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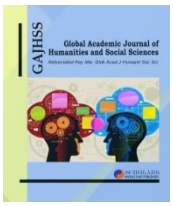

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**Original Research Article**

# Effects of Reflective Insrtuctional Strategy on Students' Performance in Cell Physiology Concepts among Senoir Secondary Schools in Zaria

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**Abstract:** The study investigated Effect of Reflective Instructional Strategy on students' performance in Cell-Physiology Concepts among Senior Secondary Students in Zaria. Quasi-experimental pretest, post test control group design. The population comprised of one thousand two hundred and twenty five Biology SS11 students from 11 public Senior Secondary Schools in Zaria metropolis. A sample of 137 students from two schools was randomly selected. The study involves two groups- experimental and a control group. The experimental group was taught Cell Physiology using Reflective Instructional Strategy while the control group was exposed to the same concept using Conventional Method. One instrument was used for data collection Namely Cell-Physiology Performance Test. The instrument was duly validated and have reliability coefficient of 0.87, using Pearson Product Moment Correlation statistic. Two research questions and two null hypotheses were formulated and answered using Mean and Standard deviation statistics and Independent Samples t-test at alpha 0.05 level of significance. The major findings reveals a significant difference between mean academic performance scores in favor of the experimental group. Based on the findings, it was recommended among others, that workshops, seminars and conferences should be organised for Biology teachers on the use of Reflective Instructional among secondary schools in Zaria metropolis.

**Keywords:** Reflective Instructional Strategy, Performance, Lecture method, Cell physiology concept.



## INTRODUCTION

Teachers are discovering untapped resources for accelerating students' performance by themselves due to the traditional teaching method in Nigeria. Now, the Nigeria system of education is geared towards producing individuals who will not only posses the capacity to solve his problems but also contribute to the development of his society. A number of several subjects can be identified in the curriculum of our schools at all levels of Nigeria education, the subjects are included with the expectation that when properly taught, students will perform excellently (Federal Republic of Nigeria (FRN) 2004).

As a science subject, biology serves as a prerequisite to the study of medicine, pharmacy, agriculture among others. Biology concepts according to Oyarole, (2023) can sometimes be difficult particularly when describing ideas that are abstract or cannot be fully comprehended by learners for the first time. Research finding by

Oyarole (2015); West African Examination Council (2018) have also shown that a number of concepts in biology which include Cell Physiology, Evolution and Cell physiology contains topics that pose difficulty for biology students to understand. Cell physiology is an aspect of the biology syllabus that senior secondary students at SS2 must study. However, it is considered as abstract in nature and difficult to understand which has resulted in poor performance among students (Etobro & Fabinu, 2017).

Despite the importance of Biology as a science subject, empirical studies such as those of Etobro & Fabinu (2017) and Adegboye, *et al.*, (2017) have shown that students still perfom poorly in Biology at Senior Secondary level. Umar (2015) reported that Biology is one of the science subjects having downward trend in the performance of students at Senior Secondary Certificate Examination (SSCE). Timothy (2018) noted that a review of students' enrollement in science subjects at senior secondary schools in Nigeria shows that more students register Biology than any other subject but their academic performance in the subject is comparatively lower at SSCE. The poor performace has been attributed to the method of instruction

The predominant instructional method used in teaching at all levels of education, is through the use of lecture method (Oyarole, 2023). Lecture method on the other hand has been reported by Umar (2016) and Wada (2016), to be passive mode of instruction. The use of lecture method entails one way flow of communication from the teacher to the students. It is teacher-centre or teacher dominated apt of the talking is carried out by the teacher while the students remain as passive. Any teaching method that does not encourage positive interaction between the students and the teacher and amongst the students is incomplete (Muokwe and Okeke, 2021). One of such innovative teaching methods is Reflective Instructional Strategy.

Reflective Instructional Strategy is a process of critically reviewing the quality of one's performance in a given activity (Nnaemeka *et al*., 2021). The act of reflecting is one which causes students to make sense of what they've learned, why they learned it, and how that particular learning took place. Reflective instructional strategy is a learner centered strategy that engages learners in series of learning processes which enables them construct knowledge and learn meaningfully through questioning and evaluation without necessarily relying on the teacher for everything (above). It is a broad based approach that draws from skills such as peer evaluation, feedback mechanism, scaffold instructions. Reflective instructional strategy is an innovative strategy that incorporates a blend of active thinking with active social learning atmosphere of social interaction

Another variable that has been of concern to researcher in science education his gender. Many researchers in science education have conducted studies on gender–related differences with a view to improving science instruction for boy and girls in the secondary schools .Researchers such Sarac (2017) and Musa (2017) in their separate studies reported great concern that girls are not achieving as much as their male counterpart in science education.

**Purpose of the Study**

Over the years, there has been an upsurge in the number of candidates sitting for public examinations such as Senior Secondary Certificate Examination (SSCE) and particularly biology papers. This is because of the stipulation that students must offer one of the basic science subjects (Biology, Chemistry and Physics) and biology it is preferred by most students. The results obtained by candidates have been abysmal and do not justify the popularity as observed by researchers (Maikano, et.al, 2016) and Jack, (2017) The statistics of performance in Biology in the May/June Senior Secondary Certificate Examination (SSCE) revealed a poor percentage pass at credit level.

## OBJECTIVES

The objectives of this study was to:

1) Determine effects of Reflective Instructional Strategy instructional on students' performance in cell physiology concept
2) Examine effect of Reflective Instructional Strategy between male and female students' performance in cell physiology concept

**Research Questions**

The study formulated two research questions for answering:

1) What is the difference between the mean performance scores of students taught cell physiology concept using Reflective Instructional Strategy and those taught same concept using conventional method?
2) What is the difference between the mean performance scores of male and female students taught cell physiology concepts using Reflective Instructional Strategy?

**Null Hypotheses**

On the basis of the research questions, the following null hypotheses were stated for testing at p`≤ 0.05 level of significant:

$HO_1$: There is no significant difference between the mean performance scores of students taught cell physiology concepts using Reflective Instructional strategy and those taught same concepts using conventional method.

$HO_2$: There is no significant difference between the mean performance scores of male and female students taught cell physiology concepts using Reflective Instructional strategy.

## METHODOLOGY

The study was quasi-experimental-control group design employing pretest, posttest. Two groups of students were used for data collection; experimental (EG) and control groups (CG). A pretest was administered to the two groups in order to determine the equivalence in ability of the two groups. The experimental group was taught cell physiology concept using Reflective Instructional Strategy instructional strategy. The control group was taught same concept using Lecture Method (LM). At the end of the six weeks treatment, a posttest was administered to both groups of students to evaluate the effectiveness of the treatment in enhancing students' academic performance in cell physiology.

**Population of the Study**

The population for the study was made up of all the Senior Secondary II student in Zaria Metropolis, with a total number of 1225 students comprising males and female. One hundred and twenty-five were selected using simple random sampling techique

## RESULTS

**Research Question 1**

What is the difference between the mean performance scores of students taught cell physiology concepts using Reflective Instructional strategy and those taught same concept using conventional method?

**Table 1: Means and Standard Deviation of Post Scores for Academic Performance For Experimental and Control Group**

| Group | N | Mean | Std. Deviation | Mean Diff |
|---|---|---|---|---|
| Experimental | 73 | 21.17 | 5.89 | |
| Control | 64 | 11.89 | 3.46 | 9.28 |

Results from Table 1 shows that the academic performance means scores for the experimental and control group were 21.17 and 11.89 respectively. The standard deviation for the experimental and control group were 5.89 and 3.46 respectively. The mean difference was 9.28. This means the experimental group achieved higher than the control group.

**Hypotheses**

The state null hypotheses were tested at p≤0.05 Level of significance.

**$Ho_1$:** There is no significant difference between the mean performance scores of students taught cell physiology concepts using Reflective Instructional strategy and those taught using conventional teaching method.

**Table 2: Summary of Independent t-test Analysis, of Academic Performance Mean Scores of Experimental and Control Group**

| Gender | N | $\bar{X}_1$ | SD | t-CAL | DF | P | Remark |
|---|---|---|---|---|---|---|---|
| EXP | 73 | 21.17 | 5.89 | | | | |
| | | | | 11.04 | 135 | 0.00 | S |
| CONRT | 64 | 11.89 | 3.46 | | | | |

P≤0.05

Table 2 result shows experimental group has higher mean scores of 21.17 as compared to that of control group with mean scores of 11.89. The p-value is 0.00 which is less than 0.05 level of significance. Hence, the null hypothesis was rejected. This means reflective instructional strategy is effective in enhancing student's performance in cell physiology concepts.

**Research Question 2**

2. What is the difference between the mean performance scores of male and female students taught cell physiology concepts using Reflective Instructional strategy?

**Table 3: Means and Standard Deviation of Post Scores for Male and Female in Experimental Group.**

| Gender | N | Mean | Std. Dev | Mean Diff |
|---|---|---|---|---|
| Female | 73 | 19.61 | 5.91 | |
| Male | 64 | 9.48 | 2.65 | 10.13 |

Result in Table 3 showed the mean scores for male and female students were 19.61 and 9.48 respectively, with mean difference of 10.13 and the standard deviation for the females group achieved higher than the males.

**Hypothesis 2:** There is no significant difference between retention of ecology concepts between male and female students taught using Reflective Instructional Strategy.

**Table 4: t-test Analysis of Post-posttest Mean Scores of Male and Female Students in Experimental Group**

| Gender | N | $\bar{X}_1$ | SD | t-CAL | DF | P | Remark |
|---|---|---|---|---|---|---|---|
| Female | 73 | 19.62 | 5.95 | | | | |
| | | | | 12.54 | 135 | 0.26 | NS |
| Male | 64 | 9.48 | 9.48 | | | | |

Table 4 shows that there is no significant difference between male and female students academic performance scores when exposed to reflective instructional strategy i.e treatment. They female and male recorded a mean of 19.62 and 9.48 respectively**.** The calculated p-value of 0.26 is higher than the 0.05 alpha level of significance. Therefore, the null hypothesis which stated that there is no significant difference between male and female students exposed to reflective instructional strategy is hereby retained.

## DISCUSSION

The result of analysis showed that the students taught cell physiology concept with reflective instructional strategy had a higher mean score than the students taught using lecture method. This result is in agreement with the findings of Oyarole, (2015) and whose works found that reflective instructional strategy enhanced students academic performance in science subjects. The findings of this study are also in agreement with that of Talam & Gulsecen (2019) that the use of reflective instructional strategy results in higher achievement of students in Biology concepts. However, the finding is not in agreement with the findings of Arwa, Din & Hussin (2017) who found no significant difference in performance of reflective instructional strategy on the concept of physics education

There was no significant difference between male and female students .i.e reflective instructional strategy had impact on performance of both male and female students who were exposed to it. This findings agree with the findings of Oyarole, (2023) who reported no significant difference between the academic performance girls and boys who were exposed to reflective strategy. No significant difference between males and females students exposed to reflective instructional strategy as revealed by the result of this study may be due to the fact that reflective instructional strategy encourage students to work on the same task, share ideas and experiences freely. This equal opportunity for the students to learn together irrespective of their gender differences.

## CONCLUSION

In the light of the findings of the study, the researcher concluded that:

1. Reflective Instructional strategy enhances students performance in cell physiology concepts
2. The findings in this study revealed that Reflective Instructional Strategy model of instruction is efficacious in eliminating gender related differences in science learning, indicating that the strategy is gender friendly.

## RECOMMENDATIONS

Based on the findings in the study, the researcher wished to make the following recommendations.

1. Biology teachers should adopt the use of reflective instructional strategy in teaching various concepts in Biology.
2. Seminars/Workshops should be organized by ministry of education for Biology teachers to appraise them with the use of Reflective Instructional Strategy of instruction.

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