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EFFECT OF POST-CLASSROOM AND IN-CLASSROOM ASSIGNMENTS ON BIOLOGICAL DRAWING ABILITY OF SECONDARY SCHOOL STUDENTS IN SOKOTO STATE, NIGERIA

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ABSTRACT

This study investigated the effect of post-classroom and in-classroom assignments on secondary school students' biological drawing ability in Sokoto State, Nigeria. A pretest post-test quasi-experimental design was used followed by a supplementary qualitative interview. The population comprised 15,301 Senior Secondary School II students, from which 380 students were selected using multistage and purposive sampling techniques. Data were collected using the Biological Drawing Ability Test (BDAT) and an interview schedule administered to five purposively selected students from the experimental group. Quantitative data were analysed using mean, standard deviation, and an independent-samples t-test, while qualitative data were analysed using thematic analysis. The results revealed a significant difference in biological drawing ability between the experimental and control groups, with students exposed to post-classroom assignments obtaining a higher mean score of 30.67 and a SD of 8.82 than those exposed to in-classroom assignments. An independent sample t-test showed there was a statistically significant difference between the two groups. The interviews further showed that family support, a conducive home learning environment, and students' motivation enhanced opportunities for practising biological drawings. The study concludes that post-classroom assignments are more effective than in-classroom assignments in improving students' biological drawing ability and recommends their integration into biology instruction.

Keywords: post-classroom assignment, in-classroom assignment, drawing ability, biological drawings

Introduction

Drawing is a common learning activity that is done by students in biology. It is mostly used to record observations on the structures of the cells, tissues, organs and organism specimens (Nugraha, 2018). It is an important tool for many teachers to assess student's understanding about specific biological concepts. This central role of drawing in learning of biology is reinforced by experienced secondary school biology teachers, who affirm that meaningful teaching and learning of many biological concepts is difficult, if not impossible without the use of drawings to illustrate structures and processes (Ibrahim, 2014). Drawing improves memory, attention to detail, conceptual understanding, and the identification of misconceptions, enabling students to develop meaningful understanding of biology (Peart, 2022).

Drawing also allows students to observe and record specimens in detail and students are expected to produce high quality drawing irrespective of their artistic ability (Kamar & Bello, 2018). Specimen drawing does not mean that one has to be an expert in drawing, rather students are to present their specimens clearly in neat outlines (Okereke, 2023). Therefore, students should be taught basic drawing skills in understanding the content of most biological concepts (Chabrier & Janke, 2018).

However, in practice many teachers spend little time developing students drawing skills often asking students to replicate what they have drawn on the board as an in-classroom activity for a limited lesson time. When this practice is neglected in classrooms, students often struggle to develop the required skills in drawing. Although, biological drawing does not require artistic talent, many students grapple and lack basic drawing skills, which is a major weakness among Nigerian Secondary School Students (WAEC, 2023). Sokoto State, like many others across Nigeria has been faced with decline in students' performance in biology as a result of poor drawing skills (Kamar & Bello, 2018). The students often face challenges with basic aspects of biological drawing, including proportion, labelling, neatness and the use of simple lines. Recognising this gap, researchers have made concerted efforts to unravel the causes of poor drawing ability in biology and to proffer possible solutions. One of the factors identified by researchers is the use of in-classroom assignment to teach biological drawings (Ihejiamaizu, Etop & Obi, 2020).

Moses (2019), refers to in-classroom assignment as an activity supervised by a teacher where students complete and submit tasks in class by replicating drawings demonstrated on the board. In-classroom assignment can be carried out in the classroom or laboratory during which the students are expected to listen, observe and imitate the teacher while drawing (Olajide, Adebisi & Tewogbade, 2017). Without students imitating the teacher in the classroom, the teaching of drawing skills through in-classroom assignment may become ineffective.

An alternative to in-classroom assignment in teaching and learning drawing skills is the post-classroom assignment which provides students with the opportunity to practice and strengthen their drawing skills. Post-classroom assignment is defined as the school tasks that teachers give to students to complete outside school hours (Turgut & Yildrim, 2020). A common goal of post-classroom assignment is to enable students to apply classroom learning outside school, reinforcing understanding and promoting mastery of drawing skills through independent practice (Turgut & Yildrim, 2020).

Statement of the Problem

Biological drawing is an important component of biology because it enhances students' observation, understanding, and communication of biological structures and processes. It also contributes substantially to students' performance in biology examinations. However, reports from the West African Examinations Council (WAEC, 2022, 2023, 2024) consistently indicate that secondary school students perform poorly in biological drawing, with

common weaknesses including incorrect labelling, poor proportions, inappropriate titles, inaccurate guide lines, and inability to identify observable structures and their functions. These persistent weaknesses suggest that many students have poor biological drawing skills.

Although previous studies have investigated students' achievement in biology and the use of different instructional strategies, limited attention has been given to the effectiveness of post-classroom assignment activities in improving students' biological drawing ability particularly among senior secondary school students in Sokoto State, Nigeria. Consequently, it remains unclear whether providing structured post-classroom drawing assignments can address the persistent weaknesses identified in biology examinations. Hence, the need to investigate the factors responsible for students' failure to answer questions on drawings in senior secondary certificate biology examinations. This study therefore investigated the effectiveness of post-classroom assignment activities on students' biological drawing ability in Sokoto State. Post-classroom assignment might be an invaluable tool to improve the drawing ability of students and help them to perform better in exams.

Objectives of the Study

The main objective of the study is to determine the effectiveness of post-classroom assignment in improving the biological drawing ability of senior secondary school students in Sokoto State, Nigeria. The specific objectives are to:

1. Determine the difference between the drawing ability of secondary school two students exposed to post-classroom assignment and those exposed to in-classroom assignment in Sokoto State, Nigeria.
2. Determine the extent to which post-classroom assignment provides secondary school two students the opportunity to practice biological drawings in Sokoto State, Nigeria.

Research Questions

Based on the objective of the study, the following research question was raised for answering:

1. In what ways does post-classroom assignment create opportunities for senior secondary school students to practice biological drawings in Sokoto State, Nigeria?

Null Hypothesis

Based on the research question raised in this study, the following null hypothesis was tested:

H_{01}: The biological drawing ability of students exposed to post-classroom assignment is not significantly different from that of students exposed to in-classroom assignment in Sokoto State, Nigeria.

Methodology

This study adopted a pretest post-test quasi-experimental research design involving an experimental and a control group. This design was considered appropriate because the study involved the use of intact classes where random assignment of participants to groups was not feasible. The experimental group were given post-assignment involving biological drawings, while the control group were given in-classroom assignment. Both groups were subjected to a pretest before the commencement of the treatment in order to establish their baseline equivalence in terms of drawing ability. After the intervention, a post test was administered to both groups to determine the effect of the treatment. The choice of this design enabled the researcher to compare the performance of the two groups before and after the intervention, thereby determining the effectiveness of post-assignment on students' drawing ability towards biological drawings.

In addition to the quantitative component, a **supplementary qualitative approach** was employed through the use of interviews with selected participants from the experimental group. This was done to obtain deeper insights into students' experiences, perceptions, and

factors influencing their engagement with biological drawing post-classroom assignments. The qualitative data served to support and enrich the quantitative findings.

Population

The population of this study comprises of 15, 301 senior secondary school 2 students within the 6 education zones in Sokoto State during 2025/2026 academic session. In all, there are one hundred and sixty-eight (168) senior secondary schools in the state.

Sample and Sampling Technique

The sample size from this study consisted of 380 students estimated using Krejcie and Morgan table for sample size estimation. The study adopts multi stage sampling to select four (4) education zones out of six (6) in the state due to insecurity challenges faced in the excluded two (2) zones. The exclusion of two education zones due to insecurity may limit the generalisability of the findings to all secondary school students in Sokoto State. As a result, the findings may not be fully generalisable to all secondary school students across Sokoto State. Initially, purposive sampling was used to identify four Local Government Areas (LGAs) based on them having a relative stable security. Subsequently four schools were randomly selected from these LGAs providing a representative sample of the selected education zones. Furthermore, one intact class was selected from each of the four (4) schools and the members of these schools constitute the subjects of the study.

Additionally, purposive sampling technique was employed to select five participants from the experimental group. The selection of participants was based on their level of participation during the intervention, drawing performance, and willingness to provide detailed responses and in-depth perspectives on the use of post-classroom assignment in improving biological drawing skills. Furthermore, effort was made to include participants with varying levels of drawing ability and engagement in order to capture diverse experiences and responses to the intervention. The choice of five participants was considered adequate for the qualitative aspect of the study, as the focus was on obtaining detailed information rather than generalization. The participants were drawn exclusively from the experimental group because they were directly exposed to post-classroom assignment, which is the focus of the qualitative approach.

Instrumentations

The instruments used in this study was a questionnaire titled Biological Drawing Ability Test BDAT) and an interview schedule. The Biological Drawing Ability Test (BDAT) designed to assess students drawing skills is made up of 3 questions each with a and b. The items were extracted from WAEC past questions between the year 2015 and 2022. All the three (3) questions required students to make detailed drawings and label fully. The interview has five (5) open ended questions seeking to gather information and deeper understanding of how post-classroom assignment provides secondary school students the opportunity to practice biological drawings. The interview was administered only to the experimental group after the treatment phase and only five (5) students were selected.

Validity and Reliability of the Instrument

The Biological Drawing Ability Test (BDAT) was subjected to face and content validation by an experienced Senior Secondary School Biology teacher to ensure its relevance, appropriateness, and alignment with the study objectives. The expert's recommendations resulted in an increase in the test duration from 1 hour 30 minutes to 2 hours and the replacement of one drawing item to better reflect the students' curriculum. A pilot study involving 25 SSII students from a school outside the study sample was conducted to assess the clarity and practicability of the instrument. The reliability of the BDAT was determined using the test-retest method, with scores analysed using the Pearson Product Moment Correlation (PPMC). A reliability coefficient of 0.73 was obtained, indicating that the instrument was sufficiently reliable for use in the study.

Results

Interview data were analysed using Braun and Clarke's (2006) thematic analysis approach. The interview transcripts were read repeatedly to achieve familiarity with the data, after which meaningful statements were assigned initial codes. Similar codes were grouped into categories and subsequently reviewed and refined into themes that reflected students' experiences regarding how post-classroom assignments supported the practice of biological drawings. Quantitative data obtained from the Biological Drawing Ability Test (BDAT) were analysed using inferential statistics to test the null hypothesis at the 0.05 level of significance. The results are presented according to the study objectives.

Research Question: What is the extent to which post-classroom assignment provides secondary school two students the opportunity to practice biological drawings in Sokoto State, Nigeria?

Table 1 Themes Codes and Sample Quotes from Five Respondents

Theme	Codes	Sample Quotes from Respondents
Family Support and Guidance	Family monitoring, Family guidance/feedback, Family support/time allocation, Family motivation	"They corrected me whenever I was wrong" (R1); "My parents guided me and gave me time to do my assignment." (R2); "My sister corrected my mistakes." (R3); "They checked my work before I submitted it." (R4); "They encouraged me to practise other drawings." (R5)
Conducive Home Environment	Conducive environment, Quiet/stress-free environment, Time availability	"Home is more conducive than school." (R1, R3); "Our area is quiet enough." (R2); "They asked me to stay home after school." (R4); "No one disturbs me at home." (R5)
Discipline and Obligation	Must do assignment / forced to practice	"I must do the assignment." (R3, R5); "Sometimes they made me do it." (R4)
Motivation for Learning	Enjoyment/preference, Exam motivation, Career motivation, Intrinsic motivation	"It will help in my exams." (R1); "I want to become a doctor." (R3); "I always wanted to know how things are." (R4, R5)
School Environment Barriers	School environment not supportive	"My friends don't allow me to do drawings." (R3); "There are no distractions at home." (R4); "Home is more conducive than school." (R1, R2)

Table 1 shows that post-classroom assignments provided students with valuable opportunities to practice biological drawings outside the classroom. The thematic analysis identified five major themes: family support and guidance, a conducive home environment, discipline and obligation, motivation for learning, and school environment barriers. Family support through supervision, encouragement, and feedback promoted regular practice, while a quiet home environment enabled students to concentrate on drawing tasks. Students also reported that examination preparation, curiosity, and future career goals motivated them to practice consistently. Conversely, some participants indicated that peer distractions in school limited opportunities for focused practice, highlighting the value of post-classroom assignments in providing additional learning opportunities beyond the classroom. One respondent explained, *"*They asked if I was given assignment and corrected me whenever I was wrong*,"* highlighting how assignments at home prompted regular practice. The conducive home environment also

facilitated practice. Respondents reported that quiet and comfortable spaces at home, free from distractions, allowed them to focus and spend sufficient time completing their post-classroom assignments. For example, one respondent noted, *"*Home is more conducive than school; I pay more attention at home." Discipline and obligation imposed by family members further ensured that students completed their drawings, with students acknowledging that they practiced even when they did not initially want to. This structured approach, coupled with intrinsic and academic motivation including preparation for exams and future career goals encouraged students to use post-assignment effectively to improve their drawing skills.

Testing Hypothesis

The results of the inferential statistics conducted to test the hypothesis formulated for the study is presented in a table, followed by a description of the findings.

Ho_1: There is no significant difference between the drawing ability of secondary school two students exposed to post-classroom assignment and those exposed to in-classroom assignment in Sokoto State, Nigeria.

Table 2 T-test Result of the Post-Test Scores for Drawing Ability of Experimental and Control Group

S/N	Group	N	Mean	Std. Dev	t-value	Df	P- value	Decision
1	Experimental	188	30.67	8.823	18.064	378	0.000	$H0_1$
2	Control	192	17.66	4.596				Rejected

Table 2 presents the test of significance in drawing ability between the experimental and control groups after the intervention. The experimental group had a mean score of 30.67 with a standard deviation of 8.823, while the control group had a mean score of 17.66 with a standard deviation of 4.596 The t-value of 18.064 with 378 degrees of freedom and a p-value of 0.000 indicates a statistically significant difference between the two groups. Based on this result, the null hypothesis ($H0_1$) is rejected, showing that the post-classroom assignment significantly improved students' drawing ability compared to the in-classroom assignment.

Discussions

The significant improvement in the drawing ability of students exposed to post-classroom assignments indicates that extending drawing activities beyond the classroom enhances the development of biological drawing skills. This improvement is likely because students had additional time to observe diagrams carefully, practice repeatedly and refine their drawings without the time constraints of the classroom. The finding suggests that post-classroom assignments provide learners with opportunities for deliberate practice, which is important for mastering drawing skills such as accurate representation, correct labelling and appropriate proportion.

This finding is consistent with the study by Akintola, Ayanlola and Sulaiman (2021), who reported that frequent engagement in practical activities improves students' knowledge and competence in biological drawing. Likewise, Haq, Shakil, and Din (2020) found that post-classroom assignments enhance academic performance by encouraging independent learning and reinforcing classroom instruction. The present study extends these findings by demonstrating that post-classroom assignments are not only beneficial for academic achievement but also for the acquisition of biological drawing skills.

The findings have important implications for biology teaching. Incorporating structured post-classroom drawing assignments into regular instruction can provide students with sufficient opportunities to practice and improve their drawing ability. This approach may ultimately contribute to improved performance in biology examinations.

The interview findings further revealed that post-classroom assignments provided students with meaningful opportunities to practice biological drawing outside the classroom. Family support, including supervision, encouragement, and assistance with assignments, played an important role in sustaining students' engagement. In addition, a quiet and conducive

home environment enabled students to concentrate on their drawing tasks and practice more effectively.

These findings support previous studies that have highlighted the importance of family involvement and a supportive learning environment in promoting students' academic development. Turgut and Yildrim (2020), reported that parental involvement enhances students' learning and skill acquisition, while Peart (2022), found that an organised home learning environment improves students' concentration and academic performance. Similarly, Olajide, Adebisi, and Tewogbade (2017) emphasised that structured family expectations encourage students to complete learning tasks consistently.

The interview also showed that students' personal motivation, including enjoyment of drawing, preparation for examinations, curiosity, and career aspirations, encouraged regular practice. However, one participant noted that peer distractions at school sometimes limited opportunities for effective practice, suggesting that post-classroom assignments can compensate for constraints within the school environment. These findings demonstrate that the effectiveness of post-classroom assignments depends not only on the assignments themselves but also on the availability of supportive home environments and students' motivation to engage with the tasks. This highlights the importance of involving parents and encouraging positive learning habits when implementing post-classroom assignment strategies.

Conclusion

The findings of this study demonstrate that post-classroom assignment is a more effective instructional strategy than conventional in-classroom assignment for improving students' biological drawing ability. Students exposed to post-classroom drawing tasks achieved significantly better performance, suggesting that extended opportunities for practice beyond classroom hours contribute meaningfully to the development of biological drawing skills. The study further revealed that supportive home factors, including family encouragement and a conducive learning environment, improves students' engagement with drawing activities. Therefore, improving students' competence in biological drawing requires not only effective classroom instruction but also structured opportunities for independent practice outside the classroom. However, the findings should be interpreted in light of certain limitations. Two of the six education zones in Sokoto State were excluded due to insecurity challenges, which may limit the generalisability of the findings to the entire state. Additionally, the qualitative component involved only five students from the experimental group; therefore, future studies may consider involving a larger and more diverse group of participants to obtain broader perspectives on the effectiveness of post-classroom assignments.

Recommendations

Based on the findings of this study, the following recommendations were made

1. Since students exposed to post-classroom drawing assignments demonstrated improved biological drawing ability, biology teachers should integrate structured post-classroom drawing tasks into their teaching practices to provide students with additional opportunities for practice and skill development beyond classroom periods.
2. Based on the finding that continuous practice contributed to improved drawing performance, biology teachers should provide timely and constructive feedback on students' biological drawings to help them identify errors in proportion, labelling, and accuracy and improve their drawing skills.
3. Given that family support and a conducive home learning environment were identified as factors that improved students' engagement with biological drawing activities, parents and guardians should be encouraged to support students by monitoring drawing assignments, providing encouragement, and creating suitable spaces for learning at home

4. Since some students reported that peer distractions within the school environment limited effective practice, schools should create supportive environments for biology learning activities by reducing distractions and providing adequate opportunities for students to concentrate on drawing tasks.

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