Journal

of

Educational Review

TEACHERS' USE OF ICT RESOURCES FOR INSTRUCTIONS IN HIGHER EDUCATION AND STUDENTS' PERFORMANCE IN CHEMISTRY

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The use of information and communication technology (ICT) has increased significantly over the years. There is a paucity of research in Nigeria which explores the extent which the use of ICT predicts students' academic performance hence, the purpose of this paper was to investigate into how teachers' use of ICT resources for instruction predicts students' performance in chemistry. The subject of this study was made up of 40 teachers and 120 students drawn from the population of 86 teachers and 1,562 chemistry education students in Nigerian south south universities. The research outcome typified that teachers' use of ICT resources did not significantly predict the students' performance in chemistry. Besides, the extent to which teachers' used ICT resources was significantly high, while students' performance in chemistry was not significantly high. Therefore, it was strongly recommended that teachers should make good use of ICT resources within their reach for instructions.

Keywords: Teachers, ICT Resources, Instructions, Students' Performance.

INTRODUCTION

The advent of information technology (ICT) has radically changed the educational sector as evidenced in modern devices and laboratory equipment which engender meaningful teaching and learning. Emphasis has shifted from the traditional "talk-chalk" method of teaching to the use of modern ICT as tools in the production of knowledge. In recent years, educational reforms such as Education for All (EFA) the Road Map (RM) Millennium Development Goal (MDG), among others, have enhanced awareness on the use of ICT in different part of the world.

New techniques and innovations have been introduced to bring about profound learning. Despite all these, students' failure in public examinations like those conducted by such external bodies like the National Examination Council (NECO), West African Examination Council (WAEC) and National Business and Technical Examination Board (NABTEB) is still on the high side. Ivowi (2008) reported that students fail to perform well in Senior Secondary School Examination (SSCE) partly due to defective delivery of curriculum content.

Essentially, teaching is about educating and empowering the leaners with knowledge and skills. This can be achieved through a systematic and effective utilization of instructional resources. Instructional resources is defined by Betiku (2000) as all available and accessible theoretical, practical and skill oriented resources and devices that assist teachers in transmitting facts, skills, attitude and knowledge to the learners. For student to perform well, chemistry should be taught using appropriate instructional materials (Nnaobi, 2005).

Invariably, this calls for the use of new technological tools such as ICT resources like the computer, internet, video projector, television and multimedia to increase interest in learning, enhance acquisition and longer retention of facts for better performance. This is because these resources have the potential of arresting the students' attention thereby making learning experience more permanent thereby

improving students' performances (Eze, 2005). Abonyi (2006) opined that while encouraging participation in indigenous resources, new technologies should be utilized as essential resources in the teaching/learning of science.

A recent research by Ekpo and Ekukinam (2006) on the exposure and utilization of ICT resourcs by Akwa Ibom Secondary School Teachers revealed an existing gap in knowledge and utilization of ICT. The negative influence such gap has on teaching and learning various subjects was widely articulated. Such gap was repeated among secondary school administrators in Akwa Ibom State in their level of awareness and utilization of electronic human resources information system (e-HRIS) appraised (Etudor-Eyo, Etuk, & Azunwena (2009). The gap was so conspicuous among the male administrators than their female counterparts. This low level of awareness and utilization of ICT resource by the school administrators explains why most teachers, especially the old ones may not be able to use ICT resources in teaching students.

On the contrary, a positive relationship has been established between the use of ICT infrastructure in education and higher achievement test scores among secondary school students in India, Kenya, Canada and other countries of the world (Thiessen 2005, & Lee 2009). The higher achievement was attributed to the fact that teachers were employed based on merit; and they were able to use their ingenuity in teaching the students via ICT infrastructure.

An effective teacher is hard working, intelligent and highly innovative and qualitative (Rhee 1997). This explains why the Federal Government of Nigeria (2010) urged Teachers Institutes (the National Colleges of Education, Polytechniques, Universities) to review teachers' preparation programmes in the context of knowledge of subject matter, teaching skills and competence. Such reviewed preparation programme is said to improve teaching effectiveness which would also improve students' academic performance (Etuk, Etudor, Nwaoku & Etuk, 2006).

Teachers are critical and play crucial roles in influencing student learning outcome; therefore, effective implementation of curriculum depends to a large extent on the teachers' creativity, skills and competency in appropriately selecting and effectively utilizing resources to bring about meaningful learning (Udofia 2010). However, despite the importance of ICT resources in advancing knowledge and skills; a resource to be utilized for knowledge expansion and problem solving towards achieving the objectives of instruction, some teachers, especially the new graduates, rarely use it, probably due to the type of training they received. As reported by Ekpo (2008) the curriculum does not adequately equip student teacher with skills of communication, problem solving computer application and self evaluation.

STATEMENT OF THE PROBLEM

The abstract nature of chemistry concepts makes it very challenging for teachers to teach and students to learn meaningfully without the use of technology that can appeal to multiple senses. Busari (2003) and Nwosu (2003) agreed that most teachers in Nigeria do not have ICT support and majority rarely apply ICT in instructional process. Consequently, this has led to poor students' performance as rightly observed by Ivowi (2008) that the actual content delivery is fraught with problems of poor facilities, lack of ICT skills, poor preparation and inadequate teaching learning resource. Therefore, this study was carried out to ascertain the extent of deployment of ICT resources by new chemistry teachers for instruction and its influence on students' performance. In order to solve this problem one research question and three hypotheses were formulated to guide the study.

Research Question

To what extent are ICT resources used for instruction by teachers?

Hypotheses

1. Teachers' use of ICT resources for instruction is not significantly high.
2. Students' performance in chemistry is not significantly high.
3. Students' performance in chemistry is not significantly predicted by teachers' use of ICT resources for instruction.

METHODOLOGY

An ex-post facto survey design was used to explore the ICT use for instruction and students' performance relationships. The subject of this study was made up of 40 teachers and 120 students drawn from the population of 86 teachers and 1,562 chemistry education students in Nigerian south-south universities. Each chemistry teacher selected for the study was paired up with three of his students whose performance in chemistry was investigated. The average performance of the three students was attributed to each teacher. The instrument Teachers' ICT Resources Use Questionnaire (TICTUQ) and Students' Achievement Test in Chemistry (SATC) were used in collecting data for the study.

The TICTUQ consisted of two sections A and B. Section A elicited teachers' demographic information in the area of gender and years of teaching experience. While section B elicited information on new teachers' deployment of ICT resources for instructions and the items were placed on a four point scale type of scale ranging from strongly agree(4), agree(3), disagree(2), strongly disagree(1). The SATC, made up of 20 test items to measure the performance of students in chemistry.

The internal consistency for the rating scale analyzed with Cronbach ($\alpha = .87$), while that of SATC was analyzed with test-retest technique. The coefficient α and r (.72) appeared modest reliable for the variables measured.

RESULTS

Table 1 shows that among the ICT resources, graphics model was the highest deployed, while flash, blog and wiki were not deployed at all. When the ICT resources used are compared with those not used, the Table shows that even the highest used (graphics model) was under utilized.

Histogram 1 shows the extent which teachers' used ICT resources for instructions in the study area while Histogram 2 reveals the extent of students performance in chemistry.

Table 1
The Extent of Teachers' use of ICT Resources for Instruction in 2009/2010 School Session

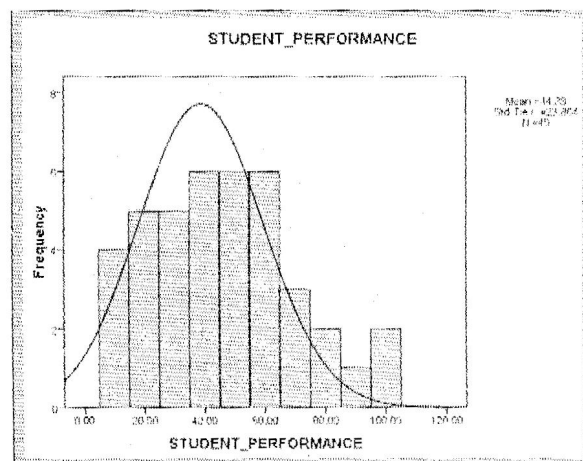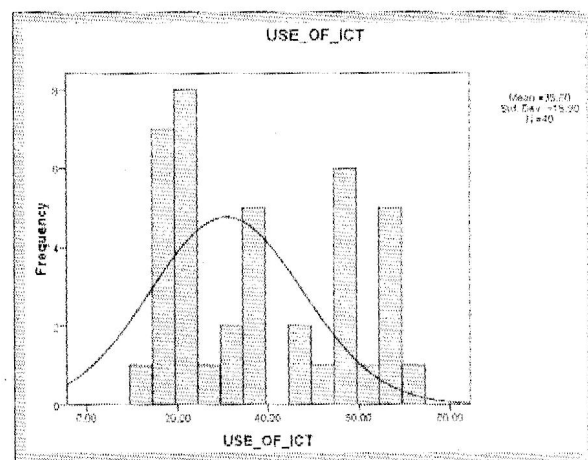| ICT Resources	Frequency Used	Frequency Not used
Television	15	25
Overhead projector	3	37
Power-point projector	10	37
Computer software	10	30
Transparency CD	7	30
Slide projector	7	33
Data projector	11	33
Multi-media projector	13	29
Desktops	14	27
Laptops	0	26
Flash	0	40
Blog	0	40
International White-board	5	35
Wiki	0	40
Camcorder tape	4	36
Graphics Model	25	15
Simulation software	8	32
Virtual laboratory	1	39

Table 2
Population t-test Analysis for the Extent of Teachers' Use of ICT Resources for Instruction

Variable	Mean	SD	t - value	df
Teachers' use of ICT Resources	38.60	18.90	-2.14	39
(Reference Mean Score)	45.00		0.00	

*Significant at 0.05 level; critical t = 2.030 N = 40.

Entries in Table 2 show that the calculated t-value (-2.14) is higher than the critical t-value of 2.030 at .05 alpha level with 39 degrees of freedom. Therefore, the hypothesis that teachers' use of ICT resources for instruction is not significantly high was rejected. However, the negative t-value of -2.14 means that the observed mean score of 38.60 of the respondents is significantly lower than the hypothesized reference scores of 45.

Table 3
Population t-test Analysis for Students' Performance in Chemistry

Variable	Mean	SD	t - value	df
Students performance in Chemistry	44.38	23.86	-1.49	39
(Reference Mean Score)	50.00		00	

*Significant at .05; critical t = 2.030; N = 39.

Table 3 shows that the calculated t –value of -1.49 is less than the critical t-value of 2.030. Besides, the observed mean score of 44.38 is lower than the hypothesized mean score of 50. Therefore, the null hypothesis that students' performance in chemistry is not significantly high is retained.

Table 4
Results of Simple Regression Analysis of the Prediction of Students' Performance in Chemistry Using Teachers' Use of ICT Resources

	ANOVA[b]				
Source of Variation	Sum of Squares	Df	Mean Square	F	Sig.
Regression	556.736	1	556.736	.977	.329[a]
Residual	21652.639	38	569.806		
Total	22209.375	39			

a. Predictors: (Constant), teachers' use of ICT resources
b. Dependent Variable:students' performance in chemistry
R = .158; R^2 = .025

*Significant at .05; critical $F_{(1, 38)}$ = 4.10; N = 40

The result of simple regression analysis in Table 4 indicates a correlation R of .158 and R^2 of .025. This implies that less than 1% of the total variance of students' performance in chemistry is predicted by teachers' deployment of ICT resources.

The result of analysis of variance in Table 4 shows that teachers' use of ICT resources did not significantly predict students' performance in chemistry. Therefore, the null hypothesis that students' performance in chemistry is not significantly predicted by teachers' use of ICT resources was retained. This interpretation is derived from an insignificant F-ratio of 0.98 which is compared with the critical F-value of 4.10 shown in Table 4.

DISCUSSION

The extent of teachers' use of ICT resources for instruction was significantly high. This finding contradicts those of Busari (2003) and Nwosu (2003) which claimed that majority of teachers do not deploy ICT resources for classroom insructions.The extent of students' performance in chemistry was significantly low. This finding was in consonance with the findings of Ivowi's (2008) study that students did not perform well in examinations.

The study also revealed that students' performance in chemistry was not significantly predicted by teachers' use of ICT resources for instructions. This finding was at variance with those of Nnaobi (2005), Etuk, Etudor, Nwaoku & Etuk, (2006), Etudor-Eyo, Etuk & Azunwena (2009), which observed a significant relationship between the use of ICT and academic performance. The finding rather agreed with those of Thiessen (2005) and Lee (2009) which did not establish a significant relationship between the two variables. The insignificant of the result could be explained by the fact that the use of ICT resources in schools in this area has recently been emphasized by the government (FRN, 2010). Besides, since the use of ICT is fairly new in the study area, students are trying to adjust to these changes in their learning experiences.

Moreover, the fact that less than one per cent variances of new teachers' deployment of ICT resources predicted the performance of students' in chemistry could be given by the fact that many other

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Moreover, the fact that less than one per cent variances of new teachers' deployment of ICT resources predicted the performance of students' in chemistry could be given by the fact that many othe⁻

factors like school environment, home environment and students' variables like age, IQ, peer influence to mention a few, account for the 'performance of students' in a particular subject' Therefore, the influence of such variables on students' performance could be investigated also.

CONCLUSION AND RECOMMENDATION

Deployment of ICT resources by teachers had less than one per cent prediction over students' performance in chemistry. Teachers' use of ICT resources for instruction is high and students' performance in chemistry is low in higher education in the area of study hence, emphasis should be made by the government for teachers to deploy ICT resources in teaching, not only chemistry, but all other subjects in their respective departments and institutions.

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