Relationship Between Self-Regulated Learning Skill and Achievement of Secondary School Students in Physics in Enugu State

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Abstract

The study focused on the relationship between self-regulated learning skills and achievement scores of physics students in the secondary schools in Enugu state. Three research questions guided the study and three hypotheses were tested at 0.05 level of significance. The study adopted the correlational design. The study population comprised 1,304 SS2 physics students in Enugu Education Zone of Enugu state. A sample of 400 SS 2 physics students obtained using a multi-stage sampling was used in the study. The instrument for data collection was Self-regulated Learning Skills Scale validated by experts. The reliability of the instrument was established using Cronbach Alpha technique which yielded reliability coefficient of 0.73. The method of data collection involved administering the instrument to the students with the aid of research assistants. The data obtained were analysed using Pearson correlation coefficient. The results revealed that a significant low positive relationship existed between self-regulated learning and achievement scores in physics. There is also a significant low positive relationship between male students' self-regulated learning and their achievement score in physics. However, no significant relationship was found between female students' self-regulated learning and their achievement scores in physics. The study recommended that orientation exercises should be organized by educational stakeholders for students on the skills of self-regulated learning so as to have greater number of students improve on such skills.

Keywords: Self-regulated learning, physics, achievement, secondary school students

Introduction

The world is witnessing tremendous advancement in the area of science and technology. One of the major subjects necessary for such advancement is Physics. Physics deals with natural phenomena through the study of the nature of matter and energy. It attempts to help man understand the nature and structure of the universe. Branches within the field of Physics help us to study things in different ways and from different perspectives. The different fields

of Physics include: Acoustics, Astronomy, Astrophysics, Atomic physics, Biophysics, computation physics, cosmology among others.

The study of physics and other science subjects develops in the learner well defined abilities and values such as spirit of inquiry, creativity, objectivity and the courage to question (Federal Republic of Nigeria, 2004). In Nigeria, science education programmes are designed to enable the learner acquire problem solving and decision making skills and to discover the interrelatedness of the various science subjects such as the relationship existing between physics and health, agriculture, industry among others in the aspects of life.

Despite several efforts directed towards promoting the study of physics, students have continued to be inconsistent in their performance in external examinations. The report of students' performance in West African Examination Council (WAEC) physics examinations reveals that the number of students who passed physics from 2007-2018 at credit level is below 50% of the enrolled students in most of the years. The report from West African Examination Council for physics students in Enugu has remained poor. In 2013, the percentage of students who made credit pass in physics decreased drastically when compared to the previous year 2012. The percentage of students who made credit pass and above in physics also decreased in 2015 as compared to 2014. The number of students with credit passes from 2015 to 2018 has not been encouraging.

The inconsistencies reveal that there have not been persistent increases in the number of students passing physics across the years when compared to some other subject areas. Amuche, Amuche, Bello and Marwan (2014) reported that students' poor performance in physics examinations had been traced to a number of factors such as: shortage of physics textbooks in the library, inadequate laboratory facilities, insufficient time allocated for practical work, use of predominantly lecture method by physics teachers, use of too many technical

terms or terminologies in physics lessons, poor motivation of teachers, poor funding, and poor attitude of students towards the study of physics.

Efforts had been made by the Federal and state governments at improving the teaching and learning of physics in schools through building of science laboratories and provision of science equipment in the schools. Perhaps the lecture method of teaching commonly used by most physics teachers do not offer the students opportunity for active participation in the lesson and do not promote meaningful learning of physics concepts. It is hoped that making students take responsibility for their own learning through self-regulated learning may enhance students' academic achievement in physics.

Self-regulated learning is an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation and behaviour guided by their goals and contextual features in environment (Tang, 2012). Reports from a number of early studies on self-regulated learning show that self-regulated learners are familiar with and know how to apply series of cognitive strategies (rehearsal, elaboration, organization) which help them to attend, transform, organize, elaborate, and recover information; as well as be able to plan, control, and direct their mental processes toward achievement of learning goals.

Self-regulated learners show motivational beliefs and adaptive emotions such as a sense of academic self-efficacy (Banu, 2013), the adoption of learning goals, the development of positive emotion towards tasks (example joy, satisfaction, enthusiasm). Such learners have the capability to control and modify them to the requirements of the pre-set task and the specific learning situation (Loong, 2013). They plan and control the time and effort to be spent on tasks, and they know how to create and structure favourable environments, such as finding a suitable place to study and seeking help from teachers and classmates when they encounter problems. Self-regulated learners show greater efforts to participate in controlling and regulating

academic tasks, classroom climate, and structure; and are able to effect a series of volitional strategies aimed at avoiding external and internal distractions so that they maintain their concentration, effort and motivation in performing tasks (Banu, 2013). It has been found that a good mastery of self-regulatory techniques or skills has positive and significant correlation with academic achievement (Banu, 2013; Garrido-Vargas, 2012; Loong, 2013; Matuga, 2009).

Self-regulated learning has enabled students in the past to engage actively and take responsibility for their own learning. Hence, they tend to be more motivated and properly conceptualize the subject matters being learnt. It is thought that self-regulated learning may hold a beneficial boost for the learner as it provides many information-rich experiences that could be of great help to both male and female physics students. Since gender remains an issue in physics achievement, teaching and learning methods should enhance achievement across gender. This underscored the need to examine whether self-regulated learning would correlate achievement in physics irrespective of gender. Gender influence on academic achievement have remained inconsistent. The inconclusive results of gender predictions of achievement therefore, pose a problem that continually attracts the interest of researchers. Hence, gender was examined in this study.

Purpose of the Study

The purpose of this study was to investigate the relationship between self-regulated learning skills and achievement in physics by secondary schools students in Enugu state. Specifically, the study sought to find out the:

1. Relationship between self-regulated learning skills scores of students and their achievement scores in physics.
2. Relationship between male students' self-regulated learning skills scores and their achievement scores in physics.

3. Relationship between female students' self-regulated learning skills and their achievement scores in physics.

Research Questions

The following research questions guided the study:

1. What is the relationship between self-regulated learning skill scores and achievement scores in physics?
2. What is the relationship between male students' self-regulated learning skill scores and achievement scores in physics?
3. What is the relationship between the female students' self-regulated learning skill scores and achievement scores in physics?

Hypotheses

1. There is no significant relationship between self-regulated learning skill scores and achievement scores in physics.
2. There is no significant relationship between male students' self-regulated learning skill scores and achievement scores in physics.
3. There is no significant relationship between the female students' self-regulated learning skill scores and their achievement scores in physics.

Method

The design adopted for the study was correlational. The choice of correlation design was because the study established the relationship between self-regulated learning and students' achievement scores in physics. There are different institutions of higher learning in Enugu state. The population of the study was 1,304 senior secondary two (SS2) physics students in all the public secondary schools in Enugu state. The sample for the study was 400 SS2 physics students. A multi-stage sampling procedure was used compose the sample using purposive and simple random sampling.

The instrument for the study was Self-regulated Learning Skill Scale (SLSS). SLSS was a modified Motivated Strategies for Learning questionnaire (MSLQ) designed and developed by Paul R. Pintrich, David A.F. Smith, Teresa Garcia, and Willbert J. McKeachie in 1990. Students rated themselves on a seven-point scale from "not at all true of me" to "very true of me". Negatively worded items and the ratings have to be reversed before an individual's score can be computed. The result of the physics students in the second term examination in which the instrument was administered was collated. The instrument, the objectives of the study, the research questions and hypotheses were validated by two experts and one experienced physics teacher in secondary school for validation. The reliability of the instruments was established using Cronbach Alpha technique. This choice of Cronbach Alpha was because the instrument was polytomously scored. The instrument was administered once to forty (40) SS2 Physics students outside the study area. The scores of the students from the instrument were computed for reliability index using Cronbach Alpha. The coefficient of internal consistency obtained was 0.73.

The instrument was administered on a one on one basis to the students through the help of the four research assistants and the schools' physics teachers in each school that were used in the study having obtained permission from the school authority.

Data relating to the research questions were analysed using Pearson correlation coefficient to determine the nature and magnitude of relationship. The interpretation of the correlation is as follows: $r = .00$, no relationship, $r = \mp.01\ to\ \mp 0.20$, low relationship; $r = \mp.20\ to\ \mp 0.50$, slight to fair relationship; $r = \mp.50\ to\ \mp 0.70$, substantial relationship; $r = \mp.70\ to\ \mp 0.99$, high relationship and $r = \mp 1.00$, perfect relationship. The decision rule for testing the hypothesis is reject null hypotheses when the significant value (P-value) is less than 0.05, otherwise the null hypotheses were not rejected.

Results

Research Question 1: What is the relationship between self-regulated learning skill scores of students and their achievement scores in physics?

Table 1: Relationship between Students' Self-Regulated Learning and Achievement scores in physics

Source of Variation	n	Self-regulated learning r	Achievement in physics r	Remark
Self-regulated learning	400	1.00	0.045	Low Positive Relationship
Achievement in physics	400	0.045	1.00	

Table 1 shows that a very low positive relationship of 0.045 exists between self-regulated learning and achievement scores in physics.

Research Question 2: What is the relationship between male students' self-regulated learning skill scores and their achievement scores in physics?

Table 2: Relationship between male students' self-regulated learning and achievement scores in physics

Source of Variation	n	Self-regulated learning r	Achievement in physics r	Remark
Self-regulated learning	157	1.00	0.158	Low Positive Relationship
Achievement in physics	157	0.158	1.00	

Table 2 shows that a low positive relationship of 0.158 exists between male students' self-regulated learning and their achievement scores in physics.

Research Question 3: What is the relationship between the female students' self-regulated learning skill scores and their achievement scores in physics?

Table 3: Relationship between female students' self-regulated learning and achievement scores in physics

Source of Variation	n	Self-regulated learning r	Achievement in physics r	Remark
Self-regulated learning	243	1.00	0.037	Low positive Relationship
Achievement in physics	243	-0.037	1.00	

Table 3 shows that a low positive relationship of -0.037 exists between female students' self-regulated learning and their achievement scores in physics.

Hypothesis 1: There is no significant relationship between self-regulated learning skill of students and their achievement scores in physics.

Table 4: Test for significant relationship between students' self-regulation learning and achievement in physics

		Self-regulated learning	Achievement in physics
Self-regulated learning	Pearson Correlation	1	.100*
	Sig. (2-tailed)		.045
	N	400	400
Achievement in physics	Pearson Correlation	.100*	1
	Sig. (2-tailed)	.045	
	N	400	400

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4 shows that correlation coefficient of 0.045 between self-regulated learning and achievement in physics is significant P(0.045) < 0.05. Therefore the null hypothesis was rejected. Thus, there is significant relationship between self-regulated learning of students and their achievement scores in physics.

Hypothesis 2: There is no significant relationship between male students' self-regulated learning skill and their achievement scores in physics.

Table 5: Test for significant relationship between male students' self-regulation learning and achievement score in physics

Male		Male self-regulated learning	Male physics Achievement
self-regulated learning	Pearson Correlation	1	.158*
	Sig. (2-tailed)		.047
	N	157	157
Physics Achievement	Pearson Correlation	.158*	1
	Sig. (2-tailed)	.047	
	N	157	157

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5 shows that correlation coefficient of 0.158 between male students' self-regulated learning and their achievement scores in physics is significant P(0.047)<0.05.

Therefore the null hypothesis was rejected. Thus, there is significant relationship between male students' self-regulated learning scores and their achievement scores in physics.

Hypothesis 3: There is no significant relationship between the female students' self-regulated learning skill and their achievement scores in physics.

Table 6: Test for significant relationship between female students' self-regulation learning and achievement score in physics

Female		Female self-regulated learning	Female physics Achievement
self-regulated learning	Pearson Correlation	1	.037
	Sig. (2-tailed)		.562
	N	243	243
Physics Achievement	Pearson Correlation	.037	1
	Sig. (2-tailed)	.562	
	N	243	243

Table 6 shows that correlation coefficient of 0.037 between female students' self-regulated learning and their achievement scores in physics is not significant P(0.562)<0.05. Therefore the null hypothesis was not rejected. Thus, there is no significant relationship between female students' self-regulated learning and their achievement scores in physics.

Discussion

Self-regulated learning according to Tang (2012) is an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation and behaviour guided by their goals and contextual features in environment. The students at the senior secondary level of education have had some experience in learning. Physics as a science subject often prove difficult for students. The students to overcome the difficulties associated with learning physics must over time have developed some collective and individual skills for learning physics. These skills whether setting goals, metacognitive self-regulation, monitoring and evaluation of self are all part of self-regulated learning.

Accordingly, when learners are in a problem situation and attempt to find solution to challenging tasks, they not only perform cognitive activities, they also set for themselves specific goals, arrange their activities, monitor their achievement during the problem-solving process and evaluate the efficiency of their actions (Seel, Ifenthaler, & Pirnay-Dummer, 2009; Wirth & Leutner, 2008). The processes of self-regulated learning can be greatly enhanced through serious engagement with learning activities. The results of this study support the findings of Sedigheh, Mohd and Reza (2012) when they reported that there was a positive meaningful relationship between SRL and students' achievement. The result of the study also supports the finding of Abrami, Wade, Pillay, Ofra, Bure, and Bentley (2007) who found out that the self-regulated learning positively correlated with achievement.

The study also revealed that there was a significant low positive relationship between male students' self-regulated learning and their achievement in physics. However, a non-significant low positive relationship existed between female students' self-regulated learning and their achievement in physics. The diverse nature of students' academic wants and individual differences among learners makes it hard to create an environment that could encourage self-regulated learning even for the most experienced teacher. The wants is most of the time different for male and female students. Male students who seem more inclined to science related subjects may devout more skills in the learning of physics concepts than females especially on the grounds of gender stereotyping in the teaching and learning of science.

Another explanation for the results of significant correlation between male students' self-regulated learning and achievement in physics is the issue of social support and feedback. One important way to help students be more self-regulative is through social support and feedback from teachers and peers as well. Patrick, Ryan, and Kaplan (2007) noted that students who were keen on using self-regulated learning were mostly those who received social support from their teachers and peers. The social support can be in the form of effective feedback

where-with teachers include information about what students did well, where they need improvement and how best they can improve in the area noted in the feedback. Such social support can easily be facilitated through peer help. Peer tutorials and help from other students can facilitate the learning of concepts. This is common with male students who may find more interest in learning physics than female.

Conclusion

It can be concluded from the findings of the study that self-regulated learning has significant relationship with students' achievement in physic.

Recommendations

In the light of the findings also, the recommends that:

1. The government should provide facilities such as libraries within school environment that students can use when engaging in self-regulated learning.
2. Orientation exercises should be organized by educational stakeholders for students on the strategies of self-regulated learning so as to have greater number of students improve on such skills.
3. Teachers should always encourage students to indulge in self-regulated learning activities while at the same time giving them tasks that will move them to engage in the practice and use of such skills.

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