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Academic Self-Efficacy and Locus of Control as Predictors of Secondary School Students' Academic Achievement in Physics in Agbani Education Zone in Enugu State

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ABSTRACT

The study investigated academic self-efficacy and locus of control as predictors of secondary school students' academic achievement in Physics in Agbani Education Zone in Enugu State. Three research questions guided the study. Correlation research design was employed for the study. The population includes all the 1439 senior secondary SSII Physics students in all the Government Secondary School in Agbani Education Zone. The sample for the study comprised 313 senior secondary SS2 Physics Students drawn from the education zone using multi-stage sampling techniques. Three instruments were used for data collection namely Modified Abdul Gafoor and Muhammed (2006) academic self-efficacy scale and Modified Trice (1985) academic locus of control scale and students achievement score retrieved from their promotion examinations. The instrument were validated by 3 experts and the internal consistency and students achievement scores retrieved from their promotion exam the reliability index of 0.75 and 0.76 were obtained using Cronbach Alpha and Kuder Richardson formula (KR-20) respectively. Data collected were analyzed using moderated multiple regression analysis. The findings of the study among others revealed that both academic self- efficacy and locus of control independently and jointly predicted academic achievement of secondary school Physics students. Recommendations such as the Physics teachers should assist the students in developing and improving these identified psychological factors for improvement of their academic achievement and that Physics educators need to spend more time in implementing curriculum, instructional and management techniques that reinforce students' belief and internal tendencies in order to foster growth towards a more efficacy and perceived sense of control for students with external tendencies.

Keywords: Academic Self-Efficacy, Locus of Control, Academic Achievement, Physics.

INTRODUCTION

Physics is a core science subject that is taught in senior secondary schools in Nigerian education system. It is one of the fundamental fields of knowledge that underlines the physical universe and applies constantly to people's life in their daily activities. Physics according to Ehimetaor, Farinde and Dada (2015) is a physical science that deals with the behavior of matter in relation to energy. According to Anosike (2023), Physics is the process of finding solutions to the fundamental challenges concerning human life based on the existence of phenomenon involving energy and matter by observation, measuring, experimenting, and analyzing, predicting and drawing conclusion. It is also seen as the science of measurement. Physics knowledge has contributed immensely to the production of tools and devices of tremendous advantage to the human race (Sani, 2012). According to Udo as cited in Oguama, Ugwoke and Ugwuanyi (2020) knowledge of physics develop in students, the scientific and technological knowledge, skills and attitudes which will assist them to

make decisions based on the observation and experimentation. Geophysics, Medical Physics, Computing Physics, Material physics, Environmental Physics, Communication, Physics Education, Engineering and Industrial Physics to mention but a few are career courses in institutions of higher learning which cannot be undertaken without the knowledge of physics at secondary school level.

Interestingly, as important as Physics is, students' academic achievement in the subject at secondary school and institution of higher learning has not been encouraging. Record of students' achievement at Senior School Certificate Examination (SSCE) in Physics conducted by West African Examination Council (WAEC) showed that between 2010 and 2022 less than 50% of the students who enrolled for Physics obtained credit level pass and above to secure admission into the university in order to pursue courses that require Physics. The failure rate is recorded in 2013, 2014, 2015 (46.0%, 47.83%, 38.68%) and in 2018 (48.15%) with an improved achievement in 2010, 2011 and 2012 (50.2%, 62.6% and 67.2%) and also 2016, 2017, 2019 and 2020 (52.97%, 59.22%, 64.18% and 65.24%) (WAEC Examiners report, 2022). In general, none of the success achievement is up to 70% and this cannot be considered an acceptable achievement for an important science subject like Physics. This shows that academic achievement in Physics is not encouraging.

The consistence decline in the academic achievements of secondary school students in Physics in internal examination is becoming so worrisome that they might have massive failure in external examination like WASSCE, NECO and JAMB. The students' poor achievement in physics in particular and sciences in general has been attributed to many factors. This decline according to Omole (2015) might be caused by factors like the unsymmetrical nature of the subject, non-chalant attitude of students to classes, qualification of the teacher, students' internal characteristics such as students' academic anxiety, academic locus of control, academic motivation, academic resilience, emotional intelligence but mostly on academic self-efficacy and locus of control (Adedayo and Jegede, 2013).

Self-efficacy is someone's belief in his or her ability to complete academic tasks successfully. Self-efficacy according to Screenivasulu (2015) is the belief in one's capabilities to organize and execute the courses of action required to produce a particular attainment. People's beliefs about their abilities in particular domains are thought to be important in motivating them to do what they can do in -order to achieve their goals (Hawthorne, 2014). The significance of self-efficacy appears to be dependent on its ability to affect one's choices and behaviors. Academic self-efficacy according to Okonkwo (2012) refers to student's belief in their capabilities and competencies to perform their classroom assignment or work. Students' sense of academic self-efficacy impacts their personal choice of goals, activities, effort and persistence in classroom activities (Ormrod, 2014). Academic self-efficacy has been proven to have a strong link to students' academic learning outcome and achievement in a number of ways because self-efficacy was positively related to the learner's academic achievement (Bartimoke-Aufflick, Adam, Walker, Manjuli and Lorriane, 2016). Achufusi and Utaka, (2021) reported that students with positive academic self-efficacy would put more effort when trying an unfamiliar academic task. In contrasts, students with low sense of academic self-efficacy will put less effort and surrender when faced with difficulty carrying out new academic tasks. Thus, developing a positive academic self-efficacy can improve the academic achievement of a

student and promote their choices in which learner's feel more competent and at the end, results in positive educational outcomes (Akomolafe and Ogunmakin, 2013)

Locus of control has also been identified as one of the personal traits that have great influence on students' academic achievement. Locus of control, according to Akomolafe and Ogunmakin, (2013) is the site of a cause, that is, whether or not the outcome of an event is attributed to something inside (internal) or outside (external) to the person involved. Hasan and Khalid, (2014) defined academic locus of control as the student's attribution of academic successes and failures to either factor within or outside their control. Adedeji, Adeniyi and Adeyinka, (2011) opined that academic locus of control manifests in students' beliefs regarding their control over the academic situations. Okonkwo (2012) reported that locus of control is a good predictor of academic achievement and developing a positive locus of control can therefore improve the academic achievement of a student. Inel and Turker, (2012) concludes that students with an internal academic locus of control believes that success or failure is not beyond their control. This set of students attributes grades to their efforts and believes that attending classes is important, studying regularly is important and they do not think that teachers give free rides to some students unlike those with external academic locus of control. For instance, according to Inel and Turker, (2012), these students would believe that academic excellence are the outcome of their efforts whereas students with external academic locus of control believe that academic excellence is controlled by external forces beyond their control and may believe that academic achievements do not reflect effort rather, reflected by external factors such as luck, examination system, biased attitude of teachers and many more. It can therefore be inferred that students with internal academic locus of control are the captains of their academic achievements while the students with external academic locus of control are at the mercy of external factors or forces. (Inel and Turker, 2012)

Achievement, according to Adeyemi (2018) is the scholastic standing of a student at a given moment. It has to do with the successful accomplishment of selected educational goal(s). The purpose of testing an achievement is to help the teacher and the students evaluate and estimate the degree of success attained in learning a given concept, it is also useful in testing the retention of information and skills (Chukwu, 2011). One of the issues at stake in education today and mostly in science teaching is students' achievement measure in relation to teaching and the overall success of learning outcome. Nevertheless, studies on students' academic achievement have mostly pointed out that students' socio-psychological variables are major predictors yet they have received very little attention if any, in the literature of Agbani Education Zone. Available record indicated that students' achievement in physics is poor despite the urban location of most of the schools in the area with appreciable number of qualified physics teachers among others. What actually will be the cause of this low academic achievement of students in Physics in Agbani Education Zone? The study however, sought to ascertain the relative and joint contributions of students' academic self-efficacy and locus of control to the prediction of secondary school students' academic achievement in Physics in Agbani Education zone in Enugu state.

Purpose of the Study

Generally, the study sets to figure out the predictions of academic self-efficacy and locus of control on academic achievement of secondary school students in Physics in Agbani Education Zone in Enugu state.

Specifically, the study sought to ascertain the:

1. The relationship between students' academic achievement, academic self-efficacy and academic locus of control in Physics in Agbani education zone.
2. Contribution of students' academic self-efficacy in predicting their academic achievement in Physics in Agbani Education zone.
3. Contribution of students' academic locus of control in predicting their academic achievement in Physics in Agbani Education Zone.
4. Joint contribution of students' academic self-efficacy and locus of control in predicting their academic achievement in Physics in Agbani Education Zone.

Research Questions

The following research questions guide the study;

1. What is the relationship between students' academic achievement, academic self-efficacy and academic locus of control in Physics in Agbani education zone?
2. What is the contribution of students' academic self-efficacy in predicting their academic achievement in Physics in Agbani Education Zone?
3. What is the contribution of students' academic locus of control in predicting their academic achievement in Physics in Agbani Education Zone?
4. What is the Joint contribution of students' academic self-efficacy and locus of control in predicting their academic achievement in Physics in Agbani Education Zone?

Method

The study employed correlation research design. Correlational research design employs correlation co-efficient or regression analysis for data analysis which indicates the direction and magnitude of the relationship between variables. Therefore, this design is preferred because data was collected and analyzed using regression analysis. The population is 1439 senior secondary school (SS2) physics students in the 34 Government owned secondary schools in the Agbani Education Zone of Enugu State. Agbani Education zone was chosen as the study area due to the relevant evidences of the consistence decline in the academic achievements of the secondary school students in physics both in internal and external exams. The sample is 313 SS2 students offering physics which was obtained using Taro Yamane's formula for sample determination. The selection of the sample was done in three stages using multi-stage sampling. First involves selection of two out of three local government areas that make up the zone by simple balloting (lucky dip), The second stage involved selection of Schools: Out of the 25 government owned secondary schools in the two chosen local government areas, four schools from each LGA was drawn using simple random sampling technique, making it a total of eight secondary schools. The third stage was selection of participants: SS2A made up of only science students in each of the selected schools was drawn purposefully using purposive sampling technique, given a total of 313 SS2 students. The purposive sampling is used because SS2A is the main target population since all the students in the class are science inclined and offer Physics as a core subject.

Three instruments were used for data collection. They are:

1. Modified Abdul Gafoor and Muhammed (2006) academic self-efficacy scale
2. Modified Trice (1985) academic locus of control scale and
3. SS2 students' scores from their unified promotion examination 2019/2020 academic year will be used to measure their academic achievement in physics.

Modified Abdul Gafoor and Muhammed academic self-efficacy scale is a 20-item instruments developed by Abdul Gafoor & Muhammed to assess the academic self-efficacy of secondary school students based on self-efficacy theory of Albert Bandura, placed within the framework of social cognitive theory. On the scoring procedure, for the positive statements, 5 points is awarded for Exactly true, 4 for Nearly True, 3 for Neutral, 2 for Nearly False and 1 for Exactly False respectively. Negative statements are scored in the reverse order. The least possible score of the scale when completely filled is 20marks, the highest possible score is 100 marks and the mean score is 60.

Trice academic locus of control scale is developed by Trice to measure the construct of locus of control in the college context. The researcher adapted the scale to measure Physics students' attribution of their academic success and failure. The scale instrument is a 28-item scale. Participants' responses was measured dichotomously using true/false options. The total possible score is 28 if correctly shaded. For the Scoring procedures, the items are scored directly by adding together the True or the False responses that are correctly shaded. The correct shaded True or False item has one mark each while incorrect shaded has 0 mark each. A respondent's total score is the addition of the Yes and the No correct shaded item.

SS2 physics Students' achievement scores of the 2021/2022 academic year was used. Scores of students in physics were collected from their result sheets through school records in their respective schools.

With the help of the subject teachers in the sampled schools, who were trained and exposed to the purpose of the study, the instruments was administered to the respondents. The respondents was given enough time to express their honest feelings without bias. The instruments was collected from the respondents immediately after completion on the spot to ensure maximum copies retrieved. Physics achievement scores of students were collected from their school record through the subject and form teachers respectively. With the names of Students on the instruments, their results was easily located and retrieved. The data collected was analyzed statistically using moderated multiple regression analysis.

Results:

Research questions 1: What is the relationship between students' academic achievement, academic self-efficacy and academic locus of control in Physics in Agbani education zone?

Table 1: Descriptive Statistics and Inter-correlations among the Variables

Variables	N	Mean	SD	A A	S E	L C
A A	313	55.84	12.638	1.000		
S E	313	58.96	7.911	.122**	1.000	
L C	313	13.72	2.966	-.177**	.140**	1.000

The analysis of the correlation between self-efficacy and academic achievement resulted in a significant positive relationship (r = .122) as can be seen in table 1. That is, as self-efficacy scores increases, indicating higher efficacy incidents, achievement

scores increases equally indicating higher achievement. This supports the idea that SS2 physics students with higher achievement scores have high self-efficacy than those with lower achievement scores.

The data exploring a correlation between locus of control and academic achievement as seen in table 1, a significant negative correlation (r= -.177) was demonstrated. That is, as achievement scores go up, indicating higher achievement, locus of control scores go down, indicating a more internal locus of control. Thus, it seems appropriate to state that SS2 physics students with high locus of control have greater academic achievement than those with low locus of control.

Further analysis of the variables of self-efficacy and locus of control (r = .140), as seen in same table 1 indicate a significant positive relationship. That is, as self-efficacy scores rise, indicating higher efficacy incidents, locus of control scores also rise.

Research questions 2 & 3: What is the individual contributions of students' self-efficacy and locus of control to the prediction of their academic achievement in Physics?

Table 2: Relative Contributions of the Predictor Variables on Academic Achievement.

Coefficients

Model	Unstandardized coefficients		Standardized coefficients
	B	Std. error	Beta
1. (Constant)	51.357	6.122	
Self-efficacy	.19	.088	.121
Locus of control	-.487	.233	-.117
2. (Constant)	50.836	6.152	
Self-efficacy	.333	.165	.213
Locus of control	-1.029	.602	-.247

Table 2 displays the un-standardized coefficients. The table shows that each of the independent variables made a significant contribution to the prediction of academic achievement. Considering the extent of contribution for: (1) self-efficacy, the un-standardized coefficient (B = .190) and standardized coefficient or slope (β = .121) as seen in table 3. This indicates that for every one point increase in students' self-efficacy, their academic achievement increases by 19/100 of one point when controlling locus of control. And (2) locus of control, the un-standardized coefficient (B = -.487) and standardized coefficient (β = -.117). Thus for every one point decrease in the students' locus of control, their academic achievement will increase by approximately 49/100 of one point when controlling for self-efficacy.

Research question 4: What is the joint contribution of the predictor variables to the prediction of students' academic achievement in Physics?

Table 3. Moderated Multiple Regression Analysis on Academic Achievement

Model	R	R^2	Adjusted R^2	Std. error	R^2 Change
1	.169a	.028	.022	12.23	.028

Table 3 above shows that the independent variables (self-efficacy and locus of control) when combined together as seen in model 1, show significant effect on the academic achievement of the students. With the values of R^2 = .028 and adjusted R^2 = .022, it implies that the two independent variables, self-efficacy and locus of control together contribute to approximately 3% prediction of academic achievement, thereby indicating that they are good predictors of academic achievement.

Discussion

The results of this study along with the immense research on the area of perceived control provide significant evidence supporting the impact of self-efficacy and locus of control on school success. Success in school is usually thought of as acquiring good grades and achieving well on standardized tests. This is certainly one aspect of success but many other factors are also involved. Factors such as motivation levels, self-esteem, ability to adapt to various settings, acceptance of constructive criticism and willingness to learn according to the literature, are influenced by self-efficacy and locus of control. From the result, self-efficacy made a significant contribution to academic achievement and it was found to be statistically significant. The finding is consistent with the previous work of (Screenivasulu, 2015; Akomolafe and Ogunmakin, 2013) but against the work of (Achufusi and Utaka, 2021). This was also consistent with Bandura (1997) who noted that those who have a sense of self-efficacy in mastering academic task tend to learn better in formal school environment as well as in informal environment outside the school. Be that as it may, the sky is the starting point for students that have good self-efficacy.

The significant impact of locus of control on the academic achievement as indicated in this study cannot be underestimated. The finding is consistent with the previous work of (Adedeji, Adeniyi and Adeyinka, 2011) but against the previous work of (Akomolafe and Ogunmakin, 2013). This means that students who are not achieving well academically are more likely to be easily contented with just minimal success and achievement. It also implied that the better the achievement of a student in classroom activities the more he/she is able to use locus of control to enhance achievement.

Conclusions

This study examined self-efficacy and locus of control as predictors of academic achievement of secondary school students in physics. The result had so far revealed that the two independent variables relatively and jointly correlated with and significantly predicted academic achievement.

Recommendations

1. It is therefore important for the physics teachers in particular and sciences in general to assist the students in developing and improving these identified psychological factors for improvement of academic success.
2. Physics educators need to spend time implementing curriculum, instructional and management techniques that

reinforce students' belief and internal tendencies in order to foster growth towards a more efficacy and perceived sense of control for students with external tendencies.

3. The policy makers should therefore include in the educational blue prints strategies that will help students (right from elementary school) to develop goal setting skills, appropriate learning style (studying style), perception of self and time management skill. The policy should not just be a window dress blue print, but proactively implemented and monitored until the expected skills are developed by all students at different ages and levels.
4. Finally, school authority should always make sure that students are not left out in decision-making. It is hoped that this will promote their sense of efficacy beliefs about themselves and academic activities.

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