



Gender Differences in Basic Science Achievement of Private Junior Secondary School Students in Obio/Akpor Local Government Area, Rivers State

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Abstract

This work investigated gender differences in achievement of Basic Science students in private secondary schools in Obio/Akpor Local Government Area of Rivers State. Fifteen private Junior Secondary Schools were selected using stratified random sampling method from which 800 Junior Secondary School III students comprising 428 females and 372 males were used for the study. Two research questions and one hypothesis were raised. Data used were the students' grades in the Junior School Certificate Examination (JSCE) Results in Basic Science which served as the measure of achievement. Frequencies, percentages and t-test were used to analyse the data. The finding of the study showed that gender did not significantly influence students' achievement in Basic Science in private secondary schools. Following the findings it was recommended amongst others that stakeholders in education should provide male and female students with equal opportunities and equal treatment to participate actively in science activities. Also, female science teachers should engage in pep talk and as well act as role models to the female students so as to socially persuade, induce and encourage them (the female students) to develop positive attitude towards science.

Keywords: Gender Differences, Private Secondary Schools, Basic Science Achievement.

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INTRODUCTION

Gender differences in academic achievement have been of great concern to researchers and education policy makers, both local and international. It is one of the current academic issues under deliberations all over the world (Abdu-Raheem, 2012). Mbah, Obanyan, & Onyene (1999) pointed out that the performance of students especially female students drop year by year. A number of studies (Amogne, 2015; Josiah & Adejoke, 2014; Abubakar & Adegboyega, 2012; Abdu-Raheem, 2012; Oluwagbohunmi, 2014; Doris, O'Neil & Sweetman, 2012; Halpern, Benbow, Geary, Gur, Hyde, & Gernsbacher, 2007; Yip, Chiu, & Ho, 2004; Anderson, 2012; Gömleksiz, 2012; Gonzales, Williams, Joycelyn, Roey, Kastberg & Brenwald, 2008; Farooq, Chaudhry, Shafiq & Berhanu, 2011) have been carried out on gender issues relating to academic achievement in many school subjects at all levels of education in different countries with different results reported. With regard to gender gap in science achievement, the finding is somewhat divided. While some researchers (Amogne, 2015; Olasehinde & Olatoye, 2014; Oludipe, 2014; Jack, 2013; Sungur & Tekkaya, 2003; Bilesanmi-Aworderu, 2006) have reported no significant difference between male and female students' academic achievement, others (Hashim, Ababkr, & Eljack, 2015; Lin (2015), Ezeudu & Obi, 2013; Raimi & Adeoye, 2002) found out that there is a statistically significant difference between male and female academic performance in favour of the male students. Yet, other studies showed the significant difference in favour of girls (Farooq, Chaudhry, Shafiq & Berhanu, 2011; Voyer & Voyer, 2014) and that it increases with increase in grade level (Bursal, 2013) while Mullis, Martin, Fierros, Goldberg, and Stemler (2000) reported that result of the 1999 Trends in international mathematics and science study (TIMSS) showed that gender difference in science achievement in favour of boys increases with increase in grade level.

In a survey study conducted by Olasehinde and Olatoye (2014) to compare male and female learning outcome in science on the basis of students' attitude towards science and academic achievement, the result revealed no statistically significant difference between male and female students in overall science achievement as well as in attitude to science. Even so, in both science achievement and attitude, female students had higher mean score than male students.

Bursal (2013) conducted a longitudinal study on 222 elementary students from Yozgat City, Kadihiri Province, Turkey using science and technology course scores between 4th – 8th grades, and Level Determination Exam results of 6th – 8th grades. Result showed that girls had higher science scores than boys in all grade levels. Bursal also reported that among 4th – 7th graders the difference in science achievement score between boys and girls was not significant, while a statistically significant difference in favour of girls exist in the 8th grade.

In his study, Oludipe (2014) investigated the influence of gender and science anxiety as predictor variables of secondary school students' achievement in basic science and found that gender had no significant influence on students' achievement as the difference in mean score of male and female students was not statistically significant. Olatoye and Afuwape (2004) reported that there is no significant difference between male and female students' achievement in each of the science subjects, Usman and Memeh (2007) found out that there is no significant difference between male and female students even in their overall achievements in the three basic science subjects.

Hashim, Ababkr, and Eljack (2015) examined the influence of inquiry-based science teaching on Junior secondary students' academic achievement and found among other things that inquiry based science teaching was significantly in favour of male students as the male students had higher mean achievement score than female. Lin (2015) looked at gender differences in science performance of students in 3rd, 5th and 8th grade by using the Early

Childhood Longitudinal Study Kindergarten Class of 1998-1999 (ECLS-K) with sample size of 7,305 students, and questions that concentrate on understanding of science concepts and scientific investigation. And the results proved that gender significantly affects students' performance in science in 3rd, 5th and 8th grade in support of the male students.

Raimi and Adeoye (2002), in their study on gender differences as determinant of students' performance in integrated science found out that there was a significant difference between male and female students in terms of their science achievement score and attitude to science. However, the male students had a significantly higher attitude and as well performed better than their female counterparts in integrated science. Yoloye (1994) studied achievement by comparing the percentage of male and female candidates that had credit and above in the science subjects for the years 1981 – 1984 and found that the Performance for both girls and boys was generally in a descending order for chemistry, physics and biology. He also reported that male students consistently performed better than female students even in the so called female subjects.

On a larger scale, results of cross national studies carried out by International Association for the Evaluation of Educational Assessment (IEA) showed the trend about achievement in science with regards to gender. According to Mullis, Martin, Fierros, Goldberg and Stemler (2000) result of the 1995 Trends in international mathematics and science study (TIMSS) showed that gender difference in science achievement increases with increase in grade level. They found that in the 1995 TIMSS report, 4th grade boys demonstrated better performance than girls in science in approximately half of the European countries that participated in the study, while boys in 8th grade had better performance in science than girls in most of the European countries that participated in the study. Again in 2003 TIMSS report, while there was no gender gap in science achievement amid 4th graders in most of the participant European countries, there was a gender gap among 8th graders in favour of boys as observed in TIMSS 1995 (Martin, Mullis, Gonzales, and Chrostowski, 2004). In 2007 TIMSS report also showed no gender difference in science achievement among 4th graders in more than half of the participant countries. However, in most of the countries boys outperformed girls while girls had better performance than boys in some of the participant countries (Martin, Mullis, Foy, Olson, Erberger, Preuchoff, et al., 2008).

Though differences do exist in nature, gender differences in academic achievement may be caused by several variables not limited to socio-economic status (Rotich, Rono & Mutisya, 2014, Okafor, 2000; Ezewu, 1980), poor teacher quality (Ridge, 2010), students' interest (Ogunjuyigbe, Ojofitimi, & Akinlo, 2006), Students' attitude (Olasehinde and Olatoye, 2014), political, and social conditions (Cappon, 2011 in Anderson 2012), pattern of assessment (Lafontaine & Monseur, 2009) as well as school type (Shafiq, 2011 in Anderson, 2012). For example, Okafor (2000) inferred that women's learning problem springs from the economic status of their parents, as students from low economic status home tend to exhibit less interest in studies, and perform poorly than students from affluent homes. Parental status as well as parental involvement in their children schooling have been associated with students' academic success (George & Mensah, 2010; Topcur, Keane, Shelton, & Calton, 2010). This is likely to be so because parents who attain high status in society have a very high tendency of sending their children to schools with good instructional facilities, and staffed with qualified teachers. They also tend to provide their children with the required educational materials.

Regarding school type (Public and Private) and students' academic achievement, studies (Adeyemi, 2014; Braun, Jenkins, & Gregg, 2006; Adeyemi, 2006; Ani, 2006) have established the difference in academic performance between public and private schools in favour of private schools. The study conducted by Adeyemi (2014) compared the academic performance between private and public primary schools using a sample of 240 pupils

randomly selected from Ilesa East and Ilesa West Local Government Council Areas of Osun State, Nigeria. The result showed that pupils in private schools performed significantly better than those in public schools. In a related study in U.S, Braun, Jenkins, and Gregg (2006) compared the performance between private and public school pupils in grade 4 and grade 8 and found a statistically significant difference in the mean performance score in favour of private school pupils in both grade 4 and grade 8. Adeyemi (2006) reported that the quality of output (in terms of grades obtained) from public secondary schools is low compared with that of private schools that is high. In the same vein, Ani (2006) recognized that private secondary school students tend to show high academic achievement as they continue to score high grades in both English language and mathematics in external examinations.

Amogne (2015) analysed gender disparity in regional examination in Ethiopia using the 2014 grade 8 regional examination results of 538 students from 13 randomly selected schools in Dessie Town and found that female students slightly outperformed male students in Chemistry and Physics while in biology male students perform slightly better than female. However, in both cases the difference between male and female mean score was not statistically significant. In addition, the result also showed that in both Private and Public schools, female students had higher mean score than male students, and that the mean score of students' performance in Private schools is higher than that of the students in Public schools.

Contrary to the above findings, the result of the study conducted by Igbinedion and Epumepu (2011) to compare students' performance in business studies in private and public Junior Secondary School Certificate Examination showed that from 2008–2011, there was a significant difference in performance in favour of public school as the overall performance of students as well as the performance of male and female students in public school was higher than those of their colleagues in private schools.

Despite the numerous studies that analyzed gender differences in academic achievement among students in different school subjects, there seems to be none (specifically on basic science) in private secondary schools. The dearth of such work has been one of the problems that call for this present work. Again, according to Ogoniji (1991) the causes of students' poor performance in external examinations include: mass admission, automatic promotion, low quality and moral of teachers, parents inability to provide their children and wards with books and other school requirements as well as lack of motivation on the part of the students. These are assumed to be highly minimized in private schools where equal educational opportunity is claimed to be given to all students. This study therefore looked at gender difference in academic achievement of students in basic Science in private secondary schools in Obio/Akpor Local Government Area, Rivers State, Nigeria.

Research Questions

- What is the percentage achievement of male students and female students in Basic Science in private secondary schools?
- What is the difference in mean academic achievement of male and female students in Basic Science in private secondary schools?

Hypothesis

- Gender does not significantly influence students' achievement in Basic Science in private secondary schools.

METHODOLOGY

Design

The study adopted ex-post facto research design because the variables involved in the study cannot be controlled or manipulated by the researcher.

Study Sample and Sampling Technique

The study used stratified sampling method to select fifteen private secondary schools in Obio/Akpor Local Government Area from which 800 Junior Secondary School III students comprising 428 females and 372 males were selected.

Data Collection and Analysis

The only source of data for this study was the Junior School Certificate Examination (JSCE) result in Basic Science for 2017/2018 academic session which served as the measure of students' achievement in Basic Science. The JSCE result in Basic Science was collected from the principals of the fifteen selected private schools in Obio/Akpor Local Government Area of Rivers State. From the JSCE result, the students' achievement as indicated by letter grades i.e. Excellent, A., Credit, C., Pass, P and Fail, F were then rated as 4, 3, 2, and 1 respectively in order to generate scores (data). Data were analysed using frequencies, Percentages and t-test.

RESULTS

Research Question 1: What is the percentage achievement of male students and female students in basic Science in private secondary schools?

Table 1: Percentage on the disparity in academic achievement of male and female students in private secondary school.

Gender	Pass	% Pass	Fail	% Fail	Total
Male	317	39.625	55	6.875	372
Female	366	45.75	62	7.75	428
Total	683		117		800

Table 1 showed that 317 (39.625%) of the male students passed the examinations in Basic science while 55 (6.875%) failed. On the other hand, 366 (i.e. 45.75%) of the female students passed the examination while 62 (7.75%) failed. Again, figure 1 indicated that among the 317 male students that passed 51 had excellent (A), 201 had credit (C) and 65 had pass (P), whereas from the 366 female students who passed, 46 had A, 220 had C and 100 got P. The result showed that the achievement of the female students in basic Science was slightly better than that of the male students.

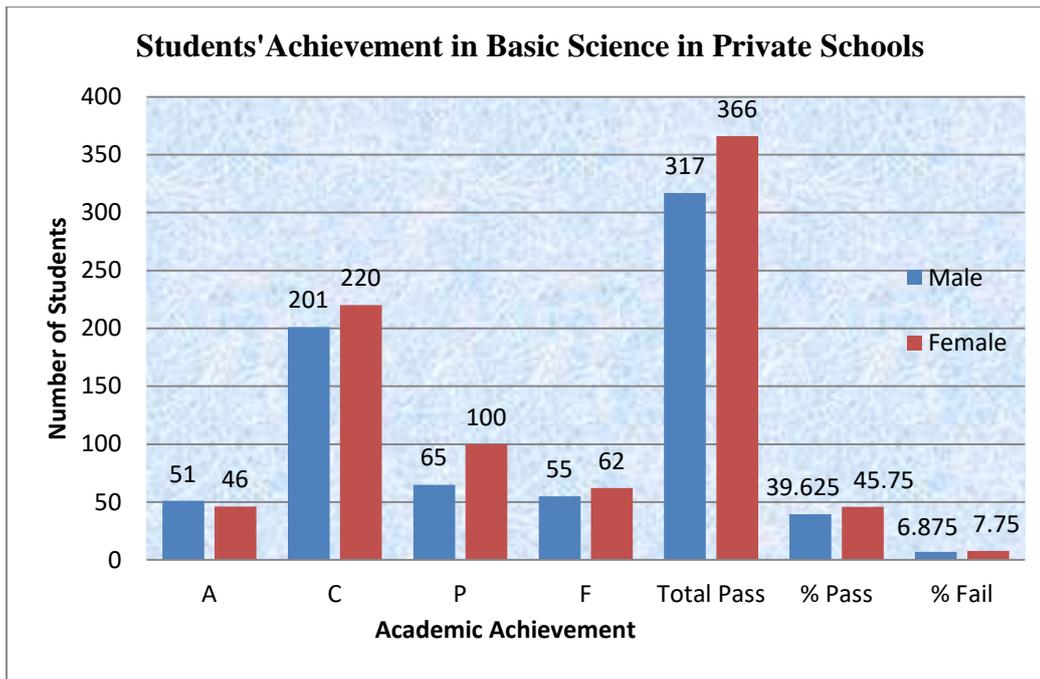


Figure 1: Male and female students' academic achievement in Basic Science in private secondary schools.

Research Question 2: What is the difference in mean academic achievement of male and female students in Basic Science in private secondary schools?

Table 2: Difference in mean academic achievement of students in basic science classified by Gender

Achievement	Gender	N	Mean	Std. Deviation	Std. Error Mean
	Male	372	2.6667	.89121	.04621
	Female	428	2.5841	.86565	.04184

Table 2 revealed that male students had better achievement score (mean =2.6667, SD=.89121) more than the female students (mean =2.5841, SD= .86565).

Hypothesis

Gender does not significantly influence students' achievements in Basic Science in private schools.

Table 3: T-test of difference in mean academic achievement of students in basic science classified by gender

	Gender	N	Mean	Std. Dev	t-cal	Df	Sig.(2-tailed)	Decision
Achievement	Male	372	2.667	.8912	1.33	79	.185	NS
	Female	428	2.584	.8657				

NS= Not significant at $p > .05$

Table 3 showed that the difference in the mean academic achievement of male and female students is not significant ($t_{cal}=1.33$, $df=798$, $p=.185$) since $p > .05$. This showed that gender does not significantly influence students' achievement in Basic Science in private schools.

DISCUSSION

From the result in table 3 it was seen that gender did not significantly influence students' performance in Basic Science in private schools though the performance of male students was slightly lower than that of the female students as seen in table 1 and 2, and in figure 1. This is in agreement with Oludipe (2014), Olasehinde and Olatoye (2014), Usman and Memeh (2007), and Olatoye and Afuwape (2004) who reported that gender had no significant influence on students' achievement in science. However, the findings of this study is in disagreement with the findings of Hashim, Ababkr, and Eljack (2015), Lin (2015), Raimi and Adeoye (2002),

The observed no significant difference in academic achievement in private schools with regard to gender may be attributed to some issues that are commonly observed in private schools. These include issues like strong parent teachers association, high teacher - parent, and teacher – student relationship, regular and adequate supervision of teachers and students activities, adequate or manageable teacher – student ratio, and lack of strike action by teachers. Also, the management of private schools ensure that parents provide their children and wards with the required school materials.

In addition, because private schools generate funds, the management tend or may tend to do everything possible to promote the academic performance of their students as well as maintaining good standards, and making the school appealing enough so as to gain more students.

CONCLUSION

This study has revealed gender as a non-significant variable affecting students' achievement in basic Science in private secondary schools. Based on this, the following recommendations were made.

- Stakeholders in education (i.e. Government, Parents and Teachers) should provide Male and female students with equal opportunities and equal treatment to participate actively in classroom and out of classroom science activities.
- Community heads and leaders and parents should abolish and abandon traditional beliefs that discourage female science education.
- Female science teachers should engage in social persuasion (in the form of pep talks or verbal messages) as well as acting as role models to the female students to induce and encourage them to develop positive attitude towards science, which will in turn enhance their grades.
- Government should as a matter of necessity equip all public schools with the necessary infrastructures as well as adequate teaching and learning materials. In addition, government should put adequate machinery in place to regularly inspect schools, and supervise teachers (especially those in science) and their doings as regard to science teaching so as to boost science teaching and learning in our schools.

REFERENCES

- Abdu-Raheem, B. O. (2012). Gender differences and students' academic achievement and retention in social studies among Junior Secondary Schools in Ekiti State, Nigeria. *Euro J. Educ. Stud*, 4(1), 155–161.
- Abubakar, R.B., & Adegboyega, B. I. (2012). Age and gender as determinants of academic achievements in college mathematics. *Asian J. Natural & Appl Sc.*, 1(2), 121–127.

- Adeyemi, S. B. (2014). Comparative study of pupils' academic performance between private and public primary schools. *World Journal of Education*, 4(4), 55–60. doi.org/10.5430/wje.v4n4p55.
- Adeyemi, T. O. (2006). A comparative study on the quantity of output in public and private schools in Ekiti State Nigeria, Nigeria. *Journal of Educational Administration and Planning*, 5(1), 85-93.
- Amogne, A. E. (2015). Analysis of gender disparity in regional examination: Case of Dessie Town; Ethiopia. *Basic Research Journal of Education Research and Review*, 4(2), 29–36.
- Anderson, E. W. (2012). Is there a crisis for boys? Gender differences in student academic achievement and teacher training characteristics in the Gulf Co-operation Council Countries. *Theses and Dissertations Paper 1394*. Retrieved from <http://Preserve.Lehigh.edu/etd> on 03/01/2016.
- Ani, C. I. (2006). Performance of students in English language and mathematics in public and private secondary schools. Nigeria. *Journal of Educational Administration and Planning*, 5(7), 34-46.
- Bilesanmi-Awoderu, J. B. (2006). Effect of computer assisted instruction and simulation/games on the academic achievement of secondary school students in biology. *Sokoto Educational Review*, 8(1), 49 – 60.
- Braun, H., Jenkins, F., & Grigg, W.(2006). Comparing private schools and private schools using hierarchical linear modelling (NCES 2006-461). U.S department of Education, National Centre for Education Statistics, Institute of Education Science Washington DC: U.S Government printing office. Nces.ed.gov/nationsreportcard/pdf/studies/2006.
- Doris, A., O’Niel, D., & Sweetman, O. (2012). Gender, single-sex schooling and maths achievement. ZA discussion Paper No. 6917., Bonn, Germany.
- Ezeudu, F. O., & Obi, T.N. (2013). Effects of gender and location on students achievement in chemistry in secondary schools in Nsukka Local Government Area of Enugu State. *Research on Humanities and Social Sciences*, 3(15). Retrieved from <http://pt.slideshare.net/AlexanderDecker>.
- Farroq, M. S., Chaudhry, A. H., Shafiq, M., & Berhanu, G. (2011). Factors affecting students' quality of academic performance: A case of secondary school level. *J. Quality Tech. Manag.*, 7(2), 1-4.
- George, D.D., & Mensah, D.K.D. (2010). Parental Involvement in homework for children's academic success. A study in the Cape Coast Municipality. *Academic Leadership*. 8(2). Retrieved August, 23rd 2018 from <http://www.academicleadership.org/empiricalresearch>.
- Gömleksiz, M. N. (2012). Elementary school students' perception of the new science and technology curriculum by gender. *Educational Technology & Society*, 15(1), 116 – 126.
- Halpern, D. F., Benbow, C. P., Geary, D.C., Gur, R. C., Hyde, J. S., & Gernsbacher, M. A. (2007) The science of sex differences in science and mathematics. *Psychological Science in the Public Interest*, 8(1), 1–51.
- Hashim, A., Ababkr, T.E.I.S., & Eljack, N.S.A. (2015). Effects of inquiry based science teaching on Junior Secondary School Students' academic achievements: A case study in Hadejia zonal Education Area of Jigawa State, Nigeria. *SUT Journal of Humanities*, 16 (1), 156 -169.
- Igbinedion, V.I., & Epumepu, E.A. (2011). A comparison of students' academic performance in business studies in public and private Junior Secondary School Certificate Examination (JSSCE) in Ovia South West Local Government Council Area of Edo State. *Technical and Vocational Education Journal*, 3(1), 42–53.

- Jack, G. U. (2013). The influence of identified student and school variables on students' science process skills acquisition. *Journal of Education and Practice*, 4(5), 16-21.
- Josiah, O., & Adejoke, E. O. (2014). Effect of gender, age and mathematics anxiety on college students' achievement in algebra. *Ame. J. Educ. Res.*, 2(7), 474-476.
- Lafontaine, D., & Monseur, C. (2009). Gender gap in comparative studies of reading comprehension: To what extent do the test characteristics make a difference? *European Educational Research Journal*, 8 (1), 69-79.
- Lin, H. (2015). Gender differences in science performance. *Journal of Studies in Education*, 5(4), 181-190. doi.org/10.5296/jse.v5i4.8526.
- Martin, M. O., Mullis, I. V. S., Foy, P., Olson, E., Erberger, E., Preuchoff, C. et al. (2008). TIMSS 2007: International science report. Boston College, MA: TIMSS & PIRLS International Study Center.
- Martin, M. O., Mullis, I. V. S., Gonzales, E. J., & Chrostowski, S. J. (2004). TIMSS 2003: International science report. Boston College, MA: TIMSS & PIRLS International Study Center.
- Mbah, P., Obanyan, M., & Onyene, J. (1999). The general school environment in WICE and the ford foundation (1999), Gender training manual for higher education. Lagos, Almarks Publishers.
- Mullis, I. V. S., Martin, M. O., Fierros, E. G., Goldberg, A. L., & Stemler, S. E. (2000). Gender differences in achievement : International Association for the Evaluation of Educational Achievement (IEA)'S third international mathematics and science study (TIMSS). Boston College, MA: TIMSS International Study Center.
- Oguniji, M. B. (1991). Rhetorics of science education for rural transformation. *Journal of STAN*, 12(2), 126-132.
- Ogunjuyigbe, P. O., Ojofeitimi, E. O., & Akinlo, A. O. (2006). Science education in Nigeria: An examination of people's perception about female participation in science, Mathematics and technology. *Journal of Science Education and Technology*, 15(3-4), 277-284.
- Okafor, P. N. (2000). Scientific and technological education in the 21st century, challenges for women educations. *Journal of women in colleges of education*, 4, 37-38.
- Olasehinde, K. J., & Olatoye, R. A. (2014). Comparison of male and female Senior Secondary School students' learning outcomes in science in Katsina State, Nigeria. *Mediterranean Journal of Social Sciences*, 5(2), 517-523. Doi: 10.5901/mjs.2014.v5n2p517.
- Olatoye, R. A., & Afuwape, M. O. (2004). Students' Integrated science achievement as a predictor of later achievement in Biology, Chemistry and Physics. *Journal of STAN*, 39(1 & 2), 10-15.
- Oluwagbohunmi, M. F. (2014). Gender issues in classroom interaction and students' achievement in social studies. *Intern. J. Inov. Res Dev.*, 3(5), 742-745.
- Oludipe, D. I. (2014). Gender and science anxiety as predictors of Nigerian Junior Secondary School Students' academic achievement in Basic Science. *Sch. J. Arts, Humanities and Social Sciences*, 2(2A), 197-303
- Raimi, S. A., & Adeoye, F. A. (2002). Gender differences among college students as determinant of performance in integrated science. *African Journal of Educational Research*, 8 (1 & 2), 41-49.
- Ridge, N. (2010). Teacher quality, gender, and nationality in the United Arab Emirates: A crisis for boys. *Dubai School Of Government: Working Paoer No. 10 – 06*
- Rotich, S.K., Rono, K.J., & Mutisya, S.M. (2014). University Education of the Maasai Girls in Kenya at crossroad: A viewpoint of the role of local leaders and socio-cultural factors. *The Intern. J. Soc. Sci. Hum. Invention*, 1(1), 51- 61.

- Sungur, S., & Tekkaya, C. (2003). Students' achievement in human circulatory system unit. The effect of reasoning ability and gender. *Journal of Science Education and Teaching*, 12(1), 59 – 64.
- Topor, D., Keane, S., Shelton, T., & Calton, S. (2010). Parental involvement and student academic performance: A multiple meditational analysis. *Journal of Prevention and Intervention in the Community*, 38(3), 183-19.
- Usman, K. O., & Memeh, I. M. (2007). Using guided scoring strategy to improve students achievement in chemistry at secondary school level in Nigeria. *Journal of STAN*, 42(182) 60-65.
- Voyer, D., & Voyer, S.D.(2014). Gender differences in Scholastic achievement: A meta-analysis. *Psychological Bulletin*; 140(4), 1174 – 1204. Doi: org/10.1037/a0036620.
- Yip, D. Y., Chiu, M., & Ho, E. S. (2004). Hong Kong students' achievement in OCED – PISA study: Gender differences in science content, literary skills, and test formats. *International Journal of science and mathematics Education*, 2(1), 91-106
- Yoloyo, A.(1994).Intervention strategy in promoting women participation. Science and Technology in Nigeria in perspective on women in science and technology in Nigeria SY ed. Ibadan SAM Bookman Education and Communication Services.

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