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**Research Article**

# Students' Motivation and Self Efficacy as a Correlates of Achievement in Senior Secondary School II Physics in Ogun State, Nigeria

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**Abstract:** This study investigated the relationship and combined influence of students' Motivation, Self-efficacy on Achievement in Senior Secondary School II Physics in Ogun State. The study was an ex–post facto research, and data were collected in order to answer four research questions. The sample comprised of three hundred and seven (307) senior secondary II Physics students (male = 166 and female = 141) drawn from population of Physics students in Ogun State. Multi stage sampling technique was employed to randomly select eighteen schools from three Local Government Areas of the three Senatorial Districts of Ogun state, and an intact arm of SS II from each of the sampled schools was used. Three instruments adapted and validated were administered on the subjects; the resulting data were then collated and analysed using descriptive statistics (mean and standard deviation) and regression analysis. The finding revealed that there is positive but low significant relationship between Motivation and achievement in physics ($r = +0.242$, $p < 0.05$), Self efficacy and achievement in Physics ($r = +0.275$, $p < 0.05$). Motivation and Self–efficacy accounted for 5.9% and 7.5% of the total variance in Achievement in Physics respectively. Also Motivation and Self- efficacy jointly accounted for 10% of the total variance in Achievement in Physics (Rsquare = 0.100, $p < 0.05$). These percentages are statistically significant. There is positive significant relationship between motivation and self-efficacy ($r = +0.515$, $p < 0.05$), motivation and achievement in physics ($r = +0.242$, $p < 0.05$). Sequels to the findings, it is concluded that students will perform very well in physics when they are motivated and enough confidence is built in them to courageously face physics test or examination without anxiety or fear. It's therefore recommended that the teachers and parents should communicate to students that they believe they can learn physics meaningfully.

**Keywords:** Self – efficacy, Motivation, Physics Achievement, Ogun State.

## 1. BACKGROUND TO THE PROBLEM

The goal of science education is to help students grasp essential science concepts, to understand the nature of science, and to enhance students' scientific literacy. Through science education students are helped to realize the relevance of science and technology to their lives, and this will encourage them to willingly continue their science study in school, or beyond school. Students' confidence in their ability to control their feelings, actions and thoughts and therefore be able to influence an outcome is self-efficacy (Pajares, 2002). In an achievement context, self-efficacy has to do with students' confidence in their cognitive skills to learn and perform the academic course work. Self-efficacy influences the choices students make and the courses of action they pursue. Students tend to select tasks and activities in which they feel confident and competent and avoid those in which they do not (Palmer, 2006). Students will have little incentive to engage in those actions in which they believe their actions will not have the desired consequences. a student who feels hopeless in linear algebra may not go far with interest in Physics take? How long students will persevere when confronting obstacles, how resilient they will be in the face of adverse situations and how much effort they will expend on an activity, will be determined by their self-efficacy believe (Zimmerman, 2000).

Deficit in, or lack of student 'motivation' is as a result of lack of engagement in academic tasks. Motivation has been described as the process of arousing, sustaining and regulating activity. In academic setting, two distinct types of academic

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motivation interrelate namely intrinsic and extrinsic motivation. The drive or desire of the student to engage in learning "for its own sake" is referred to as academic intrinsic motivation. Students who are intrinsically motivated feel that learning is important with respect to their self-images, and they seek out learning activities for the sheer joy of learning (Ryan & Deci, 2002). The students focus on learning goals such as understanding and mastery of concepts. The focus of students who are extrinsically motivated is to obtain rewards (e.g., good grades, approval) or to avoid punishment (e.g., bad grades, disapproval). Extrincally motivated students tend to center on such performance goals as obtaining favorable judgments of their competence from teachers, parents, and peers or avoiding negative judgments of their competence (Ryan & Deci , 2002).

The prevalent low level of students' achievement and enrolment in physics continues to draw the attention of major stakeholders in science education. Researchers in physics education have also tried to isolate causes of this low level of achievement and proffered ways of improving students' performance in physics. For example, Adegoke (2011) recommended the use of multimedia instruction; Azar and Şengulec (2011) suggested the use of simulated experiments in teaching physics practical. Inspite of all these suggestions, little improvement has be made in students enrolment and achievement in physics. It is likely that students must feel comfortable with Physics, must be challenged to achieve, and must expect to succeed before the development of intrinsic motivation and self-efficacy. This study therefore investigated the relationship and combined influence of students' Motivation, Self-efficacy on Achievement in Senior Secondary School II Physics in Ogun State

### 1.1 Research Questions

1. What is the relationship between students' Motivation and Achievement in Physics?
2. What is the relationship between students' Self - efficacy and Achievement in Physics?
3. To what extent will students' Motivation, and Self - efficacy predict Achievement in Physics?
4. What are the relationships among students' motivation, self – efficacy and achievement in physics?

## 2.0 METHOD

### 2.1 Research Design

This study adopted ex-post facto procedure to collect data since the researchers have no direct control over independent variables as their manifestations have already occurred (Kerlinger & Lee, 2000).

### 2.2 Target population and Sample

The target population for this study comprised of all public and private Senior Secondary School II students in Ogun State, Nigeria. The sampling technique adopted was a multistage sampling technique. The twenty (20) local government areas in Ogun state were first stratified into the three senatorial districts. Random sampling technique was used to select a local government area from each of the three senatorial districts. The secondary schools in each of the three randomly selected local government areas were stratified into private and public secondary schools. Three public and three private school secondary schools were randomly selected from each local government areas to have a total of eighteen (18) schools. The selected arm was an intact class giving a total number of three hundred and seven (307) subjects.

### 2.3Instrumentation

The following instruments were employed for the study; (i) Physics Motivation Questionnaire (ii) Physics Self-efficacy questionnaire (iii) Physics Achievement Test (PAT). The Physics motivation questionnaire was used for measuring the students' levels of motivation towards Physics. The participants were asked to respond to a 4–point likert scale response options of strongly agree, agree, disagree and strongly disagree. The reliability was computed using Cronbach Alpha and this yielded a reliability coefficient of 0.85.

The Physics self-efficacy questionnaire was used for measuring the students' level of Physics self-efficacy. The participants were asked to respond to a 4–point likert scale response options of very true of me, true of me, slightly true of me and not at all true of me. The reliability was computed using Cronbach Alpha and this yielded a reliability coefficient of 0.84. The items on the two questionnaires were adapted by the researcher.

Physics Achievement Test (PAT) is a 50 multiple-choice items with four options A, B, C and D in accordance with WAEC standard. This was developed by the researcher. The content validity of PAT was ensured at the construction stage through consultation with Physics experts and the application of test blue print as stipulated by Obemeata (1999). The items was generated across three cognitive domains (knowledge, comprehension and application) using scheme of work for Senior Secondary II Physics. The reliability of PAT is 0.734.

#### 2.3.1Examples of item on PMQ

i. It is good to do better than other students in physics test
ii. Instructor's demonstrations and explanations make physics enjoyable

#### 2.3.2 Examples of item on PSQ

i. When I start solving a physics problem, I usually feel that I will not get the answer
ii. I can solve any Physics problem

#### 2.3.3 Example of item on PAT

i. Which of the following is not a vector quantity? (a) Momentum (b) Force (c) Velocity (d) Temperature
ii. The velocity ratio is 5 and the efficiency is 75%. What effort will be needed to lift a load of 150N with the machine? (a) 50N (b) 40N (c) 30N (d) 20N

**2.4 Data analysis**

Data were analyzed using descriptive statistics (mean and standard deviation) and regression for research questions 1 to 4. All research questions were answered at 0.05 level of confidence using a two-tailed test.

## 3.0RESULTS

**3.1Research Question 1**: What is the relationship between students' Motivation and Achievement in Physics?

**Table1: Summary of the descriptive statistics of Achievement in Physics Scores, Motivation for Physics and Physics Self efficacy**

| | N | Range | Min. | Max | Mean | Std. D. |
|---|---|---|---|---|---|---|
| Achievement in Physics Test Score | 307 | 30.00 | 8.00 | 38.00 | 20.7199 | 5.69827 |
| Motivation | 307 | 63.00 | 62.00 | 125.00 | 102.99 | 12.03358 |
| Self-efficacy | 307 | 78.00 | 44.00 | 122.00 | 86.3616 | 16.10838 |

**Table 2: Motivation for Physics as a predictor of students' Achievement in Physics**

| Analysis of Variance | | | | | | |
|---|---|---|---|---|---|---|
| | **Sum of Squares** | **Df.** | **Mean Square** | **F** | **P** | **Remarks** |
| Regression | 583.118 | 1 | 583.118 | 19.016 | .000 | |
| Residual | 9352.791 | 305 | 30.665 | | | |
| Total | 9935.909 | 306 | | | | |

R = 0.242, R Square = 0.059, Adjusted R square = 0.056, Standard error = 5.538, * Significant (p <0.05).

Table 1 shows that the students' achievement in physics scores range from 8 to 38, in which higher scores means greater achievement in physics and vice versa. The students' average performance in Physics (20.7) is below average. Students' Motivation toward Physics scores range from 62 to 125, in which higher score mean that students view physics as personally useful, interesting, and important. The students' mean score is 102.99.

Table 2 shows that there is a low positive correlation between motivation and students' achievement in Physics. Students' Motivation accounted for 5.9% of the total variance in achievement in Physics (R square = 0.59, $p < 0.05$). This percentage is statistically significant. Thus, students' motivation toward Physics has a significant relationship with achievement in Physics.

**3.2Research Question 2**:

What is the relationship between students' Self -efficacy and Achievement in Physics?

**Table 3: Physics Self efficacy as a predictor of students' Achievement in Physics**

| Analysis of Variance | | | | | | |
|---|---|---|---|---|---|---|
| | **Sum of Squares** | **Df** | **Mean Square** | **F** | **P** | **Remark** |
| Regression | 749.453 | 1 | 749.453 | 24.883 | .000 | * |
| Residual | 9186.455 | 305 | 30.120 | | | |
| Total | 9935.909 | 306 | | | | |

R = 0.275, R Square = 0.075, Adjusted R square = 0.072, Standard error = 5.48813, * Significant ($p < 0.05$).

Table 1 show that the students' Physics Self-efficacy scores range from 44 to 122 with a mean of 86.36. Higher score mean that students are sure that they can learn and understand material being taught in physics.

Table 3 shows that there is a low positive correlation between Physics Self-efficacy and students' Achievement in Physics. Physics Self efficacy accounted for 7.5% of the total variance in Achievement in Physics (R square = 0.75, $p < 0.05$). This percentage is also statistically significant. Thus, students' self-efficacy has a significant relationship with achievement in Physics.

**3.3Research Question 3**

To what extent will students' motivation, self-efficacy and test anxiety jointly predict achievement in Physics?

**Table 4**: **Combined influence of students' Motivation and Self - efficacy on students' Achievement in Physics.**

| Analysis of Variance | | | | | | |
|---|---|---|---|---|---|---|
| | **Sum of Squares** | **Df** | **Mean Square** | **F** | **P** | **Remark** |
| Regression | 991.111 | 2 | 330.370 | 11.191 | .000[a] | |
| Residual | 8944.798 | 304 | 29.521 | | | |
| Total | 9935.909 | 306 | | | | |

R = 0.316, R square = 0.100, Adjusted R square = 0.091, Standard error = 5.4333
* Significant (p < 0.05).

Table 4 shows that the combined influence of motivation and self-efficacy accounted for 10.0% of the total variance in Achievement in Physics (R Square = 0.100, p < 0.05). This percentage is significant. These two independent variables are therefore important predictors of achievement in Physics.

**3.4Research Question 4:**

What are the relationships among students' motivation, self-efficacy, test-anxiety and achievement in physics?

**Table 5: Correlation matrix**

| | **Physics achievement** | **Motivation** | **Physics Self Efficacy** |
|---|---|---|---|
| **Physics achievement** | 1.000 | 0.242 | 0.275 |
| **Motivation** | 0.242 | 1.000 | 0.515 |
| **Physics Self Efficacy** | 0.275 | 0.515 | 1.000 |

Significant (p < 0.05), N = 307.

Table 5 shows that there is positive significant relationship between motivation and self-efficacy (r = +0.515, p < 0.05), motivation and achievement in physics (r = +0.242, p < 0.05) and self-efficacy and achievement in physics (r = +0.275, p < 0.05). The more students are motivated towards physics, the higher the self-efficacy resulting in higher achievement in physics.

## 5. DISCUSSION

The result revealed that there is significant relationship between motivation and students' cognitive achievement in Physics. This finding therefore agrees with Sandra (2002) and Skaalvik and Skaalvik (2006) who also found that there were significant relationships between academic performances and motivation. The result was however in contrary with the finding of Onuka and Durowoju (2010), that motivation has no significant relationship with students' achievement in Junior Secondary School Business Studies.

Between the two components, the highest correlate to achievement in Physics was students' Physics Self-efficacy. Although Pintrich (1999) stated that self-efficacy was strongly related to academic performance including examinations, no such strong relationship was found in physics. Students' motivation and self-efficacy have combined and relative significant influences on achievement in Physics. They are variables to consider or reckon with in efforts to improve science achievement.

## 6. Recommendation

Parents should work concertedly with school, teachers to encourage and reward the effort their children in physics. The school, parents and teachers should overtly and covertly communicate to the students that they can do well in physics.

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