Available online at http://www.journalijdr.com

IJDR

International Journal of DEVELOPMENT RESEARCH

ISSN: 2230-9926

International Journal of Development Research
Vol. 4, Issue, 11, pp. 2409-2412, November, 2014

Full Length Research Article

STUDENT LEARNING OF PHYSICS IN COLLEGES OF EDUCATION: ANALYSIS OF PERFORMANCES

***Aina, Jacob Kola**

Physics Education Department, College of Education (Technical) Lafiagi, Kwara State, Nigeria

ARTICLE INFO

Article History:

Received 01st August, 2014
Received in revised form
10th September, 2014
Accepted 16th October, 2014
Published online 18th November, 2014

Key words:

Physics theory,
Physics practical,
Academic performance,
Examination score.

ABSTRACT

This study was carried out in Colleges of Education Kwara state in Nigeria to examine how students are performing in Physics. The participants comprises of 105 Physics students drawn from Physics/Chemistry, Physics/Computer Science, Physics/Integrated Science and Physics/ Mathematics combinations. This was a random sampling within four Colleges of Education. The instrument used was three years examination scores of these students. These scores represent what each student scored percent for three years of their studies. The finding of the analysis done using descriptive statistics and T- test reveals significant differences between students' performances in Physics theory and practical; between female Physics theory and practical and also between male Physics theory and practical. The general performance of students in Physics was just average which is not good enough for prospective teachers. Recommendations were suggested at the end of the study.

INTRODUCTION

Colleges of Education are teacher training tertiary institutions in Nigeria established to trained teachers for primary and junior secondary schools. National Commission for Colleges of Education (NCCE) is the body saddled with a responsibility of coordinating the programmes of these colleges. The academic programme of these colleges includes Physics Education for prospective Physics teachers. Physics is combining with other science courses like Biology, Chemistry, Computer Science, Integrated Science and Mathematics. Here are some possible Physics combinations:

- Physics and Biology
- Physics and Chemistry
- Physics and Computer Science
- Physics and Integrated Science
- Physics and Mathematics

Principle and method of education is general to all the combinations.

Physics is a core science subject that is crucial to the understanding of the world around us (Agommuoh and Ifeanacho, 2013). Physics is basic for understanding the complexities of modern technology, and essential for technological advancement of a nation (Erinosho, 2013). Physics occupies a very sensitive position in physical science (Shamim, Rashid and Rashid 2014). Some schools do not enroll students for Physics because of the believed that it's a difficult subject (Wanbugu and Changeiywo, 2008). Oladejo, Olosunde, Ojebisi and Isola (2011) perceived Physics to be one of the science subjects found difficult in the school curriculum. Physics is thought to be the most basic science subject whose concepts and techniques support the progress of all other branches of science (Sheriff, Maina and Umar, 2011). Physics like other physical sciences is divided into two aspects which are Physics theory and Physics practical. Physics practical involve the ability of students to use Physics apparatus to implement experimental procedure and being able to draw conclusion successfully from this experimental procedure. Physics theory belongs to cognitive domain of learning while Physics practical is in psychomotor domain. The two aspects are strongly related that is why any study on students' academic performance in Physics must analyse the two aspects separately. According to Aina (2011), the educational objective of Physics cannot be fully realized if students are not performing well in both Physics theory and practical.

Physics education has been facing a lot of problems many decades ago in Nigeria and in the whole world. Thomas and Israel (2013) admitted this fact when they observed that Physics education is going through several challenges in the

Corresponding author: Aina, Jacob Kola,
Physics Education Department, College of Education (Technical) Lafiagi, Kwara State, Nigeria.

nation educational system. There are three major problems of Physics education in Nigeria and in Africa at large among many others. These are low students' enrolment, poor students' performance and lack of qualified teachers to teach Physics.

Studies have shown that there is low enrolment in Physics all over the world. Maguswi (2011) reported that Physics is generally referred to as underachievement course therefore not many people are willing to study the course in Zambia. Mekonnen (2014) observed that Physics had the lowest enrolment among undergraduate students in Ethiopia universities. According to Erinosho (2013) only few students in Nigeria shows interest and studied Physics. Alao and Abubakar (2010) lamented that Physics is having a problem of low enrolment in Nigerian schools. Semola (2010) said students avoiding Physics in school is not Nigeria problem alone but an international problem. It has been observed that one of the major problems of Physics education in Nigeria is the absence of qualified teachers in schools (Akanbi, 2003; Aiyelabegan, 2003; Thomas and Israel, 2013, Josiah, 2012 and Adeyemo, 2012). Musasia, Abacha and Biyoyo (2012) posited that inadequate teacher qualifications as well as possession of below standard of pedagogical content knowledge by teachers are problems of Physics education. Stephen (2010) cited Odilli and Akpan that many Physics teachers in Nigeria are poorly qualified and are not familiar with the names and uses of some Physics apparatus in the laboratory.

Physics has been seen as a course where students' performances have not been encouraging. Evidence abounds that there are massive failure in public examinations like West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO) in Physics in Nigeria (Erinosho, 2013). This author explains further that slightly over 30% of students who registered for Physics passed at credit level as against 40% in Biology and Chemistry. The poor performance is not only limited to secondary schools as observed by Stephen (2010) that poor performance of students in Physics both at secondary and post-secondary in Nigeria has been a source of concern for everyone. Students at higher secondary school level of education are still performing woefully in Physics despite all the efforts of the government (Shamin, Rashid and Rashid, 2013).

Physics educators and scholars are not satisfied with students' academic performance in Physics. According to Josiah (2012), Physics results in most certified examination like West African Examination Council (WAEC) have not been satisfactory. The situation is worrisome to both teachers and parents. According to Dupe (2013), students' dwindling performances in Physics in public examinations are worrisome. Achievement of students in Physics has been worrisome to the generality of the people most especially Physics educators (Folashade and Akinbobola, 2009). Performance of students in Physics at the end of secondary school is dismal (Musasia, Abacha and Biyoyo, 2012). Thomas and Israel (2012) made it very clear that, there has been a drastic reduction in the performance of secondary school students in Nigeria in the past decades in Physics.

The issue of performance of students in Physics based on gender had been with mixed results. Some believed there is no significant difference between male and female performance in Physics while other said there is significant difference. According to Osborne, Simon and Collins (2003), boys are better than girls in Physics. Alao and Abubakar (2010) noticed gender differences in Physics performance among Colleges of Education students. Male students performed better in Physics than female in secondary school (Stephen, 2010; Victoria, 2011). The purpose of this study is to analyse Physics results of students' in Colleges of Education with the aim of confirming the literature on poor academic performance in Physics. It is also aim at knowing the ability of these students in Physics as prospective Physics teachers.

Research design

The study employed descriptive survey method of research where students' examination results are used as data. Permission was taken from the authorities of the sampled schools to use Physics examination scores of their students for the purpose of this research.

Instrument

Students' scores in Physics were used as instrument. This score is the total mark each student obtained percent in all the examination written within the three years of studies. The question papers and the results after marking have been moderated by Physics education experts. The data was reliable at 0.828 Cronbach's alpha.

Data analysis

The analysis of the data was done using descriptive statistics and T-test. Descriptive statistics is used for organizing and describing the characteristics of educational variables in concise and meaningful quantifiable terms (Daramola, 2006).

Research questions

The following research questions were raised to guide the study:

1. Is there any difference between the mean scores of students in Physics theory and practical?
2. Is there any difference between the mean scores of male and female students in Physics theory?
3. Is there any difference between the mean score of male and female students in Physics practical?

RESULTS

The results of the finding are presented in the two tables below.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Maletheory	50	21.00	66.00	50.5600	10.67930
Malepractical	50	8.00	76.00	55.1000	11.45399
Femaletheory	55	16.00	75.00	47.7455	11.95395
Femalepractical	55	9.00	74.00	52.5091	11.85229
Theory	105	16.00	75.00	49.0857	11.39848
Practical	105	8.00	76.00	53.7429	11.68088

From Table 1, mean score of Physics students in theory is 49.08% while that of Physics practical is 53.74%. The mean

score of male in Physics theory is 50.56% and for the Physics practical it is 55.1%. For the female, Physics theory mean score is 47.75% and that of Physics practical is 52.51%. Therefore the three research questions were answered.

Table 2. Paired T- Test

	Mean	Std	t	df	Sig.
Physics theory/ practical	4.65714	10.32531	4.622	104	0.000
Male theory/ practical	4.54000	9.92463	3.235	49	0.002
Female theory/ practical	4.76364	10.76683	3.281	54	0.002

Sig. at 0.05

Table 2 shows that the differences in the means are significant. However there is the need to know the magnitude of the differences using what we called Eta squared formula.

$$\text{Eta squared} = \frac{t^2}{t^2 + (N-1)}$$

Where t = T-test value

N = number of cases.

From table 2, the ***t***-values are 4.622, 3.235 and 3.281 for Physics theory/ practical, male Physics theory/practical and female Physics theory/practical respectively. The Eta squares are 0.17, 0.09 and 0.09 for Physics theory/ practical, male Physics theory/ practical and female Physics theory/ practical respectively.

DISCUSSION

The mean score of 49% in Physics theory and 53% in Physics practical are not good enough and this might be confirming the several studies that, students' academic performance in Physics is not good and not encouraging. Table 2 reveals that the mean difference is significant and the size effect is large based on the calculated Eta square. These scores are not good for pre-service teachers. If they are going to be good Physics teachers, their mean score should be higher than what we are having in this study. From Table 1, the highest marks in Physics theory and practical are 66% and 76% respectively. These are good but this study is unable to give us the statistics of how many students had up to these scores. This study also reveals that these students performed better in Physics practical than Physics theory. This finding is supporting inquiry learning where students are allowed to discover science independently on their own. According to Aina (2012), practical work will always encourage students to think clearly, independently and use their own ideas to carry out investigation to a successful conclusion.

Table 1 also reveals that both in Physics practical and theory the mean scores of male is higher than that of female. Table 2 reveals that the difference is significant and Eta Square calculated indicates a moderate size effect of the difference. This finding is supporting several studies earlier conducted by Alao and Abubakar (2010); Osbon *et al*. (2003) and Stephen (2010) that male performed better than female in Physics.

Conclusion and Recommendation

This research has established the studies that students' academic performance in Physics is not encouraging. The finding of these study shows that students performed better in practical Physics than the Physics theory. This is supporting the need for inquiry learning in science where student are allowed to learn and discover scientific information by themselves as against the popular method of teacher supplying them the information. The finding shows that the general performance of students is not good enough as prospective Physics teachers.

Male students are better than female both in Physics theory and practical as the mean difference between their scores is significant and the size effect is moderate. Reason(s) for this may be better address in another research to fully know why male are better than female in Physics.

Therefore based on the finding of the study, the following recommendations are suggested:

- Inquiry-base learning should be adopted in all Physics classes. Teachers and lecturers should allow students to always seek for scientific information on their own. The role of teacher should only be to guide but not to give them all the information required.
- Government, corporate bodies and individuals should always encourage girls who have performed brilliantly in Physics by awarding them scholarship to further their education.
- Physics teachers are to be encouraged by the government through special in-service training. This training should not be limited within Nigeria alone but to developed countries of the world. This is necessary because teacher is regarded as the best resource in any educational system and no amount spent on their professional development is too much.
- There should be adequate provision of Physics equipment in schools. This is necessary if the inquiry-base learning is going to succeed. Without modern Physics equipment in our schools students attempt to discover scientific information by themselves will be hindered.
- Community Service Learning (CSL) is a very good way of science learning which could help students learn Physics very well. Physics teachers should occasionally disengage students from classroom learning and allow them go to the college community to learn Physics. Most of what the students learn are things happening or common in our community.
- Technology has made learning of Physics very simple. Both the teacher and student should always use modern technologies for their teaching and learning of Physics. Social network like YouTube is a good technology to learn Physics. There are educational software designed to teach and learn some difficult concepts and principle in Physics.

Limitation of the study

Participants of this study were few in number due to problem of low enrolment of students in Physics. However, the finding of the study is a representation of academic performance of students in these Colleges of Education. The study may not be speaking for all the Colleges of Education in Nigeria but a guide to similar study in other colleges.

REFERENCES

Adeyemo, S.A. 2012. Background and classroom correlates of students' achievement in physics. *International Journal of Educational Research and Technology*, 1(1), 25-34.

Agommuoh, P.C. and Ifeanacho, A.O. 2013. Secondary School Students' Assessment of Innovative Teaching Strategies in Enhancing Achievement in Physics and Mathematics. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 3(5), 6-11

Aina, J.K. 2011. Relationship between students' academic performance in theory and practical physics in colleges of education in kwara state, Nigeria. (Unpublished master's thesis), University of Ilorin, Nigeria.

Aina, J.K. 2012. Importance of Practical Work to physics Learning. Retrieved from http://www.basearticles.com/Art/878157/276/Importance-of-Practical-Work-to-physics-learning-.html

Aiyelabegan, A.T. 2003. Effect of physics practical on Students' academic performance in senior school certificate physics examination in kwara state. *Lafiagi Journal of Science Education*, 5 (1& 2), 84-89.

Akanbi, A.O. 2003. An investigation into students' performance in senior secondary school physics. *Journal of Teacher Education Trends*, 1(1), 58-64.

Alao, A.A. and Abubakar, R.B. 2010. Gender and academic performance of college physics students: A case study of department of Physics/ Computer science education, Federal College of Education (Technical) Omoku, Nigeria. *Journal of Research in Education and Society*, 1(1), 129-137.

Daramola S.O. 2006. Research and statistical methods in education. Students and researchers in tertiary Institutions. Ilorin: Bamitex

Dupe, O.B. 2013. Predicting students' achievement in physics using academic self-concept and locus of control scale scores. *International Journal of Social Science and Education*, 3(4), 1149-1155.

Erinosho, S.Y. 2013. How do students perceive the difficulty of physics in secondary school? An exploratory study in Nigeria. *International Journal of Cross-disciplinary Subjects in Education (IJCDSE) Special Issue,* 3(3), 1510-1515.

Folashade, A. and Akinbobola, A.O. 2009. Constructivist problem based learning technique and the academic achievement of physics students with low ability level in Nigerian secondary schools. *Eurasian Journal of Physics and Chemistry Education*, 1(1), 45-51.

Josiah, M.M. 2012. School location versus academic achievement in physics: Does Computer-Assisted Instruction (CAI) has any effect*? Journal of Educational and Social Research*, 2(8), 162-168.

Maguswi, B. V. 2011. Factors contributing to underachievement of Zambian female students in O-Level physics examination. A case of selected high schools in central province. (Master's Thesis, University of Zambia). Retrieved from https://www.google.co.za/search?q=Victoria%2C+M.B.+(2011).+Factors+contributing+to+underachievement+of+Zambian+female+students+

Mekonnen, S. 2014) Problems challenging academic performance of physics students in higher governmental institutions in case of Arbaminch, WolayitaSodo, Hawass and Dilla Universities. *Natural Science*, 6, 362-375.

Musasia, A. M, Abacha, O.A and Biyoyo, M.E. 2012. Effect of practical work in physics on girls performance, attitude change and skills acquisition in the form two-form Three secondary schools' transition in Kenya. *International Journal of Humanities and Social Sciences*, 2(23), 151-166.

Oladejo, M.A, Olosunde, G.R, Ojebisi, A.O and Isola, O.M. 2011. Instructional materials and students' academic achievement in physics: some policy implications. *European Journal of Humanities and Social Sciences*, 2(1), 2220-9425.

Osborne, J., Simon, and Collins, S 2003. Attitude towards science: A review of the literature and its implication. *International Journal of Science Education*, 25(9), 1049-1079.

Pallant, J. 2011. SPSS Survival Manual. A step by step guide to data analysis using SPSS (4th ed). Australia: Allen and Unwin.

Semola, T. 2010. Who is joining physics and why? Factors influencing the choice of physics among Ethiopian University students. *International Journal of Environmental and Science Education*, 5(3), 319-340.

Shamim, M., Rashid, T. and Rashid, R. 2013. Students Academic Performance in Physics Correlates the Experience of Teachers in Higher Secondary Schools of Jammu and Kashmir State. *International Journal of Current Research*, 5(1), 201-204.

Sheriff, M. A. Maina, B. T. and Umar, Y. 2011. Physics in education and human resources development. Continental *Journal of Education Research*, 4(3), 23-36.

Stepnen, U.S 2010. Technological Attitude and Academic Achievement of Physics Students in Secondary Schools. *African Research Review*, 4(3a), 150-157.

Thomas, O.O. and Isaac, O.O. 2013. Assessing the relative effectiveness of the three teaching methods in the measurement of students' performance in physics. International *Journal of Material, Methods and Technologies*, 1(8), 116-125.

Wanbugu, P.W. and Changeiywo, J.M. 2008. Effect of mastery learning approach on secondary school students' physics achievement. Eurasia *Journal of Mathematics, Science and Technology Education*, 4(3), 293-302

****