



## INTEREST AS PREDICTOR OF ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN PHYSICS

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**ABSTRACT:** *The study examined the extent to which student interest can predict their academic achievement in physics amongst secondary school students in Anambra State Nigeria. The participants were 300 (134 males and 166 females) SSII students drawn from the 254 public secondary schools across the six education zones in Anambra state. The study adopted the correlational research design which is capable of predicting the relationships between dependent and independent variables in a study. The instruments used to collect relevant data from the students were Physics Interest Scale (PIS) and terminal continuous assessment results. The instruments were subjected to validity and reliability and found to be reliable at Cronbach Alpha coefficient of .87. Hierarchical regression technique was used for data analysis. The findings showed that student interest predicts about 57% of academic achievement scores of secondary school students in physics. The study thus concludes that students with an improved interest in physics science is expected to gain higher academic achievement in physics.*

**KEYWORDS:** Predictors, Student Interest, Academic Achievement, Physics, Gender

### INTRODUCTION

Physics is a science subject that studies objects, energy and their interaction. The study of physics brings all other science together as it has relation with every field of life; be it organisms or inanimate (Awodun, Omotade & Adeniyi, 2013). Mekonnen (2014), noted that without the knowledge of physics, human will face difficulties in exploring the universe. The production of equipment, instrument and devices for scientific and technological activities hinges on the knowledge of physics (Izaak, 2015). The knowledge of physics science is essential for national development in all ramifications including economic, scientific and technological inventions.

For the importance of physics, students in science class in the secondary level of education in Nigeria cannot do without physics. It helps students to develop skills for observation, accuracy, analysis, and creative thinking, which are essential for the study of other science subjects (Ukoh, 2012; Siddiqui & Khatoun, 2013; Elwan, Serage & Alwan, 2013). One can say that physics is the bedrock of very other science. This may have informed why physics remains one subject among all the core science subjects that must be required of all students for admission in science and engineering studies in Nigerian higher institutions.

Despite the place of physics in science and technology, secondary school students have not maintained relative high physics achievement in both internal and external examinations in Nigeria (Oladejo, Olosunde, Ojebisi & Isola, 2011). Academic achievement is an indicator to



measure the degree of success and failure of a learner especially at the end of a learning process. Academic achievement is the outcome of an educational process which serves as measure to the extent a student, teacher or institution has achieved a set of objectives or goals and which is commonly measured by continuous assessment or examination (Annie, 2006). Academic achievement of the student can be graded as high or low (good or poor). Academic achievement is said to be poor when the achievement falls below the expected standard (Hassan, Alasmari & Ahmed, 2015). On the other hand, an achievement that is equal to or above the standard expected of a student can be termed high academic achievement. Some of the reasons for poor academic achievement in physics are declining interest and lack of enthusiasm to take physics course in school or avoiding physics as one of the basic science subjects by students the world over (Tobias & Birer 1999, Osborne, Simeon and Collins, 1996). Students in secondary school averred that physics is more difficult and uninteresting than any other subject in the school curriculum (Ugwu, Fagbenro & Akano, 2019).

Students with an interest in a subject like physics are likely to be more motivated to manage their own learning and develop the requisite skills to become effective learners of that subject. Hence, interest in physics is relevant when considering the development of effective learning strategies for physics. In contrast, anxiety about learning physics can act as a barrier to effective learning. Students who feel anxious about their ability to cope in physics learning situations may avoid them and thus lose important career and life opportunities.

Interest is, generally, student attention, greater concentration, pleasant feelings, and increased motivation to learn (Mazer, 2010). It is the psychological state of engaging or having the tendency to reengage in a particular content in the course of time (Hidi & Renninger, 2006). The contemporary theorists on interest carved two components of interest as individual interest and situational interest (Harackiewicz & Hulleman, 2010). Individual interest is more enduring, and trait-like, and endures over time. It can be considered a disposition that individuals take with them from one context to the next. For instance, when a student has personal liking for physics that spurs him to always do physics tasks and discuss physics problems, such a student would be said to have developed individual interest in physics. Irrespective of circumstances, such students would want to take the interest with him or her to any place he or she goes. On the other hand, situational interest is more momentary and depends on the environment he or she finds him- or herself. This is the sort of interest that arouses when a person watches an entertaining video clip or engages in incisive conversation. For physics students, individual interest will normally develop gradually and tends to have a lifelong effects on his or her physics achievement, whereas situational interest is an emotional state that is evoked by interestingness of the content and context and partially under the regulation of teachers, which often have only a short term effect on an individual's knowledge and values (Schraw & Lehman, 2001; Hidi, Renninger & Krapp, 2004).

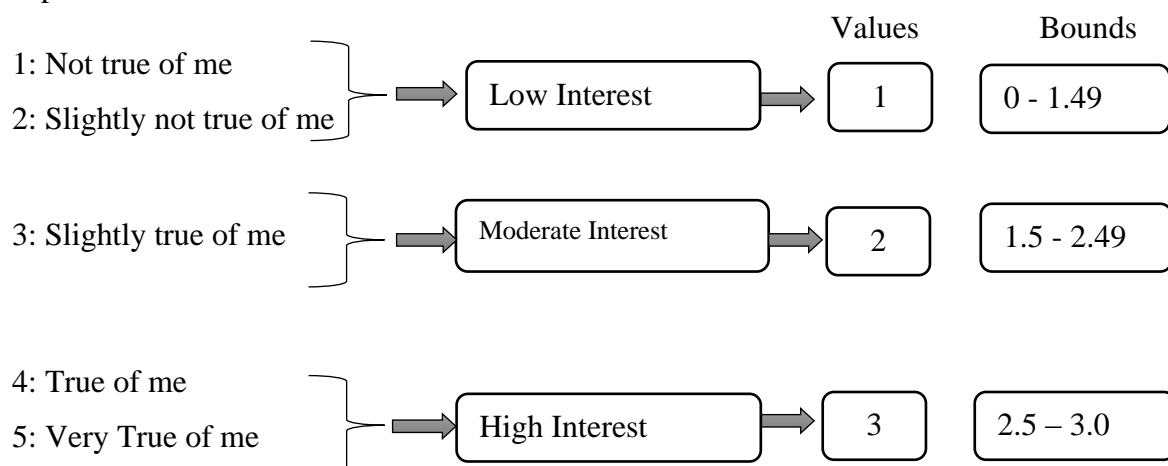
Teacher's ability to arouse student interest is essential for higher achievement. Interest is therefore the motivation in a learner which results in the option of object and activity that is enjoyable, profitable, and will ultimately bring complete satisfaction in itself (Serdyukov, 2017). Some empirical studies in Nigeria have shown that interest has a significant positive effect on academic achievement in Biology (Awodun, Adekunle & Adeoye, 2013; Femi-Adeoye, & Adekunle, 2016); Chemistry (Ezike, 2018), and explains about 21.6% of the academic achievement (Kpolovie, Joe, & Okoto, 2014). Even a gender biased study from Godpower-Echie and Ihenko (2017) revealed that interest is gender driven but gender in itself does not significantly predict Integrated Science achievement. This is true for the study of



Amelink (2012) which found students interest to be a motivating factor to learn skills needed for accomplishing everyday tasks and for student involvement in science, technology, engineering, and mathematics (STEM) disciplines, particularly for females. On the overall, students' interest in science subjects has been relatively low (Uerz, Dekkers, & Beguin, 2004, Amelink, 2012). Low interest has been traced to students' anxiety and fear (Okigbo & Okeke, 2011). Physics being one of the seemingly difficult science subjects, the extent to which interest could predict their achievement is crucial for educational policies that would boost student achievement in physics and national development in particular. On another hand, Wong and Wong (2019) averred that interest only significantly and positively influences the achievement of the low achievement students and not significant predictors of the already high achievement students. Despite these, studies that evaluate interest as predictor of physics achievement among school children in Nigeria is dearth. This study hence aims to investigate the extent to which student interest predicts their physics achievement in secondary schools in Anambra State.

## METHODS

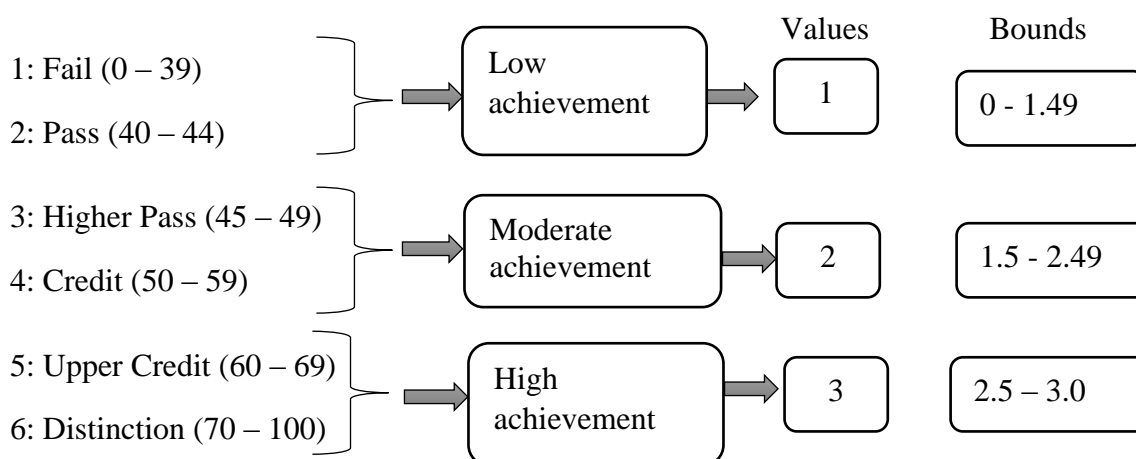
The study adopted a correlational survey design that allows for the ascertainment of the association, and prediction of one variable by another. The correlational is most suitable since it can enable the researcher to collect data on the study variables, and systematically describe the facts and characteristics of a given population, as well as predict the relationships thereof (Wenslaus, 2015). A questionnaire on physics interest and achievement scores were administered to measure interest and physics achievement, respectively. The Physics Interest Scale (PIS) comprising 20 items was adapted from a 27-item Mathematics Interest Inventory used in Wong and Wong (2019). The PIS is a five-point scale, ranging from 1 = not true of me to 5 = very true of me, which was used for all items in this instrument. 10 question items had negative cue in the instrument, precisely items 9 to 18. These negatively cued items were reverse-scored before the scores were computed at the data analysis stage. Moreover, for analytical convenience, the 5-point scale was reduced to three point after data has been collected. Thus, the analyses were based on Low interest, Moderate interest and High interest as depicted below:





Student with high interest was be assigned 3 while the ones with moderate and low interest had 2 and 1 respectively, so that the data is an ordinal one.

Physics achievement was measured based on the third term examination scores of the SSS II students in the selected schools. The third term examination is organised as a State wide examination. The third examination is therefore a suitable examination for measuring the student academic achievement for all the students in Anambra State. The examination questions are normally taken through the basic processes of validation and reliability before they were administered. Hence, the examination questions were deemed valid and reliable. The variable of academic achievement is an interval scale. A student's achievement score is lower or higher than another. The standard measure of academic achievement is the scores of students in an examination or test. It is graded 100% on a full scale as 70 - 100 = A (Distinction), 60 - 69 = B (upper credit), 50 - 59 = C (credit), 45 - 49 D (Higher pass), 44 - 40 = E, 39 - 0 F (fail). The variable has been re-graded as ordinal scale as below:



The content validity of the instruments was established through a panel of expert comprising two three physics teachers, and an educational psychologist. All of the experts were secondary school teachers in secondary schools in Anambra State, Nigeria. It was the corrections from the experts that reduced the Wong and Wong's (2019) 27-item interest scale to 20 that are suitable for the present study. The PIS was tested for reliability using the Cronbach's alpha coefficient at .87, which is rated as highly reliable in the judgment of Cohen, Manion, and Morrison (2007).

A sample of 300 (134 males and 166 females) SSII students that participated in the study was selected from a population of 13, 109 physics students (5, 988 males and 7, 121 females) in the 254 public secondary schools (161 coeducation schools, 45 boys schools and 48 girls schools) across the six education zones in Anambra state (Post Primary School Service Commission Awka, 2019). The hierarchical multiple regression was used to analyse the data collected for the study. The hypotheses were tested at 0.05 level of significance.



## RESULTS

**Table 1: Student Physics Achievement in Secondary schools in Anambra State**

Exam Score Range	Achievement Scale	Frequency	Percentage (%)
Less than 45%	Low achievement	197	65.67
Between 45 – 59%	Moderate achievement	62	20.67
Score from 60 - 100%	High achievement	41	13.67
<b>Total</b>		<b>300</b>	<b>100.01</b>

The result on Table 1 shows that rate of physics achievement in the selected secondary schools in Anambra State. The results showed that about 66% of the physics students had low achievement in their SSII terminal assessment. The proportion of students with moderate and high achievement are about 21% and 14% respectively. This suggests that 66% had poor physics achievement while about 34% had good achievements.

**Table 2: Student Interest in Physics**

SN	Items	Mean	Standard Deviation	Remarks
1	I like to answer questions in physics class	2.84	0.21	High interest
2	I like physics	2.12	1.11	Moderate interest
3	Knowing a lot about physics is helpful	2.63	0.45	High interest
4	I feel happy when it comes to working on physics	0.87	0.65	Low interest
5	I want to know all about how to do physics problems	1.23	0.56	Low interest
6	I am excited when a new physics topic is announced	0.54	0.23	Low interest
7	I want to learn more about physics	1.43	1.21	Low interest
8	I want to know all about physics	0.87	0.88	Low interest
9	I am wasting my time on physics	1.43	0.87	Low interest
10	I am bored when working on physics	0.67	0.34	Low interest
11	I would rather be working on something else besides physics	0.98	0.65	Low interest
12	I give up easily when working on physics	1.21	0.65	Low interest
13	When working on physics, I want to stop and start working on something else	1.12	0.45	Low interest
14	I am always thinking of other things when working on physics	1.02	0.67	Low interest
15	I get mad easily when working on physics	0.32	0.45	Low interest
16	I have difficulty paying attention when working on physics	1.43	0.23	Low interest
17	I spend as little time as possible working on physics	1.56	0.45	Low interest
18	I struggle with physics	2.13	0.43	Moderate interest
19	I spend many hours working on physics	1.32	0.54	Low interest
20	I want to talk about physics with my friends	0.32	0.76	Low interest
<b>Cumulative mean interest</b>		<b>1.30</b>		<b>Low interest</b>

*Note: items 9 to 18 were reversed to positive cues.*



Result on Table 2 is the physics interest scale of secondary school students in Anambra State. The result shows that, out of the 20-items questions, the students indicated low interest on 16 items, moderate and high interests on 2, respectively. The mean average physics interest scale is 1.30 which depicts low overall interest for physics students in Anambra State.

**Table 3: Correlation Coefficient, Coefficient of Determination and F-statistics of the Hierarchical Regression Model for Predicting Physics Achievement from Student Interest**

Model	R	R Square	Change Statistics				
			R Square Change	F Change	df1	df2	Sig. F Change
1	.214	.045	.045	.986	1	298	.119
2	.786	.617	.572	9.989	2	296	.000

*Dependent Variable: Academic Achievement*

*Model 1 Predictors: (Constant), Gender*

*Model 2 Predictors: (Constant), Gender, Student Interest*

Model 1: Demographic:  $F(1, 298) = .99, p = .12, R^2 = .05$

Model 2: Demographic and Student Interest:  $\Delta F(2, 296) = 9.99, p = .00, \Delta R^2 = .57$

The coefficient of determination shows that explanatory power of the independent variables (gender and student interest) on the dependent variable (physics achievement). In model 1, gender showed 0.05 prediction on physics achievement of students. In model 2, student interest was added to create a hierarchical model, and the resulting coefficient of determination becomes .62, which means a change in  $R^2$  of .57. This indicates that introduction of student's interest brings about 57% of changes in the physics achievement of secondary school students in the section public schools in Anambra State. The F-statistics change (9.99) was found to be statistically significant with a probability value of 0.00. This shows that student's interest in physics is a predictor of 57% of the academic achievements of secondary school students in physics science.

## DISCUSSION AND CONCLUSION

The results have shown that student interest is a viable predictor of their academic achievement in physics. Student interest adds about 57% explanatory power to the initial 5% predictive value of student achievement in physics as determined by demographic variable as gender. The findings connote that interest drives significantly higher achievement in physics science. This follows the conventional interest theory that when a student is interested in a subject, like physics, he or she tends to be focused in the study, become actively engaged and gains increased participation. The findings are in line with the works of Awodun *et al* (2013), Kpolovie *et al* (2014), Femi-Adeoye and Adekunle (2016) and Ezike (2018). It supposes that interest predicts extent of academic achievement in physics. Students with improved interest in physics science is expected to gain higher academic achievement in physics.





The descriptive statistics revealed poor physics achievement and low physics interest in among secondary school students in Anambra State. With the expected 57% predictive ability of students' interest on physics achievement, it is expected that enhanced student's interest would bring about improved academic achievement physics science among the students in Anambra State. This joins to affirm that interest is a driver for higher learning outcome.

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