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GOAL SETTING SELF-REGULATED LEARNING AS CORRELATE OF STUDENTS' ACHIEVEMENT IN BIOLOGY

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ABSTRACT

This study examined goal setting self-regulated learning as correlate of students' achievement in Biology. The study was carried out in Onitsha education zone of Anambra State Nigeria. The design was correlational research type. The target populations for the study were Biology students of senior secondary II (SS II) classes in Onitsha education zone in Anambra state, Nigeria. The sample for the study was three hundred and thirty two (332) Biology students (male: 156 and female: 176) drawn through stratified and random sampling techniques. Two research questions and one hypothesis was raised to guide the study. The instruments used to elicit the relevant data were: A twenty item instrument questionnaire called Goal Setting Self- Regulated Learning Scale (GSSRLS) and twenty objective test called Biology Achievement Test (BAT) designed by the researcher. The scores of students from BAT were obtained as the students' academic achievement. The reliability coefficient of .845 respectively for GSSRLS using Cronbach's Alpha and .88 for BAT was obtained using Kuder Richardson 20 formula. The data collected were analysed using Pearson's Product Moment Correlation for research questions, hypothesis was tested at .05 level of significance using regression ANOVA. The results revealed that: there is a moderate relationship between students' goal setting self-regulated learning and their academic achievement in Biology. The result revealed that there is a moderate relationship between male and female students' goal setting self-regulated learning and their academic achievement in Biology and a significant difference exist between male and female students' goal setting self-regulated learning and their academic achievement in Biology in secondary school, in favour of female students. Based on the findings of the study, it was recommended among others that academic achievement is not a gender issue, both genders should be encouraged to excel in academic achievement since equal opportunities is provided for both genders. Base on the recommendations conclusions were made.

Keywords: Biology, Goal Setting Self-Regulated Learning and Achievement

Introduction

Biology is a branch of natural science that deals with the study of living organisms, structures, functions, evolutions, distribution and interrelationships. Arsal (2019) viewed Biology as the science of life or the study of living things. Obikezie et.al. (2022) averred that Biology covers all the life processes such as movement, respiration, nutrition, irritability, growth, excretion, ecological system and reproduction which make it more important and useful to man. Opara (2019)

opined that importance of Biology includes helping man in scientific research, development of new tools, exploring of new environment and environmental identification such as ecology and techniques needed to improve the quality of lives. However, in spite of all these importance of Biology to man, many secondary school Biology students still experience weaknesses in Senior School Certificate Examination (SSCE).

West African Examination Council (WAEC) Chief Examiners' reports 2019, 2020 and 2021 outlined a number of reasons for the weaknesses of students which tantamount to level of achievement in Biology. Among the reasons given were: (i) inability to explain why a Rhesus negative man should not marry a Rhesus positive to avoid losing her second pregnancy (ii) poor grasp of genetics (iii) not given title to diagrams (iii) poor diagrams (iv) inability to cross breeding in the genetics properly (v) poor performance in questions that require application knowledge (vi) inability to identify parts of skeleton. All these have given many educators/stakeholders some concern and research has attempted to delve into causal factors.

Atmotoya (2014) averred there are factors suspected to be responsible for low level and weaknesses among secondary school students' academic achievement in Biology. Some of these factors include lack of teaching material, interest, motivational orientation, attitude, self-esteem/self-efficacy, emotional problems, study habits, teacher consultation and poor interpersonal relationships among students' teachers' poor pedagogical and content knowledge of the subject matter, parental background, extrinsic motivation, anxiety, poor interest, attitude, low self-concept and inability to regulate self-learning.

Self-regulated learning places more responsibility on the learner to participate actively in classroom environment where student-student and student-teacher interact. There are four basic self-regulation strategies that all students need to be able to use: goal-setting, self-monitoring, effective use of self-instructions or self-talk, and self-reinforcement (Bandura, 2010).

The most effective one among the four is goal setting self-regulated learning (GSSRL) because it helps students achieve excellence through practice (Bandura, 2010). Similarly it takes planning, effort, and persistence over time. Goal setting self-regulated learning allows students to become autonomous learners who can pursue their own interests. Alben (2016) submitted that in GSSRL students are prepared each day to discuss and write down their thoughts on subjects outside their class and actively participating in learning among themselves. Active learning unlike passive learning is dynamic and has won unanimous support for its use in teaching learning of science subjects especially in Biology (Chorng et. al., 2019). Alben (2016) observed that there is a relationship between goal setting self-regulated learning (GSSRL) and students' achievement in science subjects. Alben maintained that active learning is an important aspect of GSSRL. Opara (2018) opined that there is a positive relationship between goal setting self-regulated learning and students' achievement in Chemistry in Owerri municipal city Nigeria, which leads to students understanding of the subject in taking control of learning process.

Banu (2013) asserted that is a moderate correlation between goal setting

self-regulated learning (GSSRL) and high school students in Biology achievement in Turkish EFL. Long (2013) observed a moderate correlate between goal self-regulated learning and students' academic achievement in Mathematics in Australian program in Malaysia. Ogbenevwede (2019) averred that there is a moderate correlate between goal setting self-regulated learning and students' academic achievement in Biology in Delta Central Senatorial District. Ogbenevwede (2019) further averred that is a significant difference between male and female student in the relationship of goal setting self-regulated learning and academic achievement of secondary school students' biological concept of unit of life in Delta Central Senatorial District in favour of female students.

Nanda et. al. (2020) observed that there is a positive correlate between goal setting self-regulated learning and learning motivation with metacognitive skill in Biology subject in Thialand. The authors further observed that is a significant difference in male and female high school students' goal setting self-regulated learning and learning motivation with metacognitive skill in Biology subject in Thialand in favour of female high school students. Meanwhile, Nwafor et. al. (2015) did not find a significant relationship between junior secondary school students' goal setting self-regulated learning and students' academic achievement in Basic science. Furthermore, in a study designed to uncover psychological differences between academically weak and gifted students using the Tennessee self-concept scale (TSCS) and Tennessee cognitive development scale (TCDS), Garrido Vergas (2012) did not find the two 33-member groups to differ in mean goal setting self-regulated learning and mean academic achievement.

A large body of literature has also reported a relationship between gender, goal setting self-regulated learning and students' achievement reported that boys seem to have a more positive relationship in goal setting self-regulated learning and achievement in a number of dimensions such as Biology than girls (Kadivar et. al., 2012; Matura, 2009; Nasir & Akhtar, 2013)

From the foregoing, it appears the question of whether relationship exists or does not exist between goal setting self-regulated learning and academic achievement of secondary school students in Biology has not been concisely answered because both the theoretical and empirical studies reviewed in this study have produced diverse and contradictory results. Similarly, the issue of gender difference in goal setting self-regulatory learning (GSSRL) and academic achievement in Biology especially in Onitsha education zone of Anambra state has not been resolved and therefore subject to further investigation. Thus this study focused on goal setting self-regulated learning as correlate of students' achievement in Biology in Ontisha education of Anambra state, Nigeria.

Research Questions

The following three research questions guided this study:

1. What is the relationship between goal setting self-regulated learning and students' achievement in Biology?
2. What is the relationship between students' goal setting self-regulated learning and students' academic achievement in Biology based on gender?

Hypothesis

The sole null hypothesis was tested in this study at 0.05 alpha level of significance.

There is no significant relationship between goal setting self-regulated learning and students' achievement in Biology.

Research Method

The study employed a correlation research design. This design according to Nworgu (2015) seeks to establish the relationship that exists between two or more variables. The area of the study was Onitsha education zone. The population of the study comprised of all the 4000 Senior Secondary two (SSII) Biology students in the 28 State owned co-educational secondary schools in the zone (2640 females and 1360 males). Simple random sampling was used to draw 4000 students (2640 female and 1360 male) from the total population. Each stratum comprised Ogbaru (408 males and 822 female) Onitsha North 1640 (male and 1018 female) Onitsha South (800 female and 312 male). Using standard table of Yamame, sample size of 0.5% of population of 4000 is 333. One questionnaire was discarded for improper completion. Thus, sample size for which investigation was complete was 332 (156 male and 176 female).

Two instruments were used for the study; Goal Setting Self- Regulated Learning (GSSRL) and Biology Achievement Test (BAT). Goal Setting Self-Regulated Learning Scale (GSRL) was adapted from "Development and validation of an academic self- regulation of an academic scale for university students' by Nasir (2013) and their colleague researchers from school of education, university of Michigan and the National Center for research to improve post-secondary teaching and learning (NCRIPTAL) named academic self – regulated scale. The instrument is designed with 10 items regarding students' use of different cognitive and meta-cognitive strategies and 10 items concerning student management of different resource. Scale questions, where the scores range from 1 ("strongly disagree") to 4 ("strongly agree") was used. The researcher came up with twenty items (20) from Nasir's instrument named GSRL. GSRL is a 4-point scale of strongly agreed, agreed, disagreed, and strongly disagreed. To ensure the reliability of 20 items GSRL, the instrument was pilot tested using 25 students in Awka education zone which is outside the area of study, a coefficient of .85 was obtained using cronbach alpha indicating that the instrument is reliable.

The second instrument named Biology Achievement Test (BAT) is researcher's made instrument adapted from WEAC 2019-2021 in line with some selected topics SS II scheme of work which includes; genetics, rhesus factor and skeleton. The instrument is made up of twenty (20) objective questions. SS 2 students used in the study are required to answer the questions to test the achievement of the students. The test was giving to the students after Biology teachers in the drawn schools might have taught the Biology concepts. Each question has options A-D. Correct answer attracted one (1) mark making it a total of twenty (20) marks. To ensure the reliability of 20 items BAT, the instrument was pilot tested using 25 students in Awka education zone which is outside the area of study, a coefficient of .80 was obtained using Kuder- Richardson 20 (KR-20) indicating that the instrument is reliable. Both GSRL and BAT where

validated by three expects, two from Department of Science Education Biology option Nnamdi Azikiwe University Awka and from Department of Education Foundations Nnamdi Azikiwe University Awka. Pearson product moment correlation was used to answer research questions while Regression ANOVA analysis was used to test the significant relationship at .05.

Ranges of scores	Decision
±0.80 – ± 1.00	High positive or negative relationships
±0.31 – ± 0.79	Moderate positive or negative relationship
±0.00 – ± 0.30	Low positive or negative relationship.

Presentation of Results

Research Questions 1: What is the relationship between goal setting self-regulated learning and students' achievement in Biology?

Table 1: Pearson's Product Moment Correlation Analysis of students' GSSRL and their academic achievement in Biology.

Variable		SD	N	r	R^2
GSSRLS	55.67	4.03	332	0.40	0.16
Academic achievement	47.72	4.61			

R^2 = coefficient of determination

Result in Table 1 is correlation coefficients of analysis of students' goal setting self-regulated learning strategy GSSRL and their academic achievement in Biology. Results showed that the correlation between students' GSSRL and their academic achievement in Biology was 0.40. This means there was a moderate positive relationship between students' GSSRL and their academic achievement in Biology. The coefficient of determination associated with 0.40 is 0.16. The coefficient of determination (0.16) also known as the predictive value means that 16% of students' GSSRL accounted for the variation in academic achievement in Biology. This is an indication that 84% of variation in academic achievement in Biology of students is attributed to other factors other than GSSRL.

Research Questions 2: What is the relationship between students' goal setting self-regulated learning and students' academic achievement in Biology based on gender?

Table 2: Pearson's Product Moment Correlation Analysis of the relationship students' GSSRL and achievement in Biology base on gender.

Variable	SD	N	r	R^2
Male Students' academic achievement	47.74	5.11	166	0.38	0.15
Female Students' academic achievement	47.72	4.61	166	0.44	0.19
Difference in r				0.06	

R^2 = coefficient of determination

In order to provide answer to research question 3, male students' responses on students' academic achievement in Biology scores were correlated and the correlation coefficient obtained was 0.38 as shown on Table 2. This means that, there exists a direct positive relationship between male students' academic achievement in Biology. The coefficient of determination associated with the correlation coefficient of 0.38 was 0.15. This coefficient of determination indicates that, 15% of male students accounted for the variation in their academic achievement in Biology. This implies that 85% of variation in their academic achievement in Biology is attributed to other factors other than male students. Table 3 also shows that, female students' responses on students' academic achievement in Biology scores were correlated and the correlation coefficient obtained was 0.44 as shown on Table 3. This means that, there exist a direct positive relationship between female students' and their academic achievement in Biology. The coefficient of determination associated with the correlation coefficient of 0.44 was 0.19. This coefficient of determination indicates that, 19% of female students' accounted for the variation in their academic achievement in Biology. This implies that 81% of variation in their academic achievement in Biology is attributed to other factors other than the female students. The difference in the relationship between the Biology students their academic achievement in Biology based on gender was 0.06 in favour of female students.

Hypothesis: There is no significant relationship between goal setting self-regulated learning and students' achievement in Biology.

Table 3: **Regression Analysis of the differences relationship between goal setting self-regulated learning GSSRL and achievement in Biology**.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	874.053	1	874.053	64.031	.000
Residual	4504.621	330	13.650		
Total	5378.675	331			

$\alpha = 0.05$

In order to test hypothesis 1 (H_{O1}), regression analysis was used. The result in Table 3 shows thatan F-ratio of 64.03 with associated exact probability value of .00 was obtained. This exact probability value of .00 was less than .05 level of significance set as bench mark and it was found to be significant. The null hypothesis which stated that there is no significant relationship between students' GSSRL and their academic achievement in Biology is therefore rejectedand inference drawn was that, there is a significant relationship between students' GSSRL and their academic achievement in Biology.

Discussion

Result in Table 1 is correlation coefficients of the relationship between students' goal setting self-regulated

learning strategy GSSRL and their academic achievement in Biology. Results showed that the correlation between students' goal setting self-regulated learning strategy GSSRLS and their academic achievement in Biology was .40. This means there was a moderate positive relationship between students' goal setting self- regulated strategy learning and their academic achievement in Biology. Hence, there was a significant relationship between students' self-regulated learning and their academic achievement in Biology. This finding portrays that self- regulated learning do plays an important role in either to predict or to affect students' Biology achievement as 16% of students' Self-regulated learning accounted for the variation in academic achievement in biology. The finding of this study supported that of other previous researcher such as Banu (2013) who asserted that is a moderate correlation between goal setting self-regulated learning (GSSRL) and high school students in Biology achievement in Turkish EFL. Also the finding is in line with Long (2013) who observed a slight positive correlate between goal self-regulated learning and students' academic achievement in Mathematics in Australian program in Malaysia and Ogbenevwede (2019) who averred that there is a moderate correlate between goal setting self-regulated learning and students' academic achievement in Biology in Delta Central Senatorial District. The study is also in consonance with Garrido Vergas (2012) who did not find the two 33-member groups to differ in mean goal setting self-regulated learning and mean academic achievement in a study designed to uncover psychological differences between academically weak and gifted students using the Tennessee self-concept scale (TSCS) and Tennessee cognitive development scale (TCDS). By virtue of this finding, this research has joined the school of thought that relates students' goal setting self-regulated learning significantly to students' academic achievement.

In order to provide answer to research question 2, male students' scores on academic achievement in Biology were correlated with those female students' scores on academic achievement in Biology and the correlation coefficient obtained were .34 and .44 as shown on Table 2. This means that, there exist a weak positive relationship between male students' scores and female students' scores in Biology academic achievement in favour of female students. The inference drawn was that, there was a significant relationship in the difference between male Biology students' academic achievement and that of their female counterpart in favour of female students. Hence female students have high academic achievement than the male students in Biology. This result is in line with Nanda et. al. (2020) and Ogbenwede (2019) who claimed that the female students had a better academic achievement in Biology than the male students. There was a statistically significant difference between male and female students in their academic achievement in Biology but the finding of the study is not in line with the findings of Nwafor et. al. (2015) who observed no significant relationship between junior secondary school students' goal setting

self-regulated learning and students' academic achievement in Basic science. By virtue of this finding, this research has joined the school of thought that relates male and female students' goal setting self-regulated learning significantly to male and female students' academic achievement in Biology in favour female students.

Conclusion

Based on the investigation into goal setting self-regulated learning strategy as correlate of students' achievement in Biology in Onitsha education zone of Anambra State, it can be concluded among others that female students responded better in goal setting self- regulated learning strategy GSSRLS and achieved better as compared to the male students in Biology and there is a significant differences between students' GSSRLS and their academic achievement in Biology.

Recommendations

1. Academic achievement is not a gender issue, both genders should be encouraged to excel in academic achievement since equal opportunities is provided for both genders. Students should be discouraged from forming stereotyped GSSRL towards certain subjects, because of their sexes. This will boost positive competition between males and females, and enhance academic achievement and excellence.
2. Teachers should work towards the development of positive GSSRL of the usefulness in Biology learning, by planning for the affective domain in their classroom. Teaching and learning should be organized to take account of individual student differences and teachers should be educated to understand the origins and implications of gender differences and to develop pedagogical skills to accommodate and modify these as appropriate. Teachers should be trained in skills to use materials within a critical gender framework, thus enabling students to study Biology materials critically from a gender perspective. Textbooks and other curricular materials should be critically evaluated for their gender inclusivity. This is because, when a Biology curriculum is presented in a framework familiar to both girls and boys, both genders are readily involved.
3. The school environment is a powerful agency of nurturing students to have high goal setting self – regulated learning strategy GSSRL. The teachers therefore should engage the learners in both curricular and co-curricular activities to enhance their goal setting self-regulated learning strategy. Teachers should guide and counsel students constantly to avoid a state of despair. Majority of the students who could not improve in academic achievement did not see the urge to adjust and developed a stereotype thinking that will enhance their grades.

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