

IDENTIFICATION OF CHALLENGES FACED BY SENIOR SECONDARY SCHOOL PHYSICS STUDENTS IN OYO EDUCATION ZONE, OYO STATE.

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Abstract

The study explored the underlying difficulties senior secondary school physics students encountered in the learning of physics concepts. The descriptive research design was adopted to explore the learning difficulties associated with the learning among the physics students. The population of the study was made up physics students from the senior secondary schools in Oyo and its environs. Stratified and simple random techniques were employed to sample 350 students for the study. Two research questions and two hypotheses guided the study. The instrument used for data collection was the researchers developed questionnaire majorly on items consisted of challenges faced by senior secondary school physics students. It had a reliability index of 0.75. The descriptive statistics of mean and standard deviation were employed for the analyses of data. T-test and chi-square statistics at $\alpha = 0.05$ were employed to test the hypotheses. The results of the study revealed students' challenges with reading, writing, and other learning related tasks, shortage of physics teachers to handle different concepts of physics and poor methods of teaching physics are the major challenges encountered by physics students. It was recommended that physics students should be encouraged to read more by giving them home work and assignment regularly, enough teachers should be employed by the government to teach the theory part and the practical so as to make physics concepts meaningful and less abstract.

Keywords: Learning difficulties, physics, teacher, mathematics ability, physics student.

Introduction

Physics is the study of nature, and behaviour of matter and energy on a vast range of size and scale. It studies the relationship between matter, energy, force, and time in an attempt to explain how these factors shape the physical behaviour of the universe (Nwankwo, 2007). It is the foundation upon which other sciences, such as chemistry, astronomy, and geology are based (Santisteban, 2009). Many other fields of science make use of concepts from physics and it has contributed a lot to our present understanding of the universe (Asuncion, Encina, & Mayano-Atienza, 2012). Physics is one of the essential parts of the Nigerian secondary school curriculum. Thus, at the senior secondary school level in Nigeria, physics has been identified as one of the core science courses as stated in the National Policy on Education (FRN, 2004).

Physics is perceived as a difficult course for students from secondary school to university and also for adults in graduate education. Hence, teaching physics has always been a challenge for students both in the high school and college levels because of the impression of most students that physics is a difficult subject. Some students even have prior thoughts that physics is a mathematics subject so those who have fear of numbers would naturally fear physics also. Moreover there are students who have the impression that the subject is usually taught by boring teachers who would just talk and lecture for the rest of the period (Pardo, 2017).

Physics knowledge plays a fundamental role in Science and Technology. Its application has increased productivity and improved economic and industrial development in many countries of the world. Being productive in Science and Technology depends on the adoption of scientific knowledge, skills and attitudes as a way of life (Semela, 2010). Physics have contributed to socio-economic and technological transformation and especially in this era of information, communication and technology (Munishi *et al.*, 2006). These innovations require the fundamental principles of Physics education taught in Secondary Schools. These principles are taught in major topics such as Magnetism, Electricity, Mechanics and Electronics among others. Physics is an important subject in the secondary school curriculum because it helps the learners to apply the principles, acquired knowledge and skills to construct appropriate scientific devices from available resources. In addition it prepares learners for scientific and technological vocations. However in spite of this importance of Physics, available data indicate that students' performance in Physics has been low. This performance is not good enough for Physics oriented courses for nations that are focused towards high technology and industrialization (Kiptum, 2015).

In spite of the unquestionable importance of physics to mankind, majority of the students would not want to pursue a career in physics. The mere inclusion of physics as part of the curriculum gives them undue anxiety. The students have that fear for the course as they think it is difficult. Introductory physics courses have a reputation among students of being more difficult than other introductory science courses (Ornek, Robinson & Haugan, 2008). This may be because success in physics courses requires a different approach, attitude and perspective than other science courses. Physics uses mathematics more intensively, and has far more and stronger internal logical connections and unifying principles derives its reputation as a difficult course primarily from its dominant problem-solving nature (Ogunleye, 2009). Good mathematics skills are a prerequisite for success in physics (Corpuz, 2017).

Students find physics difficult because they have to contend with different representations such as experiments, formulas and calculations, graphs and conceptual explanations at the same time Ancell, Guttersrud, Henriksen and Isnes, (2004). Physics as a subject that deals with physical quantities and mathematical exactitudes, virtually all branches of physics are concerned with problem-solving (Ogunleye, 2009). Physics requires the ability to use algebra and geometry and to go from specific to general and back. For many students, mathematics alone makes physics difficult. Weak mathematics ability is one cause of student difficulty in studying physics. Comprehension of physics concepts and knowledge are attainable through solving assignments together, solving numerical problems, doing Physics practical as well as doing it in group (Lasisi & Samaila, 2020).

Meanwhile, over the years the problem of under achievement of science students has been general problem. For example many researchers in Nigeria have conducted series of research to find out what could be responsible for the problem. Factors such as lack of adequate equipment, ineffectiveness and lack of teaching proficiency of the teachers, lack of qualified teacher and lack of good school environment have been identified as major causes of under achievement of science students in Physics (Lasisi & Samaila, 2020).

The secondary school physics curriculum is designed to provide students with knowledge and skills that will enable them solve problems and make decision in everyday life (Salmiza, 2014). Since physics has been severally labelled as the most conceptually difficult science subject, it is important to explore the underlying difficulties that might impede quality learning in the subject in the context of Nigeria school environment (Erinosho, 2013). When teachers recognize these difficulties, it helps them to choose appropriate and efficient teaching methods and techniques (Erinosho, 2013).

Students need knowledge, problem-solving skills, creative and critical thinking for proper adjustment into a fast scientifically and technologically developing society like ours. Students must therefore be taught to meet up with the challenges ahead and demand by daily living. Bearing in mind the nature of physics, there is therefore, the need for the teacher to teach the subject in such a way as to eliminate these learning difficulties in the teaching of the subjects so as to enable the students learn and acquire positive attitudes and value (Agommuoh, 2018).

Statement of the Problem

In spite of the significance of Physics in driving technological innovations, senior secondary physics students confront many challenges that hinder their learning and academic achievements. The challenges are inadequate instructional materials and resources, poor teacher training and pedagogical skills, large class size, inadequate students-teacher ratios, language barriers, limited access to technological and digital resources and so on. These challenges lead to low academic success, reduced student motivation, a lack of interest in pursuing Physics and science-related careers.

Researches have been conducted to address these issues. Despite these efforts, more researches and actions are needed to overcome the deeply inherent challenges.

Objective of the Study

The objective of the study is to explore the students' challenges in physics subject among senior secondary school students.

Research Questions

The following research questions guided the study

- i. What are the challenges faced by physics students based on the teacher and student factors?
- ii. What are the mean responses of challenges faced by physics students based on gender factor?

Hypotheses

- iv. There is no significant difference in the mean responses of challenges faced by physics students based on the teacher and student factors.
- v. There is no significant difference in the mean responses of male and female students on challenges faced by physics students based on gender factor.

Methodology

The study employed a descriptive survey method. This research was designed as a descriptive survey to establish the students learning challenges in physics in public secondary schools in Oyo educational Zone. Descriptive research ensures systematic collection and analysis of data is done in order to adequately answer research questions. Descriptive research design was adopted in this study as it enabled the researcher to obtain information and the student's learning challenges in physics.

There are a total of 4,628 senior secondary physics students in Oyo educational Zone: Among these students, 2,716 of them are from public secondary schools and 1,914 of them from private secondary schools. In order to gain insight into the challenges faced in the teaching and learning of Physics students in these schools, 350 students were selected for the research

work from the two categories. This sample selection was made by employing stratified sampling techniques.

The instrument used for data collection was the structured student questionnaire with items consisted of senior secondary school physics students learning challenges. The responses were indicated as Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighted 4, 3, 2 and 1 respectively. The structured questionnaire consisted of twelve items grouped into student factors and teacher factors.

The questionnaire was evaluated for content validity by ensuring that the vocabulary, sentence structure and the questions, were suitable for the intended respondents. Content validity was done by expert judgment. The researcher sought the expertise of other researchers who had conducted research on similar studies to check if the instruments were viable to collect the intended data. The reliability index of the questionnaire was determined using Cronbach Alpha with a reliability index of 0.76.

The research questions were answered using the mean. The responses were indicated as Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighted 4, 3, 2 and 1 respectively. The weighted average of 2.50 was used to take the decision. Items below 2.50 were rejected while items greater than or equal to 2.50 were accepted. The hypotheses were tested with t-test and Chi-square statistics.

Results

Data collected for this study were presented and analysed based on the research questions and hypotheses for the study.

Research Question One: What are the challenges faced by physics students based on the teacher and student factors?

Table 1: Mean responses of the challenges faced by physics students based on the teacher and student factors?

	Items	SA	A	D	SD	MEAN	STD
1	Poor mathematics ability	156	121	47	26	3.17	1.506
2	Students difficulty with reading, writing, or other learning related tasks	104	82	92	72	2.61	1.298
3	Physics students failure to construct meanings to the problem statement	167	87	65	31	3.12	1.478
4	Laziness on the part of physics students	98	114	84	54	2.74	1.320
5	Lack of physics textbooks to complement teaching and learning	73	68	139	70	2.42	1.294
6	Inability to understand principle of physics in formulae	134	99	62	55	2.90	1.371
	Ground Mean					2.81	1.38

The result from table 1 shows the mean response of item 1 'Poor mathematical ability', item 2 'Students difficulty with reading, writing, or other learning related tasks', item 3 'Physics students failure to construct meanings to the problem statement', item 4 'Laziness on the part of physics students', item 5 'lack of physics textbooks to complement teaching and learning', and item 6 'Inability to understand principle of physics in formulae' had a mean values of 3.17, 2.61, 3.12, 2.74, 2.42 and 2.90 respectively

Research Question Two: What are the mean responses of challenges faced by physics students based on gender factor?**Table 2: Mean responses of challenges faced by physics students based on gender factor?**

	Items	SA	A	D	SD	MEAN	STD
1	Inexperienced physics teacher handling the subject	121	102	71	56	2.83	1.346
2	Physics teachers are unfriendly and not helpful	76	39	131	104	2.26	1.322
3	Shortage of physics teachers to handle different concepts of physics	153	107	49	41	3.07	1.450
4	Poor illustration of physics knowledge with no real life examples	116	98	87	49	2.81	1.34
5	Poor methods of teaching physics	146	122	48	34	3.09	1.462
6	Poor conditions of service of physics teacher	79	58	103	112	2.29	1.313
	Ground Mean					2.75	1.37

The result from table 2 reveals the mean responses of item 1 'Inexperienced physics teacher handling the subject', item 2 'Physics teachers are unfriendly and not helpful', item 3 'Shortage of physics teachers to handle different concepts of physics', item 4 'Poor illustration of physics knowledge with no real life examples', item 5 'Poor methods of teaching physics' and item 6 'Poor conditions of service of physics teacher' had a mean value of 2.83, 2.26, 3.07, 2.81, 3.09 and 2.29 respectively.

Table 3: Mean responses of learning challenges of male (physics) students

	Items	SA	A	D	SD	MEAN	STD
1	Poor mathematical ability	67	81	31	28	2.92	1.378
2	Students difficulty with reading, writing, or other learning related tasks	84	69	25	29	3.02	1.424
3	Physics students failure to construct meanings to the problem statement	44	33	76	54	2.33	1.305
4	Laziness on the part of physics students	72	59	35	41	2.80	1.336
5	Lack of physics textbook to complement teaching and learning	58	51	47	51	2.57	1.294
6	Inability to understand principle of physics in formulae	35	39	70	63	2.23	1.327
7	Inexperienced physics teacher handling the subject	62	58	40	47	2.67	1.305
8	Physics teacher are unfriendly and not helpful	68	57	43	45	2.70	1.311
9	Shortage of physics teacher to handle different concepts of physics	77	61	44	25	2.93	1.384
10	Poor illustration of physics knowledge with no real life examples	51	58	46	52	2.53	1.292
11	Poor methods of teaching physics	46	55	59	47	2.50	1.291

12	Poor conditions of service of physics teachers	67	53	39	48	2.68	1.308
Ground Mean		61	56	46	44	2.66	1.330

From table 3, the mean values of male respondents show that item 3 'Physics students failure to construct meanings to the problem statement' and item 6 'Inability to understand principle of physics in formulae' had a mean value of 2.33 and 2.33 respectively, which were below a working mean of 2.50.

Table 4: Mean responses of learning challenges of female (physics) students

Items	SA	A	D	SD	MEAN	STD
1 Poor mathematical ability	52	44	26	21	2.91	1.374
2 Students difficulty with reading, writing, or other learning related tasks	41	48	29	25	2.75	1.324
3 Physics students failure to construct meanings to the problem statement	30	26	41	46	2.30	1.312
4 Laziness on the part of physics students	32	42	35	34	2.52	1.291
5 Lack of physics textbook to complement teaching and learning	43	44	31	25	2.75	1.324
6 Inability to understand principle of physics in formulae	61	48	13	21	3.06	1.446
7 Inexperienced physics teacher handling the subject	44	40	32	27	2.73	1.317
8 Physics teacher are unfriendly and not helpful	62	42	18	21	3.04	1.431
9 Shortage of physics teacher to handle different concepts of physics	47	39	22	35	2.70	1.312
10 Poor illustration of physics knowledge with no real life examples	S	34	35	21	2.85	1.354
11 Poor methods of teaching physics	37	34	41	31	2.56	1.293
12 Poor conditions of service of physics teacher	35	42	36	30	2.59	1.295
Ground Mean	45	40	30	28	2.73	1.339

From table 4, the mean values of female respondents show that only item 3 'Physics students failure to construct meanings to the problem statement', had a mean value of 2.30. This mean value was below a working mean of 2.50.

Hypothesis One: There is no significant difference in the mean responses of challenges faced by physics students based on the teacher and student factors.

Table 5: t-test statistics of the mean responses of problem-solving learning difficulties by student and teacher factors

	N	Mean	df	t_{cal}	t_{tab}
Student factors	350	2.81			
Teacher factors	350	2.75	3	0.576	1.96

Hypothesis Two: There is no significant difference in the mean responses of male and female students on challenges faced by physics students based on gender factor.

Table 6: Chi-square statistics of the mean responses of problem-solving learning difficulties of male and female physics students

Sex	N	df	χ^2_{tab}	χ^2_{cal}
Male	207	3	7.815	0.31
Female	143			

Discussion of Findings

Research question one attempted to identify the challenges encountered in the course of studying physics by the senior secondary school physics students. The result from table 1 revealed that the item 'lack of physics textbooks to complement teaching and learning' was rejected having a mean value of 2.42, which was below the working mean of 2.50. However, other factors such as the poor mathematical ability, students' difficulty with reading, writing, or other learning related tasks, physics students' failure to construct meanings to the problem statement, laziness on the part of physics students, and inability to understand principle of physics in formulae were accepted.

Research question two attempted to identify the learning challenges attributed to the teachers' factors. Table 2 outlined the mean responses of the learning challenges based on the teacher factors. The poor conditions of service of physics teacher was rejected while other factors were accepted from the study carried out. The result of this study is in agreement with study carried out by Agommuoh, (2018). He carried out a study on the identification of learning difficulties of senior secondary school physics students with a total population of 190 senior secondary school two (SSS2) physics students from four senior secondary schools in Umuahia North Local Government Authority of Umuahia Education Zone of Abia State. The results of his study showed that difficulty with reading and / or writing, problems with mathematics skills, difficulty in remembering, problems paying attention, trouble following directions, poor coordination, difficulty with concepts related to time and problems staying organized were agreed to be learning difficulties of senior secondary school physics students.

Similarly, the result is also comparable to the results of the study carried out by Lasisi & Samaila, (2020) which revealed indicated that teachers' teaching method, instructional materials, teachers' communication skill, students' motivation, learning environment and students' study habit were highly perceived by students as important determinants of their success in learning of Physics.

Research hypothesis one attempted to establish the significant difference in the mean responses of student factors and teacher factors on the problem-solving difficulties in the senior secondary school physics. The result of this study showed that there is no significant difference in the problem-solving difficulties in the teaching and learning of physics as they are related to the teachers and students in the senior secondary schools. This result is comparable to the results obtained by the various scholars.

Halim *et al.* (2016) investigated the ability of students to apply problem-solving strategies in physics. In the semi-experimental study carried out with 25 graduate students, routine problems were used, and rubrics were utilized as the measurement tool. Heller's "Troubleshooting Strategy" was used as the problem-solving strategy. According to the results

of the study, it was determined that the students had difficulty in identifying the problem (Halim *et al.*, 2016).

Research hypothesis two attempted to establish the significant difference in the mean responses of the male and female students on the problem-solving difficulties in the senior secondary school physics. The result of this study revealed that there is no significant difference in the responses of the male and female respondents on the problem-solving difficulties in the senior secondary school physics students. This means that learning challenges among senior secondary school physics students is not gender based.

The result of this study is in agreement with the result and findings from the similar studies. The study of Sebastian (2017) showed that male and female students had no significant difference in conceptual difficulties in problem-solving but male students had higher computational understanding than female students in problem-solving.

Conclusion

Based on findings from the results, it was concluded that the senior secondary physics students encountered many challenges. Some of these challenges which were based on the student factors included poor mathematics ability, student's difficulty with reading, writing or other learning related tasks, laziness and inability to understand principles of physics in formulae. However, many other difficulties explored from the study such as inexperience on part of the teacher, shortage of physics teachers to handle different concepts of physics, and poor methods of teaching physics were teacher related problems.

Recommendations

The following recommendations were made based on the results of the study:

1. Conferences, workshops, and seminars should be organized for the newly employed and inexperienced physics teachers to improve their teaching skills on how to help students overcome learning difficulties in physics.
2. Physics students should be encouraged to be actively involved in the teaching learning process. This can be done when teachers adopt active teaching methods such as group work, cooperative learning and presentations, which initiate quality interactions between the students and the teachers in order to help students overcome their learning difficulties in physics.
3. Enough teachers should be employed by the government to teach the theory part and the practical so as to make physics concepts meaningful and less abstract.
4. Science teachers allowance should be approved for teachers in order to improve on the poor condition of teaching service.
5. Physics students should be encouraged to read more by giving them home work and assignment regularly which should be marked and necessary corrections made. By doing this students may develop more interest and consequently overcome some of these learning challenges in physics.

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