A COMPARATIVE STUDY OF TECHNOLOGY AND MATHEMATICS ACHIEVEMENT OF PRIVATE AND PUBLIC JUNIOR SECONDARY SCHOOL STUDENTS' IN OYO STATE

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Abstract

This study investigated the achievement of students in public and private Junior secondary schools in basic technology and Mathematics. The study adopted descriptive research design. A sample of 520 student from 40 Junior secondary schools in Oyo State, Nigeria was randomly drawn for this study. From the result of this study, it was found that private school students performed better than their counterparts in public schools in both basic technology ($t = 10.120$, $p < 0.05$) and Mathematics ($t = 12.635$, $p < 0.05$) Thus both male and female students performed alike in both subjects. It was recommended that provision of a conducive learning environment, adequate infrastructures, thorough monitoring and supervision of teachers among other factors would enable public secondary school students compete favourably with their counterparts in private secondary school.

Keywords: Technology, Mathematics, Private Schools, Public Schools, Junior Secondary School

Introduction

Technology is an easy way of solving problem. Technology is a means process (methods) and products (materials) that make life easy and stress free. (Elekwa, Bamiro, Oluyide, Ladoye, Nurudeen, Akuru and Olapade (2007). Technology has positively affected every area of our life. Therefore, technology makes our work easier, faster, neater more accurate and more reliable. Products of technology refers to the materials, machines and equipment that are used to make life easier. These are sometimes called tools. They are the finished products of engineering work. The tools are used to achieve specific objectives. Technology leads to economics development of the community where it is used. Technology can be applied to all areas of human life such as religion business, politics, academics, socials and a lot more. Basic Technology is categorized as a pre-vocational subjects at Junior secondary which will metamorphosize into various vocational subject at senior secondary schools. Mathematics is used in our every day's life and is needed for a meaningful and effective living in this modern age and electronic technology (Lasisi and Gbolagade, 2009).

Mathematics is a unifying subject. Mathematics is a scientific tool used to interpret scientific phenomena. Mathematics is a language of science. Nasir (2001) asserted that Mathematics is an indispensable tool used by the engineers, scientists and many professionals in their search for a clear understanding of the physical word. He stressed further that mathematics is mostly considered a tool in that it contains the skills for problem-solving, organizing, simplifying, interpreting data, performing calculations that are necessary in fields such as science, business and industry. Today, mathematics is so important to the extent that a credit pass in it is required to gain admission to study various courses in higher Institutions of learning, especially in the faculties of management sciences, social sciences, sciences, agriculture, engineering and medicine one of the reasons why technology, science and Mathematics should be emphasized right from the grass root is to enhance achievement in other school subjects. Research has shown that achievement in Mathematics has been found to enhance students performance in other school subjects especially basic technology, basic science (Arigbabu and Oludipe 2004) accounting (Ojerinde, 1984) and even physics (Melterzer, 2002) Despite efforts to improve the teaching and learning of Mathematics Science and Technology

owing to the significant role they play in national development achievement in aforementioned subjects continue to be poor (Yoloye & Olatoye, 2002). There is therefore a need for time-to-time assessments of the levels of students achievement in basic technology and Mathematics and even compare these levels between public and private junior secondary schools.

Secondary school education is the form of education children receive after primary education and before the tertiary stage (Federal Republic of Nigeria, 2004). The broad aims of secondary education within national objectives should be; (i) Preparation for useful living within the society and (ii) Preparation for higher education. According to FRN (2004) secondary school provide an increasing number of primary school pupils with the opportunity for education of higher quality, irrespective of sex or social, religions and ethnic background. Government plans for that secondary, education should be of six-years duration and be given two stages, a junior secondary school stage and a senior secondary should stage being of three- year duration (FRN, 2004) where possible, the two types of schools will be under the same roof: in any case; The separate Junior high school complements the senior high school-even when it is located in a different place.

The Junior secondary school curriculum based on pre-vocational and academic, it teaches all the basic subjects which will enable students to acquire further knowledge and develop skills. According to FRN (2004) the curriculum was structured as core subject, pre-vocational subjects and Non-vocational electives. Section 4, sub-section 19 number 4 page 24 of National Policy on Education.

In selecting two Nigerian languages, students should study the language of their own area in addition to any of the three main Nigeria languages. Hausa, Ibo and Yoruba to availability of teachers (FRN, 2004).

Concerning the proprietorship of secondary schools Government welcomes the contribution of voluntary agencies, communities and private individuals in the establishment and management of secondary schools alongside those provided by the Federal and State governments. State governments already prescribe conditions to be met by communities and others wishing to build secondary schools. State governments may include in their conditions criteria to be satisfied by communities and other groups who wish to build and run secondary schools. Local communities including the Parent/Teacher Association is required to help to ease the problem connected with establishing Junior secondary schools at low Unit cost (FRN, 2004).

Government control of secondary schools involve regulating the opening of schools, supervising and inspecting all school regularly and ensuring the provision of good qualities teaching staff and generally ensuring that all schools follow government approved curricula and conform to the national policy on education; School type has generated a lot of debate on which is doing better, private or public schools? This intimates that the type of school a child attends can impact upon his/her academic achievement (Agbatogun, 2009) she further noted that attending public or private school demands a rigorous decision-making process of their children. This is because the school that a child attends even as early as pre-school or kindergarten can set the path a child will follow for the rest of life. This shows why choosing between a private and public school can prove to be quite a difficult decision to make.

The term public and private schools need to be conceptually classified. Public school has different meaning due to regional differences (Olatoye and Agbatogun, 2009). In many parts of the world, it refers to a government-funded higher education. Public schools refer to certain elite, primary and secondary schools. In many nations of the world, a public school is a school that is financed and run by the government and does not charge tuition fees in order for children to attend. This is in contrast to a private school (known as “independent school”). Public schools educate the majority of

students and do not charge tuition fees, though most do charge a fee as a contribution to cost unlike their private counterparts. Here the word public is used in the sense that it is provided to the public expenses. However there are variations on the name such as "state school" as used in the United kingdom and some other countries; "Government school" in Hong Kong and few other countries (Sikiru, 2005). In Nigeria, public schools do not normally charge tuition. The government provides most of the fund used to run them, where students pay it is only a token to argument the fund from the government. Also, private schools are not under the direct control of government as regard the determination of school fees.

In Nigeria, the term public school is not far from how it is regarded in so many countries of the world. It is the type of school that is mainly funded by the government – Federal, state and Local. Public schools can be divided into two types: open and selective, while the open public schools accept all students from the government – defined catchment areas, the selective schools have high entrance requirements and cater for a much larger area and entrance into such school is often competitive. (Olatoye & Agbatogun, 2009) examples of such include the Federal Government Colleges.

According to Thorp and James (2006) "Pubic schools must follow all Federal, State and Local laws in educating children whereas private school are not subjected to as many, local, state and federal regulations". However, an important question is: Are public or private school doing better? This question has generated a continuous and unconcluded argument. Schemo (2006), based on the reports from the United States Federal Education Department that in reading and mathematics, children attending public schools generally do well as or better than comparable children in private schools. The teachers union in the US responded to this report that it has been revealed that public schools are doing an outstanding job. The analysis of US mathematics achievement shows that after accounting for the fact that private schools serve more advantaged populations, public school students performed remarkably well, often, outscoring their private and charter school counterparts.

According to Lubienski and Lubienski (2006) common wisdom and past research holds that private schools achieve better academic results. Perie, Viennman and Goldstein (2005) compare studies on public and private schools between the years 2000 and 2005 and reported that students at grades 4, 8, and 12 in all categories of private schools had higher average scores in reading, mathematics, sciences, technology and writing than their counterparts in public schools. They further discovered higher percentages of students in private schools performed at or above proficiency level compared to those in public schools. This was contradicted by Watkins (2006) who interpreted a recent study published by the National Center for Education Sciences (NCES) in the USA. According to the study, public schools students are performing better than private school students in fourth grade mathematics and at the same level as private school students in fourth grade reading and eighth grade mathematics. Indeed, the report says that private school students have advantage over public schools students only in eighth grading reading.

However, the results of several more sophiscated and conclusive studies of voucher programme effectiveness over whelmingly pointed toward greater mathematics and reading achievements for students who attends private schools through voucher programmes. Watkin (2006) asserted that students in private schools continued to perform better than peers attending public schools.

Another issue is, if there are variations in the performance of students from public and private schools, in what areas? Does it cover all subject areas or just some subjects? To provide answers to these questions, some researchers have studied performance in mathematics, some on English achievement and reading some on sciences and some others the social science subjects. However,

this study attempted to compare students academic achievement in both basic technology and mathematics in private and public secondary schools in Oyo State, Nigeria.

Research Hypotheses

The following hypotheses were tested in the study

(i) There is no significant difference in the achievement of students in public and private Junior Secondary schools in basic technology.
(ii) There is no significant difference in the achievement of students in public and private junior secondary schools in mathematics.
(iii) There is no significant difference in the achievement of male and female students in basic technology.
(iv) There is no significant difference in the achievement of male and female students in mathematics.

Methodology

Research Design

The descriptive survey research design was employed to carry out this study. Since the aim of the researcher is to record, analyze and interpret the existing conditions between the non-manipulated variables. This design will also accommodate generalization of the findings of the study on the target population from which only a representative position was actually studied.

Population and Sample

The target population for the study comprised all the students in Junior secondary in Oyo State. The schools were stratified into private and public sections. A random sample of 520 JS III students from 40 secondary schools – 20 private and 20 public schools was used for the study. A random sample procedure was used to select private and public junior secondary schools from the list of schools in the state. From each of the selected schools, 13 students were randomly selected to make a total of five hundred and twenty (520) respondents that constituted the sample for the study.

Instrumentation

Two instruments were used to collect data for this study, viz: Technology Achievement Test (TAT) and Mathematics Achievement Test (MAT). TAT contains 30 multiple – choice objective item in basic technology while MAT also contains 30 multiple – choice objective items in Mathematics.

Method of Data Collection

The researchers administered the instruments with the help of six research assistants. The assistants had been intimated with the make up of the instruments and how to administer them bearing in mind the age and level of maturity of the students. The achievement tests were administered on the respondents at the same time and were collected immediately the respondent complete the instrument. Students were asked to indicate their school type and genders on the answer sheets.

Validity of the Instrument

The research instruments were given to experienced secondary school teachers who considered the items adequate, suggestions offered were incorporated into the final draft.

Reliability of the Instrument

In order to establish the reliability coefficients of the tests, the two tests were administered as a pilot study on a group of 30 students on a near by school who did not participate in the major study.

The test were administered on this group of students on two occasions within two weeks. A test retest reliability co-efficients of 0.742 and 0.775 were obtained for the TAT and MAT respectively.

Method of Data Analysis

The data collected were analyzed using z-test statistics. All hypotheses were tested at 0.05 level of confidence.

Results and Discussion

Research Hypothesis 1: There is no significant difference in the achievement of students in public and private Junior secondary schools in basic technology.

Table 1: z-test statistical difference of public and private Junior secondary on technology

School Type	N	Mean	Standard Deviation	df	z-cal	Sig
Public	247	12.0030	3.9019	518	-12.8730	0.0000
Private	273	16.0909	4.3172			

From table 1, the results of the hypothesis testing show that there is a significant difference in the performance of public and private Junior secondary school students ($z = -12.873$. $P < 0.05$) This is revealed from the students mean scores of twelve (12) and sixteen (16) for public and private school students respectively. The P value of 0.000 shows the significance of the difference. The hypothesis that there is no significant difference in the achievement of public and private Junior secondary school students in technology is therefore rejected. It should also be noted that for public Junior secondary schools students' achievement in basic technology is below average while it is above average for the private Junior secondary school students. The maximum obtained score is 25.

Hypotheses 2: There is no significant difference in the achievement of students in public and private Junior secondary school in Mathematics.

Table 2: Z-test statistical difference of public and private Junior secondary school in Mathematics

School Type	N	Mean	Standard Deviation	df	z-cal	Sig.
Public	247	5.7568	1.9459	518	10.1200	0.000
Private	273	7.9884	2.7453			

The results in table 2 revealed a significant difference in the achievement of public and private junior secondary schools students in Mathematics. Private school students performed significantly better than their public school counterparts in Mathematics. The hypothesis that there is no significant difference is thus rejected and the alternative hypothesis is upheld. It should also be noted that for private and public schools, students achievement in Mathematics is below average. The maximum obtainable is 30.

Hypothesis 3: There is no significant difference in the academic achievement of male and female Junior secondary students in basic technology.

Table 3: *z – test statistical difference of male and female student in technology*

Gender	N	Mean	Standard Deviation	df	Z-cal	Sig
Male	313	10.1572	3.9141	518	-0.3092	-0.7513
Female	207	10.2762	4.3666			

There is no significant difference in the achievement of male and female junior secondary school students in basic technology (Z = 0.309, P <0.05) male and female students have the same academic achievement level in basic technology. The hypothesis is therefore not rejected. It should be noted that for male and female students achievement in basic technology is just average. The maximum obtained is 25.

Hypothesis 4: There is no significant difference in their academic achievement of male and female students in mathematics.

Table 4: Z – test statistical difference of male and female students in Mathematics

Gender	N	Mean	Standard Deviation	df	Z-cal	Sig
Male	313	7.0033	2.6362	518	0.500	0.6182
Female	207	6.8785	2.6825			

The results presented in table 4 above indicated that there is virtually no significant difference in the academic achievement of male and female Junior secondary school students in Mathematics (Z = 0.0500, P >0.05) The mean score of 6.8785 for the female is not significantly different from that of males which is 7.00033. The hypothesis is therefore not rejected. It should also be noted that for male and female students academic achievement in mathematics is below average. The maximum obtainable score is 30.

Discussion of Findings

The following are the summary of findings of this study:

(i) Private Junior secondary school students performed significantly better than their counterparts in public schools in both basic technology and mathematics (hypotheses 1 and 2).

(ii) There is no significant difference between male and female students academic achievement in both basic technology and mathematics (hypotheses 3 and 4).

(iii) Students academic achievement in technology is better than mathematics. The academic achievement in basic technology is average while that of mathematics is far below average.

The finding that private students performed better than their public school counterpart is contrary to the finding of Agbatokun (2009) who reported that school type does not have any significant influence on the academic achievement of students. This view was supported by Schemo (2006) who asserted that children attending public schools have equal level of achievement with their counterparts in private schools. Past research hold that private schools achieve better academic result (Lubienski and Lubienski, 2006). On the other hand, in a similar study by Watkins (2006), Public school students were even found to have performed better than private school students.

However, many other studies have complemented the findings that private school students outperformed public school students. Examples of such studies are Perie, Viennemann and Goldstein (2005), Oguntimehin (2006), Olatoye and Afuwape (2005). Comparing studies on public and private schools between year 2000 and 2005, Perie, Viennemann and Goldstein (2005) found that in all

categories of private school students at grade 4, 8 and 12 had average scores in basic technology, sciences and mathematics than their counterparts in public schools.

According to findings from this study, in basic technology students mean achievement is just average while it is well below average in mathematics. However, (2003) reported that students performance in basic technology and mathematics is poor due to inadequate subject knowledge of teachers, inadequate communication ability of students and teachers in the language instruction, lack of instructional materials, problem of classroom management, heavy teaching load and overcrowded classrooms. Though the scope of this study is not to find out how these factors influence academic achievement in basic technology, it is however an eye opener that studies that will investigate the influence of these identified factors on students achievement on basic technology and mathematics are still desirable. This study has been able to establish that levels of academic achievement in basic technology and mathematics are still poor in both public and private junior secondary schools.

Yoloye and Olatoye (2002) reported that male students performed significantly better in science and technology than their female counterpart. They however stated that the overall performance in science and technology was below average. According to Ogunkola (2003); Yoloye and Olatoye (2002), gender difference in student academic achievement in basic technology and mathematics has been reported in a number of national and cross-national research studies. Most studies reported male students performed better than their female counterparts. Jennings and Smith (2002) claimed that traditional instructional practices employed by most teachers are the major reasons for low performance of female students.

Conclusion and Recommendations

Many problems are affecting Junior secondary education in Nigeria, especially the public secondary schools which made parents and guardians embrace the private schools so as to escape the declining public Junior secondary schools. The difference in the academic achievement of students in public and private secondary schools may be due to some educational variables outside the scope of this study such as thorough supervision and the attendant greater commitment of teachers in schools to justify the money paid by the parents. The difference in academic achievement may also be as a result of the laxity of both government and the other stakeholders in their responsibility toward the growth and progress of the public Junior secondary schools by ensuring the provision of a conducive learning environment which will in turn allow public Junior secondary school students to compete favourably with their private school counterparts in academic achievement as well as other areas as the case may be.

Teachers should be sensitized and encouraged through regular in-service training and development to enhance qualitative teaching methods and to ensure a better attitude and disposition to their services which in turn will motivate the students in their academic achievement and attitude to basic technology and mathematics. Adequate provisions should be made to make these students enjoy their lessons in terms of furniture, conducive classrooms, well-equipped workshop accessories, tools and equipment, amongst other things.

Teaching personnel should identify strategies or methods that can awaken and sustain the interests of learners in basic technology so as to prepare them for future. Teacher should also erase the notion that a particular gender should offer technology subjects. This bias has affected some generations in the past, boys and girls should be exposed to basic technology, science and mathematics with a few to encouraging and making students enthusiastic about basic technology and mathematics and science alike as both male and female students can grow to become great in any profession or career.

Government should ensure the adequacy of qualified professional teachers in schools. Well trained teachers should be employed in schools and not just graduates of any discipline. Also the curricula of these subjects (basic technology and mathematics) should be made in such a way that will allow the integration of creative strategies that will help the teacher to work out improvisation or use of instructional material that will facilitate the need of the students in imparting knowledge.

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