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SELF-REGULATED LEARNING SKILLS AS A PREDICTOR OF SECONDARY SCHOOL STUDENTS ACADEMIC ACHIEVEMENT IN BIOLOGY IN ONITSHA EDUCATION ZONE

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ABSTRACT

This study investigated the self-regulated learning skill as a predictor of secondary school students' academic achievements in Biology in Onitsha Education Zone. Predictive correlational research design was adopted for the study. Three research questions and three hypotheses where used. The sample for the study was drawn from ten (10) secondary schools and it is comprised of 690 students of SS2 Biology. The instrument Self-Regulated Learning Skills Questionnaire (SRLSQ) developed by Daniel Frederico Marques Ezequiel Calvario Lourenco was adopted to collect data. Data collected was analyzed using linear regression. The findings of the study revealed that task analysis, self-motivational beliefs and self-observation positively and significantly predicated secondary school students' academic achievement in Biology. Based on the findings of the study, it was recommended among others that curriculum planners should make revisions in the curriculum that will prioritize the acquisition of self-regulated learning skills for students' improved academic achievement in Biology.

Keywords: Academic achievement; self- motivation; self -observation; task analysis; biology.

Introduction

Science is a rigorous, systematic endeavor that builds and organizes knowledge in the form of testable explanations and predictions about the world. Science is vital to nature. It is a conscious search for the interpretation of natural events. Nnoli and Okafor (2017) defined science as an exploration of the events in nature. In the views of Amannah, Okwelle and Wokocha (2014), science is an activity that seeks to gather and classify information while acquiring knowledge for the discovery of novel ways and ideas. They further defined science in terms of its products, process as well as ethics. According to Amannah, Okwelle and Wokocha (2014), the products of science consists of facts, concepts, theories and laws, the process of science entails the activities that are done in the course of scientific investigation namely: observation, classification, measurement, prediction, problem identification, data collection and drawing of valid conclusion while the ethics means the code of conducts in science. Science is taught and learnt in schools. It is this process that is known as science education. Biology seems to be the most vital and popular science subject among secondary school students. Biology is at the core of many witty inventions in science such as biotechnology, genetic engineering, DNA technology, pharmaceuticals as well as

health education which have considerably improved the living condition of man in his environment. Biology is so vital that it serves as a requirement for further study in science-related disciplines. Thus, Biology education in Nigeria is of paramount importance for national development. More so, the importance of Biology education to national development re-enforces the need for secondary school students' achievement in the subject to be prioritized by relevant stakeholders.

Academic achievement is a measure of extent to which a student has performed on exposure to curricular and co-curricular activities. Steinmayret, Heyder, Naumburg, Michels and Wirthwein (2018) defined academic achievement as the result of instructional performance as indicated by the extent to which a person has achieved specific goals in their learning activity in educational settings. In other words, academic achievement is measured in relation to a students' attainment at the expiration of a course, since it is the attainment of medium- or long-term goals of education. Nwanze (2016) referred to academic achievement as the outcome of learning which reveals the extent of accomplishment of instructional objectives. In the context of the current study, academic achievements can be ascertained via the final grades of students in their termly examinations in biology.

This trend of poor achievement is rather worrisome given that the recommendation of National Policy on Education (FRN, 2014) is to the effect that Biology is one of the subjects that is offered by both science and arts students. Apparently, there are many factors that could be attributed to the poor achievement of students in Biology such as learning style preferences of students, teaching method, nature of Biology curriculum, self-regulated learning skill among others. Panadero (2017) noted that self-regulated learning skill has become a potent factor to explain students' academic achievement because it captures a large number of variables related to learning, such as goal orientation, task specific strategies and metacognitive strategies.

Self-regulated learning skill is a student-centered learning skill which provides for learning at one's own pace. Self-regulated learning skill which was popularized in the 1980's entails learners' responsibility by encouraging them to learn by themselves Hamilton and Telu (2017). It is defined as one's ability to direct actions towards goals and ideas which can emanate from personal desires and consequently, assists the individuals in adjusting to societal demands Maja (2018). Akudo (2018) referred to it an act of learning that is guided by meta-cognition (thinking about one's thought), strategic action (planning, monitoring and evaluating personal progress against standards) as well as motivation to learn while evaluating one's own learning and behaviour. It entails goal-setting, self-instruction, self-monitoring, and self-reinforcement Dignath and Buttner (2018). Within the context of the current study, self-regulated learning skills include: task analysis, self-motivation beliefs, self-control, self-observation, self-judgment and self-reaction. Self-regulation skill is self-directive to the extent that it assists learners in transforming their mental abilities into habits via a developmental process that

emanates from guided practice and feedback Msayar and Akhmal(2016).

Motivation to learn and specifically self-belief with learning, may be influential in the transition into higher education. Undertaking measures of academic motivation may be useful to determine student engagement with curriculum, through identifying any link between student self-belief and performance in specific courses. Changes to curriculum based on student motivation as well as targeting early those students with reduced self-belief may improve student success, psychosocial wellbeing and retention.

Task analysis can be defined as the study of what a user is required to do in terms of actions and or cognitive processes. To achieve a task objective, the idea of task analysis provides some structure for the description of task or activities, which then make it easier to describe how activities fit together, and to explore what implication of this may be for the design of products. This can be particularly useful when considering the design of interfaces to product and how user interacts with them Kirwn and Ainsworth (1992). Task analysis is very essential in learning of biology and not just biology only but in all (from simple to complex). Task Analysis (TA) consists of three parts: Task Purpose, Task Classification and Task Demands. Self-observation is the beginning of self-knowledge. The challenge is to experience each thought, feeling and sensation as fully as possible without the attention wandering, and without judgement or evaluation. Self-study and self-observation precede and prepares for self-knowledge. “It is necessary to begin from the beginning. A man must begin observing himself as though he did not know himself at all, as though he had never observed himself.” Knowledge of oneself is a very big, but a very vague and distant aim. Man, in his present state is very far from self-knowledge. Therefore, strictly speaking, his aim cannot even be defined as self-knowledge. Self-observation is a skill which can be developed and cultivated. First one observes it, sitting by oneself in solitude and if this state of observation can be sustained in solitude then one can be in the state of observation throughout the day.

There are two methods of self-observation: analysis, or attempts at analysis, that is, attempts to find the answers to the questions: upon what does a certain thing depend, and why does it happen; and the second method is registering, simply There are two methods of self-observation: analysis, or attempts at analysis, that is, attempts to find the answers to the questions: upon what does a certain thing depend, and why does it happen; and the second method is registering or simply ‘recording’ in one’s mind what is observed at the moment. Self-observation, especially in the beginning, must on no account become analysis or attempts at analysis.

Research Questions

1. What is the predictive value of task analysis on academic achievement of secondary school students in Biology?
2. What is the predictive value of self-motivation beliefs on academic achievement of secondary school students in Biology?
3. What is the predictive value of self-observation on academic

achievement of secondary school students in Biology?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. Task analysis does not significantly predict academic achievement of secondary school students in Biology.
2. Self-motivation belief does not significantly predict academic achievement of secondary school students in Biology.
3. Self-observation does not significantly predict academic achievement of secondary school students in Biology.

Research Method

The study adopted predictive correlation research design. In the view of Nworgu (2015), predictive correlation survey design focuses on the relationships that exist between variables and predictive outcomes based on these relationships. The justification for the use of predictive correlation research design is on the premise that the study sought to predict secondary school students' academic achievement in Biology using their self-regulated learning skills in Onitsha Education Zone in Anambra state Nigeria.

The study was carried out using 610 senior secondary school Biology students in Onitsha Education Zone of Anambra state using simple random sampling technique was adopted to arrive at the sample size. Two instruments were used for data collection. The instrument was titled "Self-Regulated Learning Skill Questionnaire (SRLSQ)'' and achievements scores from biology SS1 cumulative average of their termly results.

SRLSQ was adapted for the study from an instrument developed by Lourenço (2016) to ensure that it covered the issues of the study. SRLSQ is a closed-ended questionnaire with a five-point rating scale ranging from Strongly Agree to Strongly Disagree. A closed-ended questionnaire is considered appropriate because it allows the participants to choose to avoid unwanted responses. SRLSQ consists of 48 items. The sub-scales included task analysis with four items, self-motivation beliefs with 13 items, self-control with 10 items, self-observation with eight items, self-judgment with six items and self-reaction with seven items. Certain modifications were made to some items to suit the current study. For example, 'courses' were modified to 'subjects' while 'training' was modified to 'instruction' SRLSQ was constructed in such a manner that the respondents will respond by opting for one of the five response categories viz: never true of me, seldom true of me, sometimes true of me, generally true of me and always true of me with numerical indices of 1, 2, 3, 4, and 5 respectively.

For the academic achievement, the scores of students in Biology termly examination were used for the study. It is an already existing data containing the Biology examination results of students for the academic session under review. Document containing cumulative average of termly results of students were used.

The instrument was validated by three experts; one in the Department of Science Education, one in the Department of Educational Foundations, and the other a

Biology teacher. They asked to examine the SRLSQ with respect to adequacy of the items and their relevance to the research. Their inputs were taken into consideration for the modifications of the SRLSQ such as removal and addition of some items in the final production of the SRLSQ.

The value of the reliability of SRLSQ is a result of the use of Cronbach alpha test. This was carried out by administering the SRLSQ to a class of 30 SSII students with similar characteristics in Nnewi Education Zone which is outside the study area. The internal consistency of the items in SRLSQ was determined using Cronbach alpha statistic. The alpha coefficient obtained is 0.84 for SRLSQ. This value was adjudged adequate and the SRLSQ deemed reliable since it falls in line with the recommendation of Nworgu (2015) who posited that an instrument is reliable and excellent when its reliability co-efficient is above 0.70 for quantitative research

Research Questions were analyzed using correlation analysis. Hypotheses were tested using linear regression. All the hypotheses were tested at 5% level of significance with the decision rule that the null hypothesis was rejected if p-value was less than the alpha level of 0.05; otherwise the null hypothesis was not rejected.

Result and Discussion

Research Question 1: What is the predictive value of task analysis on academic achievement of secondary school students in Biology?

Table 1: Prediction of Secondary School Students' Academic Achievement by their Task Analysis (n=604).

Model	Unstandardized (*B*)	Std. Error	Standardized β
Constant	60.150	2.518	
Task Analysis	.122	.168	.032

In Table 1, the unstandardized coefficient (B) of .122 shows that a unit rise in task analysis increases academic achievement score in Biology by .122. The standardized beta(β) of .032 shows that task analysis positively predicted academic achievement in Biology.

Hypothesis 1: Task analysis does not significantly predict academic achievement of secondary school students in Biology.

Table 2: *Regression Coefficient for Predicting achievement of secondary school students in Biology Using Task Analysis*

Model	Unstandardized *B*	Std Error	Standardized β	T	Sig	Decision
Constant	60.150	2.518		9.605	.000	Significant
Task Analysis Scores	.122	.168	.032	6.201	.001	Significant

As shown in Table 2, task analysis scores with β value of .032 significantly predicted secondary school students' academic achievement, $t(2,603)=-6.201$, $p=.001$. Since the p-value is less than 0.05, the null hypothesis is rejected.

Research Question 2: What is the predictive value of self-motivation beliefs on academic achievement of secondary school students in Biology?

Table 3: Prediction of Secondary School Students' Academic Achievement by their Self-Motivational Beliefs (n=604).

Model	Unstandardized (*B*)	Std. Error	Standardized β
Constant	60.150	2.518	
Self-Motivational Beliefs	.101	.090	.050

In Table 3, the unstandardized coefficient (B) of .101 shows that a unit rise in self-motivational belief increases academic achievement score in Biology by .101. The standardized beta(β) of .050 shows that self-motivational beliefs positively predicted academic achievement in Biology.

Hypothesis 2: Self-motivation belief does not significantly predict secondary school students' academic achievement in Biology.

Table 4: Regression Coefficient for Predicting achievement of secondary school students in Biology Using Self-Motivation Belief

Model	Unstandardized *B*	Std Error	Standardized β	T	Sig	Decision
Constant	60.150	2.518		9.605	.000	Significant
Self-Motivation Scores	.101	.090	.050	5.130	.003	Significant

Table 4 shows that self-motivation belief scores with a β value of .050 significantly predicted secondary school student's academic achievement, t (2,603) = 5.130, p=.003. Since the p-value is less than 0.05 (level of significance), the null hypothesis is rejected.

Research Question 3: What is the predictive value of self-observation on academic achievement of secondary school students in Biology?

Table 5: Prediction of Secondary School Students' Academic Achievement by their Self-Observation (n=604).

Model	Unstandardized (*B*)	Std. Error	Standardized β
Constant	60.150	2.518	
Self-Obervation	.214	.105	.088

In Table 5, the unstandardized coefficient (B) of .214 shows that a unit rise in self-observation increases academic achievement score in Biology by .214. The standardized beta(β) of .088 shows that self-control positively predicted academic achievement in Biology.

Hypothesis 5: Self-observation does not significantly predict secondary school students' academic achievement in Biology.

Table 6: Regression Coefficient for predicting achievement of secondary school students in Biology Using Self-Observation

Model	Unstandardized *B*	Std Error	Standardized β	T	Sig	Decision
Constant	60.150	2.518		9.605	.000	Significant
Self-Observation Scores	.214	.105	.088	4.752	.000	Significant

Table 6, shows that self-observation scores with a β value of .088 significantly predicted secondary school student's academic achievement, t (2,603) = 4.752, p=.000. Since the p-value is less than 0.05 (level of significance), the null hypothesis is rejected.

Conclusion

Based on the findings of the study, it was concluded that self-regulated learning skills positively predicted secondary school students' academic achievement in Biology. Finally, the study concluded that there is a significant prediction of secondary school students' academic achievement in Biology by self-regulated learning skills.

Recommendations

In view of the findings of the study, several recommendations were made which include: that the biology teachers should be sponsored by the government to embark on seminars & conferences associated with the use of the implementation of the use of self-regulated learning skills and for Biology teachers to make conscious effort towards evolving teaching strategies that would enable their students acquire task analysis skill for the improvement of their academic achievement in Biology. This will enable the students who have lost confidence to see themselves as capable & work towards a better academic achievement in biology using self-regulated learning skills.

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