PHYSICS STUDENTS RESERVATION, ENTREPRENEURSHIP AND SPACE STUDY AMONG PHYSICS STUDENTS IN SOME SELECTED TEACHER TRAINING COLLEGES IN NORTH-WESTERN NIGERIA

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Abstract
The study investigated Physics students' reservations towards entrepreneurship and space study in some selected teacher training institutions in North-western Nigeria. Three research questions and three hypotheses were formulated to guide the study. A purposive sampling technique was used to select 322 students for the study. Six colleges of education from the North Western Nigeria were selected. The instrument for data collection was a self designed questionnaire. The reliability of the instrument was determined using test re-test and a coefficient of 0.83 was obtained. Mean, and standard deviation were used to answer the research questions and while z-test and t-test were used to test the three null hypotheses. The findings among others revealed that; students have negative reservations towards learning physics as a course in teacher training institutions and that entrepreneurship courses are lacking in the curriculum of selected Federal colleges of education. Based on the above findings, it was recommended among others that physics education curriculum should include number of topics and sub-topics that will promote entrepreneurship and; that skills in theoretical physics should be incorporated in teacher training institutions curriculum to enable students acquire basic entrepreneurship and space exploration skills.

Keywords: Physics Education, Teaching Methods, Entrepreneurship, Space Study.

Introduction

The study of physics in most African countries seems to be a difficult task due to its abstract nature and perhaps lack of facilities that can enhance or appeal to learners' interest as well as assist the teachers to demonstrate practical instruction in classrooms. Majority of students in Nigeria find it difficult as a result of teachers inability to effectively teach the subject and the fact that entrepreneurial themes that prepares students after graduation to practice one vocational skill or the other with a view to be self-sufficient instead of relying on government for an employment are absent in Physics curriculum. This situation has caused Nigerian ailing economy to sufficiently provide employments to mass number of students' graduating annually from various institutions of higher learning. The growing population and poor private sector industries and service providers can no longer employ both graduate and artisans in their sectors.

Imperatively, the study of physics provides opportunity for people to understand the universe and also explore to the constituent of nature along side with the production of scientists, engineers etc whose work would bumper the nation's economy through the application of various concepts of Physics. Physics can be defined as a study of the sciences of nature. Liddell, Henry, Scott, and Robert (2016) saw it as a natural science that studies matter and its motion and behavior through space and time and that studies the related entities of energy and force. Physics is one of the most fundamental scientific disciplines, and its main goal is to understand how the universe behaves (Young; Freedman, 2014: Holzner, (2006).

Physics is one of the oldest academic disciplines and, through its inclusion of astronomy, perhaps the oldest (Krupp, 2003). Physics, chemistry, biology, and certain branches of mathematics were part of natural philosophy, but during the scientific revolution in the 17th century, these natural sciences emerged as unique research endeavors in their own right. Physics intersects with many interdisciplinary areas of research, such as biophysics and quantum chemistry, and the boundaries of physics are not rigidly defined. New ideas in physics often explain the fundamental mechanisms studied by other sciences. That is why Maxwell (2000) suggests new avenues of research in academic disciplines such as mathematics and philosophy.

However, students' reservations are mere disappointment shown by students during the process of learning physics as course in teacher training institutions and so students at this level started to build culture of remaining focused in their area of career building, which helps them to infer concepts in Physics and serves as a yard stick of professional development while some students tend to develop worries if they could not understand Physics instruction. As a result, students tend to become so bored by physics lectures being held in a large auditorium, lecture rooms and laboratories without any interaction at all through practical that can enhance future promise of self reliance and competing with global challenges of science and technology. Physics students cannot grasp this form of study, when instructions remain passive, lonely, self-disciplined and protracted.

Notably, advances in physics often enable advances in new technologies. For example, advances in the understanding of electromagnetism and nuclear physics led directly to the development of new products such as television, computers, domestic appliances, and war arsenals that have dramatically transformed modern-day society. Also, advances in thermodynamics led to the development of industrialization; and advances in mechanics inspired the development of calculus (Maxwell, 2000).

More so, Physics deals with the combination of matter and energy. It also deals with a wide variety of systems, about which theories have been developed that are used by physicists. In general, theories are experimentally tested numerous times before they are accepted as correct as a description of nature. Theory of classical mechanics accurately describes the motion of objects, provided they are much larger

than atoms and moving at much less than the speed of light. Maxwell equally noted that these theories continue to be areas of active research: for instance, a remarkable aspect of classical mechanics known as chaos was discovered in the 20th century, three centuries after the original formulation of classical mechanics by Isaac Newton between the periods of 1642–1727. These central theories are important tools for research in more specialized topics, and any physicist, regardless of his or her specialization, is expected to be literate in them.

Physics education refers both to the methods currently used to teach physics and to an area of pedagogical research that seeks to improve those methods, (Nelleke, 2014). Historically, physics has been taught at the high school and college level primarily by lecture method together with laboratory exercises aimed at verifying concepts taught in the lectures. These concepts are better understood when lectures are accompanied with demonstration, hand-on experiments, and questions that require students to ponder what will happen in an experiment and why. Students who participate in active learning for example with hands-on experiments learn through self-discovery. By trial and error they learn to change their preconceptions about phenomena in physics and discover the underlying concepts. Indeed, there are other strategies that are used to teach Physics in the study area.

Teaching strategies are the various techniques used by the teachers to facilitate the students with different learning styles. The different teaching strategies help teachers to develop critical thinking among students and effectively engaging them in the classroom. The selection of teaching strategies depends on the concept to be taught and also on the interest of the students.

Some of the popular Methods of Teaching Physics in Teacher training colleges include the lecture method and the demonstration method. Lecture method is one of the traditional ways of teaching science. However, most teachers adopt lecture method and have continued to use the method in spite of its many limitations because it is very much convenient. This method is teacher centered and so the role of the lecturer is supreme. Lecture method is ineffective in developing critical thinking and scientific attitude among students. It is usually employed by teachers because it saves time and helps in covering large number of students at a time. In lecture method, the teacher can provide more information in less time. But the learners only observe, they don't get hands on experience and it is not possible to teach all topics by this method, (Holzner, 2006).

In demonstration method the teacher perform certain experiments which students observe and put questions related to the experiment. After completion the teacher can ask questions to explain each and every step that is performed. This method is effective in science subjects and is not completely effective in theoretical subject. Demonstration method is a simple method where the teacher performs the experiment and explains the lesson to students simultaneously.

Research Objectives

1. To investigate level of students reservations towards learning the subject in some selected teacher training institutions in North Western Nigeria?
2. To assesses main instruments in laboratory that can facilitate learning of space in some selected teacher training institutions in North Western Nigeria?
3. To ascertain level of entrepreneurship skills in your physics syllabus that can facilitate self reliance after graduation in some selected teacher training institutions in North Western Nigeria?
4. To find out the relationship between students' reservations and their CGPA in physics in some selected teacher training institutions in North Western Nigeria.
5. To ascertain the difference between Federal and State government colleges of education in students' reservations toward learning physics in some selected teacher training institutions in North Western Nigeria?

Research questions and hypothesis

The study is guided by the following three research questions and three hypotheses:

1. What are Physics students' reservations towards learning the subject in the selected teacher training institutions in North Western Nigeria?
2. What are the main instruments in the Physics laboratory that can facilitate learning of space in the selected teacher training institutions in North Western Nigeria?
3. What are the entrepreneurship skills in possessed by Physics students that can facilitate self reliance after graduation from the selected teacher training institutions in North Western Nigeria?

Hypotheses

1. There is no significant relationship between Physics students' reservations and their CGPA towards the study of Physics education in the selected teacher training institutions in North Western Nigeria.
2. There is no significant difference between male and female Physics students' reservations towards the study of Physics in the selected teacher training in North Western Nigeria.
3. There is no significant difference between Physics students' reservations in the selected Federal and State government colleges of education towards learning physics.

Methodology

The survey design was used for this research. The design was appropriate because the researcher requires neither the manipulation of variables nor will receive or arrange for an event to happen. The researcher uses this design in such a way that the entire part of North western Nigeria

zone is represented. The researcher's targeted population was the entire departments of physics education in the colleges of education in North-Western Nigeria are selected. The total population of the study from the selected teacher training institutions is 2248. The institutions forming the population of the study were selected based on convenience.

Table 1: Distribution of Physics students in the selected teacher training institutions

Institutions	Male	Female	Population
1. SRCOE Kumbotso	430	185	615
2. JSCOEGumel	115	35	150
3. ZSCOE Maru	157	20	177
4. KSCOE GidanWaya		557	128 685
5. FCE Bichi	108	141	22
6. FCE Katsina	389	110	499
Total	**1756**	**492**	**2248**

Source: Physics Department of the individual colleges (2019)

Based on the population of the study and in accordance with Krejcie and Morgan (1970), the sample size for the study selected using convenience sampling technique is 322 students. The researcher added up 6 pieces of questionnaire to avoid missing and mutilation on the part of the students and ensure the minimum sample is realized.

Table 2: Physics students' distribution by population and sample in the selected teacher training institutions

SN.	College	Population	Sample	Percentage (%)
1.	SRCOE Kumbotso	615	88	27.0
2.	JSCOEGumel	150	22	6.8
3.	ZSCOE Maru	177	24	8.0
4.	KSCOE GidanWaya	685	98	30.5
5.	FCE Bichi	122	18	5.6
6.	FCE Katsina	499	72	22.4
Total		**2248**	**322**	**100.0**

Justification: Research advisor (2016).

Questionnaire was used to generate information about students' reservations in physics education. The instrument wasself developed by the researcher through asking the subjects their reservations in all the colleges of education in the north western Nigeria. Similar items were selected and used as items making the questionnaire. The instrument was validated using

research assistants due spacial distribution of the samples across hundreds of kilometers apart from each college. Students level coordinators were used to assist in administering, explanation were necessarily and retrieving the instrument. Test re-test method was used to ensure the internal consistency of the items after slight modification from the original draft. Test re-test administration was used over a period of two weeks. The reliability co-efficient of the instrument was 0.83.

The researcher sought permission of the selected colleges for permission to administer the SRESQ-A questionnaire. Owing to the distance and distribution of sample as earlier mentioned the researcher trained students' level coordinators who acted as research assistants in the (6) selected colleges of education school of sciences to help lead the students in generating the data. A total of 322 questionnaires were distributed to the respective sample students. The students' CGPA in core physics second teaching subject and main education were obtained from their level, coordinators scores in these three subjects were standardized and used to form the academic achievement measure of the subjects of study. The data obtained from this study were subjected to different statistical analyses. Descriptive statistics (mean and standard deviation) was used to answer the research questions. The criterion mean of 2.5 was used to justify the existence or otherwise of a phenomena. While z-test and t-test were used to test the three null hypotheses at 0.05 level of significance.

Results

The results below are presented according to the research questions and hypotheses.

Research Question 1: What are Physics students' reservations towards learning the subject in some selected teacher training institutions in North western Geo political zone Nigeria?

Table 3: Students' reservations and learning of Physics

Variables	N	Mean	SD
Inexperience teachers teaching methodology scared students from enrolling in physics. .6108	322	2.66	
Conceptual terminology in physics easily put off more students learning physics .7976	322	2.36	
Lack of employment after graduation. .7774	322	2.38	

Physics education is difficult and not easily Comprehended	322	2.49	.6519
Mathematical orientation of the course easily Put off students from the course	322	1.68	.8538
Lack of enough graduate to facilitate the course affects students performance	322	2.11	.5830
Poor practical materials leads to a lot of misunderstanding of physics	322	1.96	.6972
Majority of teachers in the field possess NCE certificates in physics	322	2.27	.7406
Laboratories have outdated practical materials	322	2.59	.9541
Majority of Physics text books are authored from abroad	322	1.69	.5966

Table **3** indicated Physics students' reservations towards the learning of physics which include that inexperience teachers teaching methodology scare students from enrolling in physics (2.66), conceptual terminology in physics easily put off more students learning physics (2.36), lack of employment after graduation(2.36), Physics education is difficult and not easily comprehended (2.49), poor practical materials leads to a lot of misunderstanding of physics(2.11), majority of teachers in the field possess NCE certificates in physics (2.27) and laboratories have outdated practical materials (2.29).

Research Question 2: What are the main instruments in your laboratory that can facilitate learning of space study in some selected teacher training institutions in North western Geo political zone Nigeria?

Table 4: Laboratory facilities facilitating space study in selected teacher training institutions

Variables	**N**	**Mean**	**SD**
Radiology kits	322	2.32	.7561
Solar system kits	322	2.38	.7405
NASA moon globe	322	1.73	.8409
Mountains rifts	322	1.21	.6206
Telescope	322	2.21	.7007
Constellation stars.	322	2.26	.7643

Binoculars	322	2.23	.7643
Moon phase classroom inquiry sets	322	2.24	.6439
3D orbiter	322	3.03	.7507

Table 4 presents the mean responses of students revealed that the instruments in laboratory that can facilitate learning of space and astronomy in physics are: Radiology kits (2.32), Solar system kits (2.38), Telescope (2.21), Constellation stars (2.26), Binoculars (2.23), Moon phase classroom inquiry sets (2.24) and 3D orbiter (3.03).Thus, the findings indicated moderate availability of laboratory facilities that can facilitate learning of space and astronomy of Physics.

Research Question 3: What are the entrepreneurship skills in your physics syllabus that can facilitate self reliance after graduation in some selected teacher training institutions in North western Geo political zone Nigeria?

Table 5: Physics students' Entrepreneurship skills

Variables	N	Mean	SD
I can repair electronic materials after my graduation.	322	2.19	.9350
I can construct simple machine to do some house hold work.	322	2.24	.9844
I can be hired to work in electronic /provide services to some companies.	322	2.49	.9145
Repairs of simple machines	322	2.30	.8312
Training others to be self employed	322	2.11	.9996

Table 5indicatedthat Physics students possesses the following entrepreneurship skills after graduation: repairing electronic materials (2.19),can construct simple machine to do some house hold work (2.24), can be hired to work in electronic /provide services to some companies (2.49), repairing simple machines (.2.30),training others to be self employed (2.11).

Hypothesis 1: There is no significant relationship between Physics students' reservations and CGPA in some selected teacher training institutions in North western Nigeria.

Table 6: Relationship between Physics Students' Reservations and CGPA

Variables	r-cal	sig	p-value	Decision
Reservations & CGPA	.351	0.05	.003	Reject

The z-test data in Table 6hasa P-value .003which is lower than 0.05 level of significance. Therefore, this finding showed that there is significant relationship between Physics students' reservations and their CGPA in some selected teacher training institutions in North western Nigeria.

Hypothesis 2: There is no significant difference between male and female Physics students' reservations towards the study of Physics in some selected teacher training in North Western Geo political zone, Nigeria

Table 7: Male and Female Physics students' Reservations towards the Learning of Physics in some selected teacher training institutions

Variables	N	Mean	SD	df	z-Cal	Sig	P-Value
Decision							
Male	190	16.268	4.5270				
				320	.470	0.05	.638
Accept							
Female	132	16.022	4.7268				

Table 7 above with z-cal value of .470 and p-value of .638. Since the probability value of .638is greater than 0.05 level of significance, the null hypothesis was therefore upheld. Hence, there is no statistically significant relationship between male and female Physics students' reservations towards the study of Physics in some selected teacher training in North Western Geo political zone, Nigeria.

Hypotheses 3: There is no significant difference between Physics students in Federal and State government colleges of education reservations towards learning physics

Table 8: Difference between Federal and State Colleges of education students Reservation

Variables	N	Mean	SD	df	z-Cal	Sig	P-Value	Decision
Federal	90	16.1889	4.6540					
				320	.051	0.05	.982	Accept
State	232	16.1595	4.5948					

The data in Table 8hasa P-value of .982 which is greater than 0.05 level of significance. Thus, the null hypothesis was accepted. Therefore, there is no significant difference between Physics students in Federal and State government colleges of education reservations towards the study of physics.

Discussions

The findings of this study indicated that students have negative reservations towards learning Physics. To support this finding, Rob (2005) noted that Physics students find the subject difficult in high school. As a result, many students choose less challenging subjects at school in order to produce good grades. This finding is also in line with Keeves (2002), who states that students' interest towards Sciences is at a decline due to conventional instructional approaches predominantly in use in Science instructions. The findings also revealed that the main instrument available in the laboratory that facilitates the study of Physics in the laboratory are Radiology kits, Solar system kits, Telescope, Constellation stars, Binoculars, Moon phase classroom inquiry sets, and 3D orbiter. Natasha and Carl (2018) collaborates that laboratory courses are designed to help the students to see how physics principles work in real life; conducting experiments should help them understand physics better and reinforce classroom instruction. The study equally revealed that there is no statistically significant difference in the reservations of male and female students towards the study of Physics. This finding contradicts the findings of Adrian, Sarah, and Eleanor (2013)that female were lagging behind male in physics performance and that women consistently score lower than men on common assessments of conceptual understanding of physics. The finding equally contradicts the findings of Obioma and Ohuche (2000), who states that male students show much interest in Mathematics than female students.

Recommendations

1. There is need to for the revisit the teacher training curriculum by the national regulatory body National Commission for Colleges of Education NCCE to incorporate all the entrepreneurship needs of the Physics students.
2. Colleges should provide space study tools and equipment in their laboratory to introduce the students to space study teaching and learning processes
3. Teacher education curriculum should provide the teachers with some topics that will introduce the prospective teachers to entrepreneurship and other skills acquisition.
4. Students need to develop culture of extra and self study as there is moderate correlation between their reservations and their CGPA.

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