

Effects of Senior Secondary School Physics Students' Self-Concept, on Performance in Jos North L.G.A Plateau State, Nigeria

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ABSTRACT

The study investigated the relationship between Senior Secondary School physics student, self - concept and academic performance in Jos North Local Government Area of Plateau State, three research questions and three hypotheses was formulated for the study. The instrument for data collection was self- concept conduct inventory questionnaires (SSCIQ) and physics achievement test questions (PAT). A correlation research design was used for the study. The correlation coefficient of 0.98 provides an estimate of reliability of a full test were half- test correlation is 0.96. The targeted population of the study comprises of SS II physics students in Jos North Local Government Area of Plateau State, numbering 350 students of these numbers 227 were male and 123 were female students respectively. The sample size used for this study was 200 students. A simple random sampling technique was employed to draw a representative sample for the study. The Pearson's Product Moment Correlation Coefficient 'r' was used to determine the relationship between self-concept and students' academic performance. While the t- test for independence samples was used to examine the differences that existed between male and female self-concept and their academic performance in physics. The finding was that there is positive relationship between Senior Secondary school students' self-concept and their performance in physics. It also revealed that there is no significant difference between male and female students' self-concept and academic achievement in physics. The findings further revealed that the male and female students do not differ significantly in their academic performance in physics. The recommendations made among others were that necessary measures be put in place in our educational system to remove inferiority complex in our students and enhance the development of positive self-concept on their academic achievement students.

Keywords: *Self-concept, Physics, Performance and Examinations*

INTRODUCTION

Concept as defined by (Novak & Canas (2008) as a perceived regularity in events of objects, or records of events or objects. It is seen as a set of attributes or characteristic common to all instances (people, objects, and ideas). Examples of physics concepts are simple machines, light waves, sound waves, electricity, magnetism and force.

Self-concept generally refer to as the cognitive or thinking aspect of one's self-image, it is the totality of a complex organized and dynamic system of learned beliefs, attitudes and opinions that each person holds to be true about his or her personal existence(Purkey,1988).

Physics is the study of physical forces and quantities, the scientific study of matter, energy, motion and the way they relate with each other (Goodlad, 2009). It can also be defined as the study of natural events that has to do with energy and motion in relation to matter. National Education Research Development Center (NERDC, 2004) states the following importance of physics in humanity.

1. It helps the individuals to understand and appreciate the modern industrial and technological world.
2. It also helps individual to think clearly and logical in the Study of natural events of life which can be explained with the study of mathematical Physics.
3. It helps in the calculation of length, areas, volumes and masses of objects.

Though significant development has been made in the application of Physics in the area of Bio-engineering, principles, theories and laws of physics are utilized in alerting societal occurrences, such as: earthquake, tsunami, thunderstorm, hurricanes and, so on. Nuclear energy is utilized in the generation of nuclear power and the generation of electricity; area of medicine (Bio-physics) we have X-rays in detecting internal organ in patients, and scanning of fetus of a pregnant mother, and in agriculture science, education, engineering, space technology and the availability of bomb detectors for prompt security response and so on (Akpan, 1999).

However, the importance of physics in everyday life and national development, the performance of students in Physics remains low over the years, because Physics involves calculations which students hate and reduces their self-concept, interest, attitude and their performance in the subject. Furthermore, the abysmal performance of students in physics is a recurrent issue. For instance, WAEC (2005-2012) and NECO (2005-2012) reported low mean scores obtained by candidates in physics. The reports further indicated that candidates poorly attempted physics questions, electricity radioactivity, vector representation, simple harmonic motion, electromotive force, projectiles, and waves and so on. The low performance can be traced to some factors such as lack of qualified Physics teachers, lack of laboratory facilities, insufficient funding and poor management of physical and human resources, incessant strikes by teachers. Other factors are the nature and scope of physics visa-vise its efficacy, teaching ability, methods employed in the teaching of physics, the availability of physics teachers, the facilities for teaching physics, students' self-concept, and attitude, interest and so on, from these array of factors, self-concept, interest, attitude are also noted to be a common cause of students' underachievement in physics, (Akpan, 1999 & mankilik, 2009)

Performance of students in Physics can be influenced by their self-concept and attitude towards the subject either positively or negatively and it depends on the environment in which the individuals came from. (Balogun, (2002). The issue of poor performance in physics is disturbing because it hinders the Universities to meet up the prescribed mandate of 60% for Science/Technologies, and 40% for Arts/Humanities (National Universities Commission, 2002). This is why Mankilik and Umaru (2007) observed that the output in the field of physics from tertiary institutions is inadequate. This has adversely affected the quest for scientific and technological advancement of Nigeria. This is because the pedagogical approach used in imparting knowledge of physics to learners has become inadequate to their needs, interest and the attitudes towards Physics itself by the teachers, students. Quite often, teachers employ the use of traditional teaching methods in their teachings of physics. Studies have reported that 60% of Nigerian secondary school physics teachers use lecture method only in teaching physics, which makes the content even more abstract.

Ali, 2005 observe that most schools are not lucky to have enough physics teachers, and that the few that are available often have to cope with a large number of teaching periods and students. Consequently, teaching is accomplished through 'talk and chalk' most of the time, without considering the psychological needs, interest and attitudes of the students which will retard their self-esteem and their academic performance. Physics has been the hub of science and technology that has often been recognized as the basic tool for industrialization and national development such as the Nigerian Telecommunication SAT1R, which was launched into space to enhance Information Communication Technology (ICT) and Remote Sensing. This is against the backdrop of low performance in physics among secondary school students has consistently been reported. (Agbenta, 1999; Olarewaju, 2001 & Ogunleye, 2003)

In addition, Ogunleye (2006) remarked that despite the efforts aimed at improving science, technology and mathematics education in Nigeria, there has been a growing public anxiety about falling standards in externally conducted examination such as the Senior Secondary School Certificate Examination (SSCE) conducted by the West African Examinations council (WAEC) and the National Examination Council (NECO) where the percentage of candidates who obtain credit pass and above in physics remains low. These and other issues underscores the need for this study to investigate the relationship between senior Secondary School Physics students' self – concept, on academic performance in Jos – North, Local Government Area of Plateau State.

STATEMENT OF THE PROBLEM

It is generally, believed that most of our day to day accomplishment in our endeavors is highly determined by our belief in our ability to accomplish a specific task. The way people look at their abilities determines their confidence levels on how to execute the task. Similarly, it has been observed that students' conceptions of their abilities determine to a large extent their academic achievement Durojaye (2002) asserted that self-concept is not a factor that should be overlooked among the causes of poor academic performance. Studies such as, those of Ojo (2001), and Mbamelu (2008) have examined the relationship between student's academic performance and self-concept. The outcomes of the different studies revealed mixed results; most theory of self-concept tend to suggest that the theory correlate positively with academic performance in Physics. Out of the many science schools, it was revealed that

Students detest physics as a subject, being that the knowledge of mathematics has been their main reasons for running away from the subject. Looking at their ability negatively however, they want to study any of the science discipline, such as medicine, engineering, technology and so on. Various reasons have been advanced by different researchers as to the causes of this hatred for mathematics and by extension Physics as a subject. These factors range from teacher factor to student factor. These student factors have to do with the student's concept, interest, and attitude towards their ability to handle Physics problems.

PURPOSE OF THE STUDY

This study investigated the correlation of students' self-concept, attitude and their performance scores in physics. This study was embarked upon with the view of achieving the following specific objectives: to

1. ascertain the nature of senior secondary schools two (SSSII) students' self-concept.
2. find out the level of students' performance in physics
3. determine the influence of Gender on student's self- concept and attitude towards Physics.
4. find out the difference between the attitude of male and female students' performance in Physics?
5. determine the attitude of senior secondary schools two (SSII) Students to Physics in Jos North L.G.A of Plateau state.

RESEARCH QUESTIONS

The following research questions guided the study:

1. What is the nature of senior secondary school Two (SSII) Students' Self-concept as it relates to Physics?
2. What is the difference between male and female Students Self- Concept in Physics?
3. What is the difference between the attitude of male and female students' performance in Physics?
5. What is the difference between the performance of male and female students in Physics?

RESEARCH HYPOTHESES

1. There is no significant correlation relation between students' self-concept, and performance in Physics.
2. There was no significant difference between attitude of male and female and performance in Physics.

METHODOLOGY

The research was a survey, to be specific, the correlation (2-group) design, because the design described the degree of association between the variable studies

The design was considered -because it was used for the computation of Pearson product moment correlation coefficient, for interval or ratio data of this kind of survey, using the data obtained by the researcher, examined the degree of relationship between the self- concept of secondary school students and their attitude to physics subject on their academic performance. The researchers obtained data after administering the instruments involving 30 multiple choices questions, the Physics Achievement Test (PAT), Self-concept Conduct Inventory (SCCI) and Student Attitude (SA) questionnaires was used to obtain the records of the student's academic

performance in physics. The targeted population of the study comprises of SS II physics students in Jos North Local Government Area of Plateau State, numbering 350 students of these numbers 227 were male and 123 were female students respectively The sample for the study comprised of 200 SS II Physics students, out of which 100 are male and 100 are female students. This number of students constituted the students in the different schools used for the study.

Random selection (hat and draw) was used to select 5 secondary schools of 40 students each making a total of 200 students. The names of the schools were written on pieces of paper and shuffled in a container. A colleague was asked to select 5 schools at random from the container, one at a time without replacement. The names on the papers were noted and considered. The five senior secondary schools were sampled from senior secondary schools in Jos North Local Government Area of Plateau state Nigeria.

For the purpose of this study the researcher used two major research instruments for data collection. These are self-concept Conduct Inventory (SCCI) questionnaires, Students Attitude (SA) questionnaire and a 30 - item multiple choices Physics Achievement test (PAT) which were developed by the researchers. The questions were given two colleagues using the face value of the questions generated and the questions were scrutinized. **PAT** was used in this study because it was aimed at measuring the achievement of the students; so as to find out how much learning of Physics took place among the students. The PAT covered the following concepts such as mechanics, projectile and simple harmonic motion (SHM), which consisted of 30 multiple choice objective test items, which were drawn from past WAEC/SSCE and NECO questions.

The questionnaire consisted of four point Likert scale, consisting of four points of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). It also consisted of statements relating to the relationship of students' attitude on Physics concept and the total number of items. Respondents were asked to tick the best option that suits their opinion using the four-point scale provided. The scale value of the Likert scale was rated as; SA = 4 points, A=3 point, D=2 points and SD = 1 point. The scale values of each respondent's option were totaled to get the standard deviation for the respondent.

The researcher was validated and the reliability value of the instruments determined and used in the Physics Achievement Test (PAT), consisting of 30-items multiple choices, Self-Concept Conduct Inventory (SCCI) questionnaires and Students' Attitude (SA) questionnaires were scrutinized.

Result

The results of the analyses are presented as shown in the table 1

Research Question 1

What is the nature of senior secondary school two (SSII) students' self- concept as it relates to their learning of Physics?

Table 1: Summary of relationship between strongly agreed and strongly disagreed.

	Total	%
SA	1390	69.5

SD	285	14.25
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The data from the self-concept conduct inventory (SCCI) clearly indicate that the strongly disagree of the sample expressed a significantly less positive self-concept than the sample of strongly agreed.

This indicates that positive self-concept attracts the higher performance and negative self-concept attracts lower performance. It shows that self- concept improves academic performance in Physics.

Research question II

To what extent do students of senior secondary school two (SSII) self-concept correlates with their performance in Physics?

Table 2: Summary of the PPMC statistics of the relationship between the self-concept and academic performance of students in Physics?

Self – concept (X)	$\sum X = 1181$	$\sum x^2 = 58743$	$\sum XY = 60337$
			$r = 0.96$ $t = 16.44$
Performance (Y)	$\sum Y = 1159$	$\sum Y^2 = 59161$	

Table 5 reveals that there is a significant relationship between students' self-concept and their performance in Physics. The difference that existed in some schools was not significant. The calculation of Pearson Product Moment correlation coefficient of X and Y of students' attitude and their performance was, calculated with $df = 198$ (that is $n - 2 = 198$) at $t = 1.96$ is required for significant level of 0.05. Since the calculated t (30.88) is greater than observed t (1.96). The null hypotheses was rejected the null hypothesis and conclude that the students' self-concept and their performance is significantly correlated.

Research question III

Is there any significant difference between male students' performance in Physics and their female counterparts as regards to their self-concept and academic performance score?

Table 3: Summary of PPMC and testing for significant correlated coefficient of the relationship between male and female self-concept of Physics students' performance.

Self-concept(X)	$\sum X = 1370$	$\sum X^2 = 51828$	$\sum Y = 55700$
			$r=0.90$ $t = 12.73$
Performance (Y)	$\sum Y = 1352$	$\sum Y^2 = 55776$	

Pearson's Produce Moment correlation coefficient was calculated for the two groups male and female, the result shows that there was an effect of students self-concept on the performance of the male and female students in the five schools the $df = 198$) at $t = 196$ is required for significant level of 0.05 since the calculated t (12..73) is greater than observed t (1.96), was

rejected it then implies that the students' self-concept of male and female and their performance are significantly correlated.

DISCUSSION

1. There is no significant correlation between Senior Secondary School two SS II students' self-concept and academic performance in physics.

The hypothesis was tested from each of the five schools using the Pearson's Product Moment Correlation Co-efficient (PPMC)

That there is no significant difference between the performance of male and that of female physics students. The t-test was also used in testing this hypothesis. The summary of the computation as shown in table 3 shows that the calculated t-value was 12.73. At 0.05 level of significance with degree of freedom 38, the critical t-value, however is 1.98 since the calculated t-value is less than the critical t-value, the hypothesis was accepted, therefore, there was no significant difference between the achievement of male and that of female physics students.

The problem under study was to determine the correlation of students' self-concept, on their performance in Physics in Jos-north Local Government of Plateau State Nigeria.

The major findings growing out of the study were as follows:

1. The study, which was carried out among senior secondary school students in Jos-North Local Government, has brought to light the correlation between student's self-concept on academic performance in Physics.
2. The null hypothesis one (1) which stated that there is no significance difference in academic performance and students' self-concept and was rejected; therefore, the alternative hypothesis was accepted.
3. The findings showed that performance in Physics is strongly and positively related to students' attitudes and self-concept. Thus, students whose attitudes and self-concept in Physics is improved are likely to perform better in Physics.
4. The null hypothesis two (2) which is there is no significance difference between male and female students in their self-concept measures. The result of the finding showed that a significant outcome was obtained from the calculations. This implies that boys and girls in SSS II in Jos-North Local Government Secondary School differ significantly in terms of their self-concept measures in Physics.
5. The null hypothesis three (3) which stated that there is no significance difference in academic performance and students' attitude and was rejected; therefore, the alternative hypothesis was accepted.

CONCLUSIONS

The main objectives of this study were to find out if there is a correlation between self-concept, attitude on academic performance. The following hypothesis was tested namely;

1. There is no significant relationship between male and female students in their self-concept measures.
2. There was no significant difference between self-concept of male and those of female students in Physics.

3. There was also a linear relationship between students' self-concept to Physics and their performance in Physics.

RECOMMENDATIONS

The researchers would like to make the following recommendations based on the findings of this study and other related results. These recommendations if adopted will go a long way in improving student's self-concept on academic performance in Physics.

1. It is imperative that necessary measures be put in place in our educational system to enhance the positive self-concept of students especially the girl child education.
2. Physics teachers need to work on the students' self-concept towards getting the best performance in Physics.
3. The teachers' disposition, dedication, devotion and selflessness will a long way in helping poor self- concept of the students'.
4. Apart from teachers' intervention, parents, counselors, administrators, and the government also have some roles to play. As the home helps to build up the child to overcome cultural problems, parent need to help the child to develop and learn positive self-concept in Physics.
5. Proprietors of schools will need to provide instructional materials and other related material as well as employ more qualified teachers with improved status to teach the students

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