

SELF-EFFICACY AND MOTIVATION AS CORRELATES OF SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN PHYSICS

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Abstract

The study was carried out on Self-efficacy and Motivation as correlates of secondary school students' academic achievement in Physics in Enugu state.. Three research questions and three null hypotheses were used to guide the study. The researchers adopted a correlation survey design. The sample comprises of 384 SSII physics students which were drawn from 12 out of 25 government owned secondary schools in Enugu Education Zone of Enugu State using a multi-stage sampling technique. Physics Self- Efficacy Questionnaire (PSEQ) and Physics Motivation Questionnaire (PMQ) were used for data collection. The PSEQ consists of 20 items measured in 5-point Likert scale format and adapted from Sawtelle (2011) while the PMQ also consists of 20 items measured in 5-point Likert scale format and adapted from Mubeen and Reid (2014). Pearson Product Moment Correlation and Regression analysis were used to answer and test the research questions and hypotheses respectively. The findings of the study indicated that self-efficacy was not a significant factor on students' academic achievement in physics, while motivation was a significant factor on students' academic achievement in physics. The findings also revealed that there was a low positive relationship between self-efficacy and motivation on students' academic achievement in Physics. Motivation was of great influence on students' academic achievement in Physics while self-efficacy had no significant influence on academic achievement in Physics. Based on the findings, it was recommended that; Teacher education programmes should train teachers on ways to improve their students' motivation, both state and federal governments should organize workshops and seminars and sponsor teachers to attend in-service courses on how to improve their teaching skills in order to enhance their students' achievement.

Keywords: Self-efficacy, motivation, academic achievement.

Introduction

Education is described as the development of desirable qualities in people. This is why the basic principle of education in Nigeria is equipping every citizen with knowledge, skills, attitudes and values as to enable one to derive maximum benefits from one's membership in a society, live a fulfilling life and contribute to the development and welfare of the society. In the spirit of promoting basic education

and ‘education for all’ there was a plan to provide every child with nine year schooling up to the junior secondary school level (World Data on Education, 2010).

Education helps an individual to achieve knowledge, skills, values and attitudes and be able to translate it into benefit, leading to a fulfilled life and equally contributing to the welfare of their community (Pahalson& Habila, 2014). Education therefore is a change agent that transforms an individual or society from primitive way of life of the Dark Age to modern society of today which is full of scientific and technological inventions. Hence, the valuable roles of science and technology cannot be overemphasized.

Science and technology study is the study of how social, political and cultural values affect scientific research and technological innovation, and how these, in turn affect society, politics and culture. Science and technology is quite a broad category and it covers everything from studying the stars and the planets to studying molecules and viruses. Beginning with the Greeks and Hipparchus and Galileo and today, man continues to learn more and more about the world. In technology, you will find many things that make life easy today. This includes medical advances like magnetic resonance imaging machines, portable computing devices and flat screen televisions.

Science which is a branch of study and part of education is as old as man. Since the inception of science, emphasis has been laid on the study and improvement of science because of its impact on the technology of nations. Its valuable role cannot be over emphasized in the societal world. According to Ezema (2011), science is an ever expanding dynamic subject involving the study of natural phenomenon and matter. It is a systematic enterprise that builds and organizes knowledge in the form of testable explanation and predictions about the universe. The introduction of science into Nigeria’s post primary institution according to Ebeh (2009) started as early as 1878. It was taught as “general science” before with some basic ideas of Chemistry, Biology and Physics. The general sciences were suitable for least science oriented students who cannot pursue science beyond O’level stage. Later, there was introduction of core science subjects which emerged from the general science. The core subjects are Biology, Chemistry and Physics.

Physics which is a branch of science is one of the core science subjects taught at the senior secondary school level of the Nigeria education system and is highly needed for technological breakthrough. It is a branch of science that deals with energy and matter and their interactions. It is sometimes referred to as the science of measurement and its knowledge has contributed greatly to the production of instruments and devices of tremendous benefits to the human race (Sani, 2012). The knowledge of physics is usually required to pursue courses like Astronomy, Geology, Medicine, Pharmacy, Engineering among others. Udoh (2012) established that learning of physics offers the students an opportunity to think critically, reason

analytically and acquire the spirit of enquiry. This is why he asserted that: physics is crucial for effective living in the modern age of science and technology. Given its application in industry and many other professions, it is necessary that every student is given an opportunity to acquire some of its concepts, principles and skills.

Despite the importance of physics as a subject, it is widely recognized that the teaching and learning of physics has been fraught with challenges such as low enrolment both in secondary schools and in tertiary institutions in Nigeria (Ojediran, 2016). Among the causes of low enrolment of students offering physics in schools include poor science and mathematics background of students at the junior secondary level of education, poorly equipped physics laboratory, inadequate motivation of teachers and students, poor remuneration, inappropriate teaching strategies employed by the teachers, insufficient number of qualified physics teachers, lack of proper orientation to the students, lack of indigenous textbooks (NERDC, 2009; Jegede & Adedayo, 2013; Sani, 2012).

These factors have equally added to decline in performance of students who enrolled for physics at the Senior Secondary Certificate Examination (SSCE). This is evident in the West African Examination Council (WAEC) results between 2011 and 2016. A total of 165,604 candidates, representing 31.28% who sat for the 2016 WAEC in Nigeria, obtained credits and above in physics when compared to what was obtained in the same examination in 2015, 29.27%, 2014, 29.17%, 2013, 38.81%, 2012, 26.80% and 2011, 32.64%. This shows that performance in Physics not only fluctuates but also declines with years. The problem of low enrolment of students in physics class and poor performance of physics students in SSCE had been in part attributed to students' attitudes towards the subject and students' misconceptions that Physics and most science subjects are difficult (Mekonnen, 2014). Affective factors such as anxiety, attitudes, interests, values, preferences, self-esteem, locus of control, motivation and self-efficacy influence students learning behavior and affect their final academic achievement in their coursework. In this study, focus is on self-efficacy and motivation.

Self-efficacy is the beliefs in one's capabilities to organize and execute the courses of action required for producing a given attainment. It refers not to the actual abilities of someone to perform certain tasks but rather to their self-perception of being able to perform certain tasks under given conditions. The importance of self-efficacy appears to depend on its ability to affect human's choices and behaviours. Indeed, Bandura (2006) supported that self-efficacy plays a key role in the development of human achievements and motivations. Bandura's work strongly supports the motion that human behaviours, their motivations as well as the outcome of their actions (success or failure) are the product of their self-efficacy. Thus, the way people think, feel, act and motivate themselves is affected by self-efficacy. Researchers studying self-efficacy suggest that people lacking in self-efficacy have

problems with motivating themselves to carry out tasks. When students have the impression that they will not be able to complete a certain task they will not make an effort to fulfill it and they will easily quit.

Academic self-efficacy includes various learning and teaching processes. Jamali, Noroozi and Tahmasobi (2012) referred to academic self-efficacy as students' perceptions of their competence to do their class work. Academic self-efficacy refers to individuals' convictions that they can successfully perform given academic tasks at designated levels, which also includes the beliefs about the capabilities to achieve the tasks in certain academic fields. This belief is closely linked to self-concept which is a general self-descriptive belief that incorporates many forms of self-knowledge and self-evaluative feelings.

Motivation on the other hand, is an inner drive that directs a student's behaviour towards the fulfillment of a goal. Motivation is a goal-directed behaviour and indicates the willingness of the students to exert high levels of effort toward achieving goals. Motivation influences how and why people learn as well as their academic achievement. Research opinions have suggested the validity of self-efficacy as a predictor of student's motivation and learning. To perceive the relationship between self-efficacy and motivation, self-efficacy is observed to be a major ingredient in motivation (Bandura, 2006). Self in this context is seen as cognitive structure that provides reference mechanisms and a set of sub-functions for perception, evaluation and regulation of behaviour.

Therefore, it is important to determine the variables that influence students' achievement in physics; and this study now explored self-efficacy and motivation as correlates of secondary school students' academic achievement in Physics.

Statement of the Problem

The development in technology in Nigeria is poor and this contributes immensely to the state of underdevelopment in Nigeria (Adedayo & Jegede, 2013). There is need to redress and bring about a worthwhile growth in technology. Given that physics is one of the major subjects meant to provide the basic developments needed in technology, its effective learning should be put into consideration by adopting different strategies that will promote learning.

Majority of the students in the secondary schools in Nigeria perceive physics as a difficult subject. The cause of the negative perception of students towards physics was identified to include the fear of the mathematical skills involved, poor teacher-students relationship, students' un-readiness to study, preconceived bad information that physics is a difficult subject and poor method of teaching. This impression greatly affects students' readiness, interest, motivation and self-efficacy to the study of physics. If the situation is left unchecked, the performance of the students

academically will be affected negatively and this becomes a problem. There is the need therefore, to examine the relationship between some affective factors like self-concept and motivation and students' academic achievement in Physics.

Research Questions

The following research questions guided the study;

1. What is the relationship between students' self-efficacy and their academic achievement in physics?
2. What is the relationship between students' motivation and their academic achievement in physics?
3. What is the joint influence of self-efficacy and motivation on students' academic achievement in physics?

Hypotheses

The study tested the following null hypotheses:

1. There is no significant relationship between students' self-efficacy and their academic achievement in physics.
2. The relationship between students' motivation and their academic achievement in physics was not significant.
3. There is no significant correlation among students' self-efficacy, motivation and their academic achievement in physics.

METHOD

The correlation survey design was used in this study. The correlation survey studies according to Nworgu (2015) seek to establish what relationship exists between two or more variables. The study was conducted in Enugu Education Zone of Enugu State. There are 25 public senior secondary schools in the zone. The population of the study was made up of the entire Senior Secondary two (SSII) Physics Students totaling 1,911 students in the 25 government owned secondary schools within Enugu Education Zone.

The sample comprises of 384 SSII physics students' who were drawn from 12 out of 25 government owned schools in Enugu Education Zone, using the multi-stage sampling technique. Two (2) instruments were used for data collection. These are: Self-Efficacy Questionnaire (SEQ) and Physics Achievement Motivation Questionnaire (PAMQ). The self-efficacy questionnaire developed by Sawtelle (2011) was adapted to determine students' self-efficacy in Physics. This instrument consists of 20 items. Participant's responses were measured using 5-point Likert scale ranging from "strongly agree" to "strongly disagree". The Physics achievement motivation questionnaire (PAMQ) developed by Mubeen and Reid (2014) was adapted to determine students' achievement motivation in physics. This instrument consists of 20 items. Participant's responses were measured using 5- point Likert

scale ranging from “strongly agree” to “strongly disagree”. Students’ cumulative annual results of the 2017/2018 session were also used.

The instruments were validated by experts and a reliability coefficient was established to be 0.91 for Physics Self- Efficacy Questionnaire and 0.89 for Physics Achievement Motivation Questionnaire. The researcher with the aid of research assistants which were subject teachers in the sampled schools distributed the instruments to the respondents. After the students have filled the instruments, their names were used to obtain their results. Pearson product moment correlation and regression analysis were used to answer the research questions while the hypotheses were tested at 0.05 level of significance by comparing the computed correlation index against the critical values for appropriate decision. Any correlation coefficient $r=+$ or $- 0.3$ shows a low relationship while above 0.3 shows high relationship. Null hypothesis was rejected when p-value is less than ($<$) 0.05, otherwise it was not rejected.

Results

Research Question 1: What is the relationship between students’ self-efficacy and their academic achievement in physics?

Table 1:

Correlation of Students’ Self-efficacy and Achievement in Physics

Predictor	N	Achievement in physics r	Self-efficacy r	Remark
Self-efficacy	384	0.074	1.00	low positive Relationship
Sig. (1-tailed)		0.073		

Table 1 shows the relationship between students’ Physics self-efficacy and achievement, which indicated a low positive Pearson’s coefficient of 0.074. This means that as students Physics self-efficacy goes up, their Physics achievement also increases. However, the strength of this positive relationship between the variables is weak since 0.074 is less than 0.3 showing a weak positive relationship.

Hypothesis 1: There is no significant relationship between secondary school students’ self-efficacy and their academic achievement in physics.

The data on Table 1 also showed that the positive correlation that existed between Physics students’ self-efficacy and their achievement was not significant, since the

p-value of 0.073 obtained was greater than 0.05 level of significance in which the hypothesis was stated.

Research Question 2: What is the relationship between students' motivation and their academic achievement in physics?

Table 2:
Correlation of Students' Motivation and Academic Achievement in Physics

Predictor	N	Achievement in physics r	motivation r	Remark
Self-efficacy	384	0.182	1.00	low positive Relationship
Sig. (1-tailed)		0.001		

Table 2 shows the relationship between students Physics motivation and achievement, which indicated a low positive Pearson's coefficient of 0.182. This means that as students Physics motivation goes up, the value of their Physics achievement also increases. However, the strength of this positive relationship between the variables is weak since 0.182 is less than 0.3 which shows weak positive relationship.

Hypothesis 2: The relationship between students' motivation and their academic achievement in physics was not significant.

The data on Table 2 also showed that the positive correlation that existed between physics students' motivation and their achievement was significant, since the p-value of 0.001 obtained was less than 0.05 level of significance in which the hypothesis was stated.

Research Question 3: What is the joint influence of self-efficacy and motivation on students' academic achievement in physics?

Table 3:
Regression Analysis of Students Self-efficacy, Motivation and Achievement in Physics

Predictors	b	SEb	β	t	Sig.
Constant	31.375	5.497		5.798	.000
Self-efficacy	.060	.050	.061	1.200	.231
Motivation	.205	.058	.177	3.519	.000

Table 3 shows the combined relationship between physics self-efficacy, motivation and academic achievement. From the table, both predictors have positive b-values

0.060 (self-efficacy) and 0.205 (motivation) indicating positive relationships. So as students' self-efficacy increases, achievement increases and as physics motivation increases, achievement also increases. Physics motivation showed a stronger positive relationship with achievement than self-efficacy.

Hypothesis 3: There is no significant correlation among secondary school students' self-efficacy, motivation and their academic achievement in physics.

The data on Table 3 also showed that the positive relationship between self-efficacy achievement (self-efficacy, $t(381) = 1.200$; $p = 0.231$) was not significant since the p-value of 0.231 obtained was greater than 0.05. While, the positive relationship between motivation and achievement (motivation, $t(381) = 3.519$; $p = 0.001$) was significant since the p-value of 0.001 obtained was less than 0.05.

Discussion

Self-efficacy was not a significant factor on students' achievement in physics since the p-value of 0.073 obtained is greater than 0.05. The result showed that self-efficacy had positive correlation with students' achievement but the positive relationship had no significant direct effect on achievement. This finding contradicted the result findings of Ghazanfar and Akram (2014), Screenivasulu (2015) and Deniz and Hatice (2016), whose results revealed significant influence of self-efficacy on achievement of students. Their findings proved that improvement of students' physics self-efficacy increases their tendency toward meaningful learning.

Motivation was a significant factor on students achievement in physics since the p-value of 0.001 obtained was less than 0.05. This means that motivation is positively correlated and significantly influences students' achievement in physics. This finding is in agreement with those of Chow and Seng Yong (2013) and Deniz and Hatice (2016), whose findings revealed that there is a significant influence of motivation on achievement.

The combined relationship between self-efficacy and motivation on students' achievement in physics proved that both self-efficacy and motivation had positive influence on students' achievement. This positive impact on students' academic achievement was significant for motivation and not significant in the case of self-efficacy. This result is partly in agreement with the findings of Sahile (2014) and Deniz and Hatice (2016) which revealed that motivation and self-efficacy were significant predictors of students' academic achievement.

Conclusion

The study had shown that there was a low positive relationship between self-efficacy and motivation on students' academic achievement in Physics. Motivation was of

greater influence on students' academic achievement in Physics while self-efficacy had no significant influence on academic achievement in Physics.

Recommendations

Based on the findings of this study, the following recommendations are put forward.

1. Teacher education programmes should include training of teachers on ways of improving their students' achievement motivation by adopting different teaching strategies and skills.
2. Ministries of education, both state and federal should organize workshops and seminars and sponsor teachers to attend in service courses on how to improve their teaching skills in order to enhance their students' achievement motivation, thereby effectively promoting students' academic achievement.
3. Teachers' training centers and supervision departments at schools should put in more efforts in helping teachers' perceive the importance of using activities and procedures that improve students' achievement motivation both intrinsically and extrinsically.

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