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Call for Papers

Federal University Dutsin-Ma Journal of Educational Research (FUDJER) is a biannual journal published by the Faculty of Education, Federal University Dutsin-Ma, Katsina State, Nigeria. Its editorial board comprises both local and international scholars in various fields of education. It aims at publishing scholarly articles in Education-based research **only**. All the papers are peer-reviewed to ascertain relevance, quality of research, structure and style. Authors are expected to address an international audience on pertinent educational issues in

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Managing Editor

Dr. Kayode John Olasehinde,
Department of Science Education,
Faculty of Education,
Federal University Dutsin-Ma,
Katsina State, Nigeria
+2348034902112
+2348081101712
fudjer@fudutsinma.edu.ng

For Further enquiries

Editor

Dr. Mohammed Umar Sanda
Department of Educational Foundations
Faculty of Education,
Federal University Dutsin-Ma,
Katsina State, Nigeria
+2348035892454
fudjer@fudutsinma.edu.ng.

Editorial

This is the second volume of Federal University Dutsin-Ma Journal of Educational Research (FUDJER) and according to the decision of the Editorial Board, the journal will be produced twice in a year. Publication is the life wire of an academic because without knowledge, man will be like a smoke that passes over a rock without any mark. Since we are in academic community, research work must continue to prove to the world that we will not betray the confidence the community has in us.

This second volume contains a lot of research articles which will be of benefit to our audience. I congratulate all authors who have taken their time to produce very good articles. I encourage you to continue with this zeal.

For those of you who are still afraid to submit your articles because of criticism, I encourage you to be courageous, come out of niche, submit your articles because when you write people will correct you and will help you to gain more. I congratulate the Editorial Board of this Journal for their dedication. Thank you and I wish you a happy reading.

Prof.B.A.Ladani

Editor-in-Chief

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Assessment of Knowledge of Biological Drawings Possessed by Students Based on Teachers' Gender and Teaching Experience in Nigeria

AKINTOLA, David Akinjide

Science Education Department, University of Ilorin, Faculty of Education, Ilorin, 08033669857

OLAGUNJU, Alice Morenike

Department of Science and Technology Education, Faculty of Education, University of Ibadan, 08023367591

AHMED, Adebisi Mulkah

Science Education Department, Faculty of Education, University of Ilorin, Ilorin akinjide17@gmail.com

Abstract

Evidences from researches showed that students are performing poorly in the Senior School Certificate Biology Examinations over the years. Among the reasons adduced was students' poor knowledge in biological drawings. Studies indicated that teachers' gender and teaching experience are factors of influence on students' achievements in Biology. Results from studies suggest that biological drawings could be used to facilitate students' learning. This study assessed the knowledge of biological drawings possessed by senior school (SS) students based on teachers' gender and teaching experience in Oyo State, Nigeria. Descriptive research was employed. Also, 658 Biology students were randomly sampled for the study. Students' Biological Drawings Achievement Test (SBDAT) was the instrument used with reliability value of 0.74 using test-retest method. Two research questions and hypotheses were answered and tested, respectively. Data were analyzed using t-test and ANOVA. Findings of the study showed that; teachers' gender had no significant influence on the knowledge of biological drawings possessed by students; and a significant difference existed in the knowledge of biological drawings possessed by students based on teachers' experience. The study concluded that students possessed poor knowledge on biological drawings. It was recommended among others that experienced teachers should teach biological drawings in schools.

Key Words: Assessment, Knowledge, Biological drawings, Teaching experience, Gender.

Introduction

Science and technology applications had contributed greatly to improved standard of living in virtually all the facets of life. It has greatly influences positively, the areas of education, health, communication, transportation, engineering, security and so on. Ezech (2006) affirmed the importance of science and technology as determinants of political power and prestige of every nation.

Biology which is the study of life or plants and animals is a branch of science. The knowledge of biology is needed for the understanding of Medicine, Embryology, Anatomy, Physiology and Cytology. Despite the relevance of biology to life, it was discovered that students are performing poorly in the subject. This state of poor performances in biology was confirmed by West Africa Examinations Council (WAEC) Chief Examiners' Report (2017) that among chemistry, physics and biology, the highest enrolment and percentage failure was recorded in biology. Okoli (2006) showed that students' achievement in Biology in both internal and external examinations was poor. It was also revealed that students' poor knowledge of biological drawings stood out among other factors that are responsible for poor students' achievement in biology (Prokop, Prokop, Tunnicliffe & Diran, 2007).

Biological drawing is a clear representation of biology specimens. It has to do with presenting a biology specimen on paper in form of diagram using pencil. Biological drawing is different from artistic, mathematical, geographical and architectural drawings since there are rules guiding (Lerner, 2007). WAEC Chief Examiners' Report (2017) revealed that inability of the students to follow the rules for making biological drawings such as; improper title, poor labeling, making of wooly, broking, too thick or thin lines among others are responsible for students' poor performance in drawings. Looking into the importance of biological drawings, poor performance in the area should be a thing of serious concern to various stakeholders connected with education and national development.

Paying attention to improving the knowledge of biological drawings is a rescue move to prevent poor achievements in biology and other fields of studies that their understanding hinged on the knowledge of biological drawings. Kara, Erduran-Avci and Cekbas (2008) revealed that biological drawings could be used to diagnose the quality of students' understanding about a concept. Drawings also break monotony in teaching, prevents teachers' centeredness, show relationships among different complex concepts in a simpler form, reveal students' previous knowledge about a specimen among others. Among the notable factors identified to be responsible for students' poor achievements in biology are influence of teachers' gender and experience.

Gender imbalance is noticeable in almost every facets of life. Gender issues have remained inconclusive from the results of various studies. The result from the study of Yusuf and Afolabi (2010) revealed no gender influence on the performance of students taught biology using Computer Assisted Instruction (CAI). On the contrary, male students achieved better in biology than the female students when taught using Jigsaw method (Odagboyi, 2015). The study of Olasheinde and Olatoye (2014) indicated no significant difference in the performance of male and female students in science. Furthermore, there was no effect of gender on the performance of students taught integrated science by male and female pre service teachers (Afunwape&Oludipe, 2008). Whereas, Jordan (2013) claimed that male beginning teachers' content knowledge were higher than that of the female teachers which made the students taught by male teachers to perform better than the students taught by female teachers.

Also, the performance of students taught biology by female teachers was better than the performance of students taught by female teachers because female teachers were said to be more resilient and interactive than their female counterparts (Nabwire, Toili, Ong'unya&Songok, 2014). The latter researchers also claimed that both male and female teachers paid more attention to boys than girls, this resulted in better performance of female students in biology than the performance of the male students.

Moreover, Babajide (2010) showed no teachers' gender influence on students' achievements in biology, whereas, Ahmed (2002) showed that the rating of difficult concepts in nutrition by the teachers was not influenced by gender. The variable of teachers' gender was never discovered to have been investigated in relation to students' knowledge of biological drawings. Teachers' experience is another variable considered for investigation by the researcher.

Experience was observed to promote skills, effectiveness and productivity in an individual. Rice (2010) claimed that staff promotion, salary package, transfer, and appointment are determined by their years of teaching experiences. The study of Aktas, Aksu, Kurt, and Ekici (2013) showed that teachers' year of teaching experience had influence on students' achievement in biology in favour of students' taught by experienced biology teachers. However, the study of Oyebanji (2000) revealed no significant difference between students' achievements in biology and teachers' years of teaching experience. Furthermore, influence of teachers' experience was not investigated on the very few studies carried out on biological drawings. Also, the results from such few studies were not satisfactory.

Among such studies are; Tunnicliffe and Reiss (1999), Prokop, Prokop, Tunnicliffe and Diran, (2007). These studies were carried out outside Nigeria. Also, the moderating variables investigated were not influence of teachers' gender and teaching experience. Therefore, the researcher considered investigating the knowledge of biological drawings possessed by senior school students in Oyo state based on teachers' gender and teaching experience pertinent.

Statement of the Problem

As paramount as the knowledge of biology is to the nation and individuals, it is disheartening that students' achievements in the subject is poor.. Furthermore, poor knowledge of drawings has been identified as parts of the factors contributing to poor achievements in biology. The understanding of biology is not possible without the ability of students to; draw correctly, interpret the drawing correctly, explain the relationships among the components among others. Studies have revealed that students run away from questions that involve drawings. Also, several teachers run away from drawings while teaching biology.

The observed negative attitudes to teaching and learning of biological drawings by the teachers and students, respectively became worrisome to the researcher because about 50% of the total marks is allotted to drawings with the remaining 50% allotted to essay and objectives, respectively. Not only that, poor knowledge of biological drawings negatively affected achievements in many fields of sciences that their understanding hinged on the knowledge of biological drawings. More so, discovery of very few studies in the area of biological drawings also assumed a dangerous position of encouragement to persistent poor achievement in biology with indications that researchers showed negligence to investigations on area of biological drawings.

Based on the aforementioned observations, the researcher carried out this study to improve teaching and learning of biology and to improve achievements in other areas of life that depend on the knowledge of biological drawings. Teachers' gender and teaching experience were the moderating variables of the study.

Purpose of the Study

Specifically, the study determined the:

1. knowledge of biological drawings possessed by SSS students based on teachers' gender.
2. knowledge of biological drawings possessed by SSS students based on teachers' years of teaching experience.

Research Questions

1. Does Teachers' gender have influence on the knowledge of biological drawings possessed by senior secondary school students?
2. Are there influences of teachers' years of teaching experience on the knowledge of biological drawings possessed by senior secondary school students?

Research Hypotheses

H₀₁: There is no significant difference in the knowledge of biological drawings possessed by senior secondary school students based on their teachers' gender.

H₀₂: There is no significant difference in the knowledge of biological drawings possessed by senior secondary school students based on their teachers' years of teaching experience.

Scope of the Study

The research work involved all Senior Secondary School Two (SS2) Biology Students in Oyo State. Assessment of the knowledge of biological drawings possessed by Senior Secondary School Students was the focus of the study based on teachers' gender and years of teaching experience.

Methodology

Descriptive research of the survey type was adopted using students' achievement test. All Senior Secondary School Two (SS2) Biology Students in Oyo State was the population for the study. Twenty senior secondary schools were Purposive sampling for the study; nine schools from rural area, and 11 schools from urban area. Using random sampling technique, 658 out 1006 SS2 Biology students were sample for the study.

Students' Biological Drawings Achievement Test (SBDAT) drawn from WASSCE & NECO (SSCE) Biology syllabus and Teachers' Bio Data (TBD) were the instruments for the study. Section A of SBDAT requested for biographical information of respondents while Part 1 of section B contained one plant and one animal theory diagrams. Also, Part 2 of section B was real practical where students were asked to draw two plant and two animal specimens. Six diagrams were included in the instrument (three plants and three animals). Furthermore, the Bio Data of the sampled the biology teachers that taught the sampled students were collected which include the teachers' gender and experience. The data collected were used to find the influence of the teachers' gender and experience on the knowledge of biological drawings of their corresponding students. The face and content validity of the instruments was ascertained through experts in; biological drawings, English Language, and research analyses. Reliability index of 0.7 was obtained using test retest method. SBDAT was administered in the sampled schools within three weeks.

Analyses were done using both descriptive and inferential statistics. Research questions 1-2 were answered using the percentage and mean score. Hypothesis 1 was tested using *t*-test while hypothesis 2 was tested using ANOVA.

Analyses Results

Research Question 1: Does teachers' gender have influence on the knowledge of biological drawings possessed by senior secondary school students?

Table 1 *Analyses of Students' Scores on Knowledge of Biological Drawings Based on Teachers' Gender*

Teachers' gender	N	X	SD
Students taught by male teachers	362	27.41	10.63
Students taught by female teacher	296	27.85	10.6
Total	658	27.62	10.62

From Table 1, the mean scores of students taught by male and female teachers were (27.42 and 27.85) respectively. A slight difference in means score was observed in favour of students taught by female teachers. Therefore, Teachers' gender does not influence the knowledge of biological drawings possessed by senior schools students.

Research Question 2: Are there influences of teachers' years of teaching experience on the knowledge of biological drawings possessed by Senior School Students?

Table 2 *Analysis of Scores of the Senior School Students Taught by Experienced, Moderately Experienced and less Experienced Teachers on Knowledge of Biological Drawings*

Students taught based on teachers' Experience	N	X	SD
Experienced	421	30.37	10.25
Moderately experienced	113	22.73	10.15
Less experienced	124	22.74	8.82
Total	658	27.60	10.62

From Table 2, the mean scores and standard deviation of students taught by experienced, moderately experienced and less experienced teachers were (30.37, 22.73, and 22.74), respectively. The mean scores indicated the order of performance from the highest to the lowest as students taught by experienced teachers, less experienced teachers and moderately experienced teachers; in favour of the students taught by experienced teachers. The findings revealed that the students taught by experienced teachers performed better than the students taught by moderately experienced and less experienced teachers. However, there was a slight difference in the performance of students taught by moderately experienced and less experienced teachers. Therefore, Teachers' years of teaching experience have influence on the knowledge of biological drawings possessed by senior school students.

H₀₁: There is no significant difference in the knowledge of biological drawings possessed by senior school students based on their between teachers' gender.

H₀₂: There is no significant difference in the knowledge of biological drawings possessed by senior school students based on their teachers' years of teaching experience.

Table 4 *One-way Analysis of Variance (ANOVA) Analysis of Knowledge of Biological Drawings Possessed by Senior School Students Taught by Experienced, Moderately Experienced and Less - experienced Teachers*

	Sum of squares	DF	Mean squares	F	Sig	Remark
Between Groups	8832.52	2	4416.206	44.34	0.00	
Within Groups	65243.74	655	99.609			Rejected
Total	74076.26	657				

Table 4 depicts $F_{(2,655)} = 44.34$, $p = 0.00$ ($p < 0.05$) for the knowledge of biological drawings possessed by senior school students taught by experienced teachers, moderately experienced teachers and less experienced teachers. This implies that the significant value 0.00 was less than the alpha value (0.05) and was found to be significant. Also, the mean score of the students taught by experienced teachers, moderately experienced teachers and less experienced teachers (30.37, 22.73 and 22.74) respectively, reveals that there was significant difference in the knowledge of biological drawings among the three groups of students in favour of the students taught by experienced teachers. Furthermore, no significant difference existed between the knowledge of biological drawings possessed by students taught by moderately experienced and less experienced teachers. The $p = 0.00 < 0.05$ alpha value confirmed that the null hypothesis was rejected. Therefore, there was a significant difference between teachers' years of teaching experience and the knowledge of biological drawings possessed by senior school students.

Since the null hypothesis was significant, post-hoc test (Tukey HSD) was conducted to see the group(s) that constituted the significant difference as shown in Table 25.

Table 5 *Post-hoc test (Tukey HSD) on the knowledge of Biological Drawings Possessed by Senior School Students Taught by Experienced, Moderately Experienced and less experienced Teachers*

(I) Teachers' experience	(J) Teachers' experience	Mean Difference (I-J)	Std. Error	Sig.
Experienced	Moderately experienced	7.641*	1.057	.000
	Less experienced	7.624*	1.020	.000
Moderately Experienced	Experienced	-7.641*	1.057	.000
	Less experienced	-0.016	1.298	1.000
Less experienced	Experienced Medium	-7.624*	1.020	.000
	Moderately experienced	0.16	1.298	1.000

* The main difference is significant at the 0.05 level.

From Table 5, the post-hoc test (Tukey HSD) reveals that the students taught by experienced teachers constituted the significant difference that existed in the knowledge of biological drawings possessed by the three groups of students. The students taught by experienced teachers possessed good knowledge of biological drawings than the students taught by moderately experienced and less experienced teachers as supported by their mean scores.

Discussion

Hypothesis one examined if there was a significant difference between teachers' gender and the knowledge of biological drawings possessed by senior school students in Oyo State. Since p – value is greater than 0.05. This implies that there was no significant difference in the knowledge of biological drawings possessed by senior school students based on their teachers' gender. This is an indication that biological drawings could be learnt successfully through both male and female biology teachers, and that the performances of students in biological drawings is not based on whether they were taught by male or female teachers. This finding corresponds with that of Ahamed (2002) that teachers' gender did not significantly affect the difficulties experienced by them in teaching. On the contrary, the results from the findings of Babajide (2010) and Nabwire, Toili, Ong'unya and Songok(2014) revealed that the achievements of students in biology was influenced by teachers' gender.

Hypothesis two investigated if there was a significant difference in the knowledge of biological drawings possessed by senior school students based on their teachers' years of teaching experience. Since the p – value is less than 0.05. This implies that there was a significant difference in the knowledge of biological drawings possessed by senior school students in Oyo State based on their teachers' years of teaching experience in favour of students taught by experienced teachers. This is establishing that experienced biology teachers are needed to teach the students in Nigeria schools to enhance better performance of students in biological drawings and biology at large.

The result of this finding disagrees with that of Oyebanji (2000) that there was no significant difference in the rating of experienced and less experienced Biology teachers on the level of difficulty of ecology concepts. However, the result of this study agrees with the finding of Aktas, Aksu, Kurt and Ekici (2013) that teachers' teaching experience was significant to the students' achievement in science in favour of the experienced teachers.

Recommendations

It was recommended that:

1. School authorities should make experienced Biology teachers to teach Biology while the less experienced teachers learn from them by observing their teachings to improve their pedagogical status as far as biological drawings is concerned.
2. Biology teachers should endeavour to teach aspect of biological drawings both in biology practical and theory.
3. Students should be given enough classwork and assignment with appropriate feedback after marking.

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