significant impact of teacher competency on academic achievement in science in public senior secondary school of the FCT, Abuja.

5. Discussion

Findings from the study on hypothesis one reveal there is a significant impact of teacher competency in ICT on students' learning interest in science in public senior secondary school of the FCT, Abuja. This findings is in agreement with the findings from the study of Onyeka et al (2024) which indicated there is a significant impact of Information and Communication Technology (ICT) on students' academic achievement of science in senior secondary schools in Awka South local government area of Anambra State. Thus, teacher competency in the use ICT exerts high impact on students' learning interest in science in public senior secondary schools

Findings from the study on hypothesis two reveal there is a significant impact of teacher competency in ICT on students' achievement in public senior secondary school of the FCT, Abuja. This findings is in agreement with the findings from the study of Obodo, Ani mercy & Okolo (2021) which indicated there is significant effect of digital technology innovational approach in enhancing students' interest and achievements in basic science among secondary school students in Ebonyi State ..This entails that employing digital technology in the course of instructional delivery helps in improving students' learning interest and achievement.

6. Conclusions

Based on the findings of this study, the following conclusions were made:

- There is a significant impact of teacher competency in ICT on students' learning interest in science public senior secondary school of the FCT, Abuja.
- There is no significant impact of teacher competency in ICT on students' achievement in science in public senior secondary school of the FCT, Abuja.

Recommendations

Based on the findings of the study and conclusion, the following recommended were made:

- Science teachers should employ the judicious use of ICT facilities in order to facilitate students' learning interest in science subjects.
- Periodic trainings and seminars should be organized by the Federal Ministry of Education for science teachers in order to enhance their competency in the use of ICT Facilities in order to enhance students' academic Achievement.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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