



Effect of Internet-Based Instructions on Academic Performance in Biology among Secondary Students in Giwa, Kaduna State

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Abstract

The study is designed to find out the effects of internet-based instructions on academic performance in Biology among secondary students in Giwa LGA, Kaduna state. The research design adopted is quasi experimental study. Two schools were purposive sampled; One of the two schools sampled was used as experimental group while the other school as control group, respectively. The study was guided by two objectives, research questions and null hypotheses respectively. Data was collected using an instrument Biology Performance Test (BPT) that was validated and pilot tested and the reliability was found to be 0.83 which is good for the research. The experimental group was taught Concept Respiration using internet-based instruction while control group was taught Concept Respiration using the traditional method. The t -test statistics was used for Data analysis. Findings of the study revealed that there is a significant difference between the academic performance in the concept respiration among Biology secondary students taught using the Internet-based instructions and those exposed to traditional method. Based on finding of the study, it was recommended that education stake holders should encourage the use of Internet-Based instruction for Biology teaching and Learning.

Keywords: Academic Performance, Concept Respiration, Internet-Based Instruction.



Introduction

The importance of curriculum materials in teaching and learning of Biology in secondary schools cannot be over emphasized, some of the importance includes; stimulation of the learner's interest, making teaching and learning more productive, making teaching become more concrete, real and immediate, contributing to performance analysis, stimulation of problem solving in students and helping to clarify complex events and situation Okoro & Ekpo, (2016). According to Federal Government of Nigeria (2013), one of the aim and objectives of teaching Biology in secondary schools is the ability to communicate the skills of Biology to ensure that Biology students acquire the process and skills of Biology as a science subject. This cannot be effectively achieved unless students are exposed sufficiently to practical work and laboratory experiments. The creative use of curriculum materials by teachers has increased the probability that the students will learn more, retain better what they learn and improve the performance of the skills that they develop. The aims of secondary Education according to the FGN (2013) are to equip the students to live effectively in the modern age of science and technology. The Biology Curriculum recognizes the utilization of internet-based instruction.

Nwagwu (2006), says, over the years, West/North Television (WNTV) was established in order to reduce teaching deficiencies in subject such as sciences, provide examples of good teachings, helped to upgrade the general quality of classroom instructional activities and enrich contents. Biology theorist and practitioners have always made concerted efforts to facilitate students learning through each phase of learning Biology by enhancing the quality of learning experiences through the use and proper application of instructional materials to each of the Biology phases of learning. Aladejana (2008), says, Nigeria witness a gradual improvement on the quality of teaching with the introduction of computers, later the internet-based instruction was introduced into the Educational system especially in the field of science which has changed the way teaching and learning takes place in our secondary schools today. The invention of the telegraph, telephone, radio, and computer set the stage for unprecedented Integration of capabilities. Internet based instruction as aspect of ICT is relatively new in Nigeria's educational system. It is a departure from the use of conventional tools for curriculum implementation.

The introduction of the computer opened another opportunity for the Biology Education sector; most secondary schools in Nigeria today are using the computers as learning tool, the World Wide Web created a wider platform for the teaching and learning of Biology in secondary schools. Today there are several instructional materials and learning tools that have made the Classroom to become boarder less. Evoh (2007), says, Internet-based tools are used as instructional medium that permits alternative approaches to curriculum implementation. With the internet-based learning teachers no longer need to be worried about whether an instructional material is available for the lesson to be taught, its relevance, simplicity simplification of concepts and the accuracy of the teaching aids, because the materials are seen as in real life, real situation and the information is quite accurate, Portrayal (2010), Zubairu (2016).

Zubairu (2016). says, the professional teacher's development opportunities are easily provided where the pedagogy of learning and teaching of both the relevant Biology topics and its digital representations are available with the Internet-Based Learning Tools, then teachers see the immediate pedagogic benefit to students learning even with the weakest link of the class. On the other hand, interactive technology encourages active learning; hence teaching should no longer center around transfer of content from teacher to student. With the advent of Internet based



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learning, the features, functions, physiology of different organs, life styles of different animals, ecology could be seen life and in action, while some are viewed as Animation, simulations as seen in real life, answers that students assume is impossible to be answered are answered. The internet-based learning tools arouse learning, stimulate interest, motivate and promote the spirit of research among learners. Aina (2012) pointed out that internet-based learning tools can provide the students with examples of real-life situations with specific knowledge required in addition to sound, color, and movements and stimulate the student's sensorial apparatus and bring a sense of enjoyment to the learning process.

The development and expansion of the modern technology which involves the use of the Internet-Based Instruction has now become part of the teaching and learning in Nigerian Secondary Schools, Colleges of Education, Polytechnics and Universities, Ashley (2016). However, in spite of these expansions is not every school that uses these tools in their teaching. In order to use the recent technology in Kaduna State in recognition of its importance and as one of the measures to reduce the high rate of failures in Biology subject in the West African Examination Council (WAEC), National Examination Council (NECO), the Government of Kaduna State but have made several efforts to ensure that all its secondary schools are ICT compliant by providing computers and installation of Internet facilities in all its Secondary Schools across the state.

The Internet-Based Learning Tools are those Educational platforms that provide academic information via the wide web world, offering free lessons, and information's, teaching and learning strategies, promoting research activities, academic presentations for both the teachers and students Zubairu (2016). Some of these Internet-Based Instructional tools include, Dassault, Centegage, Khan Academy, Encarta Micro Soft, Wikipedia, ERASYAPP, Slide rule, Google scholar. Thus, the study intends to investigate the effect of Internet-Based Instruction on academic performance in the concept respiration among Biology secondary students in Giwa, of Kaduna State.

Biology has been taught at schools for years, the teachers have been facing a problem on how to get students to fully understand Biology. Zubairu, (2016) reported that students perceived Biology as too wide and too difficult to comprehend, while the Biology textbooks are too difficult to read and understand which has contributed to the fluctuating results of Biology in NECO and WAEC. The call for application of internet-based learning tools in Biology teaching in Kaduna State Secondary Schools is to infuse and inject efficiency and effectiveness in Biology curriculum implementation. The effective integration of internet-based learning tools in the implementation of Biology Curriculum and its pedagogy require the school's readiness, and the proficiencies of its teachers.

The need to find solution to students' poor academic performance is therefore an obvious factor as Nwokolo (2013) opined that several factors have been responsible for low academic performance. This include: Teaching methods, learning materials, teaching factor, societal factors and strategies employed by teachers among others. Maikano (2016) also reported poor performance when Biology concepts are taught using lecture method. It is against all these backgrounds that this study seeks to investigate the effect of Internet Based Instruction on academic performance in the concept respiration among Biology secondary students in Giwa, Kaduna State.

However even the developing countries like Nigeria; internet-based learning is challenged with problems of inadequate and functional computers, absence of the internet itself can be as a result of it high cost of installation and maintenance, problem of power supply has consistently



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been poor in Nigeria. Lack of trained Biology Teachers on ICT to effectively utilize the Biology soft wares for effective teaching of Biology. Despite the above-mentioned problems secondary schools in Kaduna State employ some of the internet-based learning tools for teaching of Biology. The study therefore seeks to find out the effectiveness of the Internet-Based instruction on performance of Secondary School Biology students in Giwa LGA.

Objectives of the study

The specific objectives of this study are to investigate the effects of:

1. Internet-Based instructions on academic performance in biology among secondary students taught using Internet-Based instructions and those expose to conventional method in Giwa, Kaduna State.
2. Internet-Based instructions on academic Performance in biology among male and female senior secondary students taught using Internet-Based instructions in Giwa, Kaduna State.

Research questions

The following research questions were raised to guide the study:

1. What is the difference in the mean score of academic performance in biology between secondary students taught using Internet-Based instructions and those expose to conventional method in Giwa, Kaduna State?
2. What is the mean score of academic Performance in biology between male and female secondary school students taught using Internet-Based instructions in Giwa, Kaduna State?

Null hypotheses

H₀₁: There is no significant difference in academic Performance in biology between secondary school students taught using Internet-Based instructions and those expose to conventional method in Giwa, Kaduna State.

H₀₂: There is no significant difference in academic Performance in biology between male and female secondary school students taught using Internet-Based instructions in Giwa, Kaduna State.

Methodology

The research design used for this study is the quasi experimental research design. The Pretest-Post-test was conducted using the Biology Performance Test which was adopted from WAEC past question papers. Two schools were purposive sampled and used; One of the schools was used as experimental school while the other one was used as a control group. The target population for the study comprised of senior secondary school Biology students (SS2 Biology students) in Giwa, Kaduna State. The choice of this population is informed by the fact that they are not new to the learning of Biology and are not preoccupied with external examination preparations. The Biology Performance Test (BPT) was used to collect data for both pre-test and post-tests. Questions were adopted from WAEC questions of 2016 - 2019 on the topic respiration. The instrument was validated and pilot tested; the reliability was found to be 0.83 which according to Stevens (1996) is good for the study.

Results

Result of the data analysis was presented in Tables 1 to 4, research questions and null hypotheses respectively.

Research Questions 1:

What is the difference in the mean score of academic performance in biology between secondary students taught using Internet-Based instructions and those exposed to conventional method in Giwa, Kaduna State?

Table 1. Summary of mean performance of experimental and control group.

Groups	N	Mean	Std. Deviation	Std. Error	Mean Diff.
Experiment	48	73.83	15.942	2.255	8.41
Control	53	65.42	5.313	0.751	

The mean scores in the Table 1 revealed that performances of both groups improved after the experiment. But among the experimental group that was exposed to the use of the Internet-Based instruction, the improvement was relatively higher. The scores after the experiment the performances rose to 73.83 and 65.42 for experimental and control group respectively. From these observations, the use of the Internet – Based instruction could be said to be effective for the teaching of the concept respiration among Biology secondary students in Giwa, Kaduna state.

Research Question 2:

What is the mean score of academic Performance in biology between male and female secondary school students taught using Internet-Based instructions in Giwa, Kaduna State?

To find out the effects of Internet-Based instruction on Performance of the male and female Secondary School Students taught biology using Internet-Based instruction, the mean performance for the students were computed and compared along with that obtained by the group in the pretest scores.

Table 2. Summary of post-test mean performance of Male and Female in the experimental Group.

Gender	N	Mean	Std. Deviation	Std. Error	Mean Diff.
Male	21	45.229	8.5939	1.5595	0.466
Female	27	45.695	9.9507	1.8072	

In Table 2, the outcome of the statistics showed that there was difference in gender when students were exposed to internet-based learning tools on performance. Their computed mean of performance was 45.229 and 45.695 by male and female respectively, indicating a mean difference of 0.466 in favor of female.



Hypothesis Testing

The null hypotheses formulated in line with the objectives and research questions of the study are tested here at a fixed probability level of significance of 0.05.

Null Hypothesis One (H₀₁):

There is no significant difference in academic Performance in biology between secondary school students taught using Internet-Based instructions and those expose to conventional method in Giwa, Kaduna State.

Table 3. Independent t test statistics on the difference in Biology performance between students of control group and those in the experimental.

Groups	N	Mean	Std. Deviation	Std. Error	df	P-value	Remark
Experiment	48	73.83	15.942	2.255	99	0.001	S
Control	53	65.42	5.313	0.751			

The result in table 3 revealed that the students differ significantly in their performance by the method used in teaching them the subject. The t-value observed in the test at the 99 degree of freedom is higher than the critical value of 1.98 and the observed level of significance is 0.001. The null hypothesis which state that there is no significant difference between performances of students taught Biology with traditional method and Internet based instruction among secondary school Biology students in Giwa LGA is therefore rejected. In other words, the use of Internet based instruction is more effective for teaching Biology than the conventional method of teaching the subject at the Senior Secondary Schools in Kaduna State.

Hypothesis H₀₂:

H₀₂: There is no significant difference in academic Performance in biology between male and female secondary school students taught using Internet-Based instructions in Giwa, Kaduna State.

This hypothesis with the post-test performance students in the experimental group who were exposed to the use of Internet based instruction for teaching Biology applied in the experiment. The hypothesis was tested with the two-sample t-test procedure.

Table 4. Two sample t-test on performance of male and female students taught biology the Internet Based Learning tools.

Gender	N	Mean	Std. Deviation	Std. Error	df	P-value	Remark
Male	21	45.229	8.5939	1.5595	46	0.847	N.S
Female	27	45.695	9.9507	1.8072			

$p \leq 0.05$.



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The result in table 4 showed that the p-value of 0.847 was observed at $df=46$. Since the p-value was greater than the alpha value of 0.05, it means therefore that the difference in the performance between male and female students when exposed to internet-based learning tools was not significant. Hence the null hypothesis which stated that there is no significant difference between the academic Performance on the concept respiration among male and female biology secondary students taught using Internet-Based instructions and those expose to conventional method was therefore retained.

Discussion of Findings

This study investigated effectiveness of Internet-Based instruction for teaching Biology in Secondary Schools of Giwa LGA in Kaduna State, by comparing students' performances with that of the conventional method. Two hypotheses were tested in line with the objectives and research questions of the study. In hypothesis one, the performances of the students who were taught Biology with the Internet-Based instruction were compared with those in the control group who were taught the same subject with the conventional lecture method. The test revealed that the students who were taught with the Internet-Based instruction performed significantly better than their counterparts who were taught with the conventional lecture method. The null hypothesis was therefore rejected. The finding here agreed with the report of Mhlolo (2007), who stated that the use of ICT enhances the ability of teachers to teach more effectively and allow the students to learn in more concrete ways. The finding is in line with the report of Tinio (2013), where it was stated that ICTs are making dynamic changes in society and that its usage is influencing all aspects of life. Such influences stated in the report are felt more and more at schools because ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs.

Hypothesis two tested the significance of the variability obtained in the performances of male and female students taught biology with the use of the Internet-Based instruction. The two-sample t-test procedure used for the test revealed that the male students differed significantly in their performances when compared with the female counterparts in the group. The null hypothesis was therefore rejected. This study investigated effectiveness of internet-based instructions on academic performance in the concept respiration among Biology secondary students in Giwa LGA, Kaduna state, by comparing students' performances with that of the conventional method. Two hypotheses were tested in line with the objectives and research questions of the study.

In hypothesis one, the performances of the students who were taught Biology with the Internet-Based Learning Tools were compared with those in the control group who were taught the same subject with the conventional lecture method. There is no significant difference between academic Performance on the concept respiration among biology secondary students taught using Internet-Based instructions and those expose to conventional method in Giwa, Kaduna State. The test revealed that the students who were taught with the Internet-Based instruction performed significantly better than their counterparts who were taught with the conventional lecture method. The null hypothesis was therefore rejected. The finding here agreed with the report of Danjuma, Sarki and Daniel (2020), who stated that the use of ICT enhances the ability of teachers to teach more effectively and allow the students to learn in more concrete ways. The finding is in line with the report of Tinio (2013), where it was stated that ICTs are making dynamic changes in society and that its usage is influencing all aspects of life. Such influences stated in the report are felt more



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Conclusions

The study concludes that the use of Internet-based instruction is effective for improving teaching and learning of biology among secondary students especially for improving students' performances. Though the use of the Internet based instruction has general improvement on performances of students but male tended to have a significant edge over the female students when exposed to the use of internet-based learning tools.

Recommendations

1. The use of internet-based instruction should be encouraged among teachers of Biology to enhance students' performance towards learning of Biology.
2. The use of internet-based instruction should be encouraged among teachers of Biology to teach male and female Biology students for it is gender friendly.

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