

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

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Abstract

Research has shown that motivation and self-efficacy are related to students' achievement in academic activities in school. Studies have been conducted with the view of remedying the poor performance of students in physics but not all have been successful. However, such studies focused mainly on the cognitive aspect of students with little attention to the psychological variables. This study, therefore, determined how motivation and self-efficacy correlate with secondary school physics students' academic achievement. Correlational research design was adopted for the study using a sample of 210 senior secondary one physics students in Benue State, Nigeria. Data collection was achieved using the motivation scale and self-efficacy scale. Correlation statistics and analysis of variance were used to analyse the data. Results showed that motivation and self-efficacy significantly correlated positively with the students' academic achievement in physics. This implies that low motivation and self-efficacy of students will result in low academic achievement in physics and vice versa. It was recommended that favourable academic environment should be provided for the learners to promote their motivation and self-efficacy.

Keywords: *Correlation, Motivation, Physics, Students' academic achievement, Self-efficacy*

Introduction

Students' performance in physics examinations in Nigeria has been below expectations for several years now (Ugwuanyi et al., 2020a; Ugwuanyi & Okeke, 2020). Ugwuanyi et al. (2020b) found that students' achievement and retention in physics have been on the decline in Nigeria. Similarly, Gana et al. (2020) noted that students' performance in physics concepts over a decade now has been poor. The present researchers observed that earlier research in Nigeria traced learners' poor achievement to teachers' specific factors such as psychological factors. Despite this, most research in physics education focused more on the cognitive aspect of the students than their psychological factors. According to Antonio, Maria-Victoria and Paola-Veronica (2017), self-efficacy and motivation, among others, are all factors that need to be extensively evaluated in the academic context. However, most of these factors have not been properly researched especially how they relate to academic achievement (Antonio, Maria-Victoria & Paola-Veronica, 2017).

According to Schumacher and Ifenthaler (2018), motivation is the driver of a person's actions. Schunk et al. (2008) defined motivation as the process of instigating and sustaining goal-directed activity. According to Cook and Artino Jr (2016), motivation results from the interaction between environmental and individual factors. Based on the foregoing, Bandura (1977) as well as Zimmerman et al. (2017) submitted that both internal and external factors such as self-efficacy influence a person's motivation. Bandura (1977) defined self-efficacy as individuals' beliefs which concern their judgments and capabilities in order to reach designated goals through organised actions. Individuals who have a high level of self-efficacy are more confident in executing difficult tasks that they encounter (Kapucu, 2017). In line with the above views, the present researchers explored how motivation and self-efficacy

relate to students' achievement in physics within the theoretical frameworks of B.F Skinner and A. Bandura.

Theoretical background of the study

Theoretically, this study was anchored on Skinner's (1938) operant conditioning theory and Bandura's (1977) social cognitive theory. Skinner (1938) believed that reinforced behaviour repeats itself while the reverse becomes the case. This theory implies that adequate motivation of students produces high achievement. On the other hand, Bandura's SCT states that people learn new behaviour from the observation of a model performing a behaviour. This implies that behavioural change depends on a person's perceived self-efficacy.

Review of related empirical studies

Mohammad (2017) found that motivation correlates positively with students' reading comprehension. Achufusi et al. (2019) found that students' achievement significantly depends on motivation. Wenty and Slamet (2019) found that self-motivation relates positively with the achievement of students in biology. The learning achievement of the students of biology education significantly depends on their intrinsic and extrinsic motivation (Tokan & Imakulata, 2019). Taştan et al. (2018) reported that academic achievement in science education significantly correlates with teacher's motivation. According to Metriana as cited in Tokan and Imakulata (2019), motivation and self-efficacy had a significant positive correlation with achievement.

van Rooij, Jansen and Van de Grift (2017) revealed that students' cognition and academic interest relate positively to self-efficacy. Physics self-efficacy correlates positively with students' mathematics achievement as well as physics achievement (Kapucu, 2017). Rahman et al. (2019) revealed that teachers' self-efficacy significantly correlates positively with academic achievement. Ozkal (2019) found that self-efficacy beliefs in learning determine the achievement of students in mathematics. Suprayogi, Ratriana and Wulandari (2019) found that academic efficacy had a significant relationship with academic achievement. Taştan et al. (2018) reported that teachers' self-efficacy significantly relates to science education students' academic achievement.

The foregoing shows that a lot of studies have been conducted on the relationship among motivation, self-efficacy, and students' academic achievement. Careful examination of the findings of those studies showed that there are a lot of inconsistencies in the findings of the studies. However, most of the studies were conducted in other countries other than Nigeria. Thus, these researchers deemed it necessary to carry out this research within the Nigerian context using secondary school learners in Benue state.

Objectives of the Study

The study sought to determine the:

1. Correlation between motivation and physics students' academic achievement.
2. Correlation between self-efficacy and physics students' academic achievement.

Research questions

1. What is the correlation between motivation and physics students' academic achievement?
2. What is the correlation between self-efficacy and physics students' academic achievement?

Hypotheses

H₀₁: There is no significant correlation between motivation and physics students' academic achievement.

H₀₂: There is no significant correlation between self-efficacy and physics students' academic achievement.

Methods

Research Design

Correlational survey research design was used for this study. This type of study establishes the relationship that exists between variables. In similar studies, Gana, Ugwuanyi and Ageda (2019), Gana et al. (2020), Ugwuanyi, Okeke and Ageda (2020), Ugwuanyi, Okeke and Njeze (2020) and Ugwuanyi et al. (2020c), have used this design.

Participants

A sample of 210 senior secondary I (SS I) Physics students formed the participants for the study. This sample was drawn from a public secondary school population of 8,652 SS I Physics students in education Zone B of Benue State, Nigeria. The sample was composed through a multi-stage sampling procedure starting with the selection of four local government areas using a simple random sampling technique by balloting at the first stage. Fifteen secondary schools were sample out of the 64 public secondary schools using a disproportionate stratified random sampling technique. Finally, using a disproportionate stratified random sampling technique, 14 SS I physics students were sampled from each of the 15 senior secondary schools totaling 210 students.

Instrumentation and Procedure

The data for this study were collected using the Motivation Scale (MS) and Self-efficacy scale (SES). The researchers' motivation scale is a 20-item statement to elicit responses from the students on their level of motivation to learn. The self-efficacy scale as developed by the researchers is a 15-item statement to elicit responses pertaining to students' self-efficacy. The items of both MS and SES were modeled on a 4-point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

Students' academic achievement in physics were requested from the head of physics of the various schools used for the study. Copies of the first and second terms' results of the students who participated in the study were made available to the researchers for the sole purpose of the research. This enabled the researchers to extract the scores of the participants while the average of the scores served as the achievement score of each of the students.

Instruments Validation

To ensure the face validity of the MS and SES, the instruments were presented to three experts in instrument development. The experts looked at the clarity of items, simplicity of vocabulary, and relevance of items of the instruments to the research objectives. Based on the observations and corrections of these experts, the instruments were modified accordingly. Copies of the validated instruments were trial tested on 20 students outside the study area to establish the reliability of the items of the instruments. The reliability indices obtained for the MS and SES using Cronbach alpha were 0.83 and 0.77 respectively.

Finally, copies of the instruments were administered to the selected schools through visitation to the sampled schools by the researchers with the help of research assistants. The copies of the instruments were retrieved from the participants after completion.

Ethical Measures

The ethical approval to conduct this research was granted by the Research Ethical Committee of the Faculty of Education, University of Nigeria.

Data Analyses

Simple linear regression analysis was used to answer research questions and test the null hypotheses. The null hypotheses were tested at 5 percent probability level.

Results

H₀₁: There is no significant correlation between motivation and physics students' academic achievement.

Table 1: Regression analysis of the correlation between motivation and physics students' academic achievement

1.	2.	3.	r	4.	Standard error of	6.	F	7.	8.
	r	Squared			the		f		
				5.	Estimate				
9.	10.	11.	.42	12.	1.43	13.	8	14.	15.
	65						6.42	14	00

a. Predictors: (Constant), Motivation

Table 1 shows that motivation had a significant high correlation ($r = 0.65$) with physics students' academic achievement with a coefficient of determination of 0.42, $F(1, 214) = 86.42$, $p < .05$. This indicates that 42% of the students' academic achievement in physics is attributed to motivation. Thus, the null hypothesis was rejected at $p = .00$.

H₀₂: There is no significant correlation between self-efficacy and physics students' academic achievement.

Table 2: Regression analysis of the correlation between self-efficacy and physics students' academic achievement

16.	17.	18.	r	19.	Standard error	21.	F	22.	23.
	r	Squared			of the		f		
				20.	Estimate				
24.	25.	26.	.76	27.	2.81	28.	8	29.	30.
	76	58					7.91	14	00

a. Predictors: (Constant), Self-efficacy

Table 2 shows that self-efficacy had a significant high positive correlation ($r = 0.76$) on physics students' academic achievement, with a coefficient of determination of 0.58, $F(1, 214) = 87.91$, $p < .05$. This indicates that 58% of the students' academic achievement in physics is attributed to self-efficacy. Thus, the null hypothesis was rejected at $p = .00$.

Discussions

This study empirically determined how motivation and self-efficacy correlate with learners' achievement in physics. The outcome of the regression analysis showed that motivation and

self-efficacy had significant high positive correlation on learner's achievement in physics. These findings have strengthened the theoretical basis of operant conditioning theory by B.F Skinner and social cognitive theory by A. Bandura. From theoretical basis of Skinner, the effective motivation of learners produces a positive outcome of the learners on a particular task. In the same vein, social learning theory shows that behavioural change depends on a person's perceived self-efficacy. These findings are in tandem with the findings of previous studies such as Achufusi, Utakaj, Onuh and Okonkwoe (2019); Tokan and Imakulata (2019); Metriana as cited in Tokan and Imakulata (2019); Wenty and Slamet (2019); Taştan et al. (2018); Caroline (2017); Akam (2014); Ozkal (2019); van Rooij, Jansen and van de Grift (2017); Rahman, Ghaffar, Hamid and Thomas (2019).

Achufusi et al. (2019) found that students' achievement significantly depends on motivation. Wenty and Slamet (2019) found that self-motivation relates positively with the achievement of students in biology. The learning achievement of the biology education students significantly depends on their intrinsic and extrinsic motivation (Toka & Imakulata, 2019). Taştan et al. (2018) reported that academic achievement in science education significantly correlates with teacher's motivation. According to Metriana as cited in Tokan and Imakulata (2019), motivation and self-efficacy had a significant positive correlation with achievement.

Van Rooij, Jansen and van de Grift (2017) revealed that students' cognition and academic interest relate positively to self-efficacy. Physics' self-efficacy relates positively to students' mathematics achievement as well as physics achievement (Kapucu, 2017). Rahman et al. (2019) revealed that teachers' self-efficacy significantly correlates positively with academic goal achievement. Ozkal (2019) found that self-efficacy beliefs in learning determine the achievement of students in mathematics. Suprayogi, Ratriana and Wulandari (2019) found that academic efficacy had a significant relationship with academic achievement. Taştan et al. (2018) reported that teachers' self-efficacy significantly relates to the academic achievement of students in science education. This current study has been able to determine the correlation of motivation and self-efficacy with learners' achievement in physics using secondary school students in Benue State as participants. The study has contributed to the body of knowledge by empirically determining the how motivation and self-efficacy correlate with learners' achievement in physics. This will help physics educators in designing appropriate physics instructions that will motivate the learners and increase their self-efficacy in order to enhance their academic achievement.

Limitations

This study considered only participants from a particular cultural orientation. Thus, determining the moderating influence of cultural orientation on the correlation of motivation and self-efficacy with learners' achievement was not possible. This may have limited the generalizability of the findings to learners of different cultural orientation. Also, non-inclusion of the gender and school location as possible moderators may limit the generalizability of the findings. On this basis, the researchers suggest that future researchers should consider the moderating influences of cultural orientation, gender, and school location on the impacts of motivation and self-efficacy on learners' achievement in physics.

Conclusion

Motivation and self-efficacy of learners have significant correlation with learners' achievement in physics. In other words, high motivation and self-efficacy lead to high learners' achievement in physics. Thus, motivation and self-efficacy of learners should not be looked down on in order to achieve an enhanced learners' achievement in physics.

Recommendations

On the basis of the findings of this study, the researchers made the following recommendations.

1. A conducive environment that will promote the motivation of students, as well as their self-efficacy, should be maintained in the schools.
2. Physics teachers should adopt the best instructional strategies that will motivate and increase the self-efficacy of the learners in order to have improved academic achievement of the learners.

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