Gender Trends in Nigerian Secondary School Students’ Performance in Algebra

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Abstract: The study sought to identify gender trends in Nigerian secondary school students’ achievement in algebra. A posttest only experimental study was carried out in 2010 which randomly selected 100 senior school 2 students from two schools in Makurdi, Benue State, made up of 50 males and 50 females who were treated to completion of squares method of solving quadratic equations. The students were thereafter examined using the Quadratic Equation Roots Test, QERT, instrument to obtain mean scores and variances of both female and male students. The t-test at 0.05 alpha was used to test significance of difference in mean performance. The male students performed significantly higher than the female students.

Keywords: Achievement, algebra, completion of squares, female students, male students, quadratic equation

INTRODUCTION

Algebra is one of the strands of mathematics and is about finding the unknown or putting real life problems into equations and then solving them (Rusell, 2009), the goal in algebra being to find the unknown variables. There has been global concern about gender differences in students’ performance in mathematics and some researches have been undertaken in many parts of the globe in this respect. Although some researches have identified gender differences, other studies have that there are no significant differences in male-female mathematics performance at any level.

James (2007) studying the United States of America’s National Centre for Education Statistics’ reports on the 2004 specific proficiencies in mathematics and the percentage of gender of students who have reached proficiency in those particular areas, observes that at each level boys and girls are similarly successful on the most basic levels but for more complex areas boys show more proficiency. James attributes this to existence of cognitive gender differences and accommodations.

The American Psychology Association (2010) on the other hand reports that in reality girls around the world are not worse at mathematics than boys even though boys are more confident in their mathematics abilities and that girls from where gender equity is more prevalent are more likely to perform better on mathematics assessment tests.

Alkhateeb (2001) studied United Arab Emirates high school students and found out that females outperformed males in mathematics achievement; while Doolittle (1989) in a study found that females performed less well than males on geometry and reasoning but females performed as well as males on algorithmic operations oriented items.

This research is a similar attempt to establish if there are gender differences in mathematics performance, with specialty to algebra with respect to Nigerian students.

Relevance and significance of the study: This study is about gender trends in secondary school students’ algebra performance in Nigeria. The study is relevant as its findings of the study adds to existing findings about gender differences in mathematics performance globally and this further possibly prompts educators to further research on narrowing existing gender gulfs in secondary mathematics achievement. It specifically looks at performance of male and female students of two different secondary schools in Makurdi, Nigeria in quadratic equation solving using the completion of squares method. The quadratic equation itself is an important equation in that it is used in many areas of science and engineering (Bourne, 2007) and a good grounding on the topic becomes compelling as part of preparing students for useful life after schooling. For instance, the path of a projectile (e.g., a cannon ball) is almost parabolic and a quadratic equation is used to find out where the projectile is going to hit. Also, parabolic antennas are another application of the quadratic equation. The Nigerian education curriculum for instance emphasizes the acquisition of appropriate skills, abilities and competencies both mental and physical as equipment for the individual to live in and contribute to the
development of this society (Olaitan and Ali, 1997). Both males and females are expected to live useful lives after leaving school, hence the need to study gender trends to realize if a particular sex is doing better than another in mathematics performance.

**Research question:** Do Nigerian male students perform higher than their female counterparts in algebra?

**Null hypothesis H₀:** There is no significant gender difference in Nigerian secondary students’ achievement in algebra.

**METHODOLOGY AND DATA ANALYSIS**

The study was experimental. The study observed 100 students randomly chosen from two secondary schools in Makurdi, Benue State, Nigeria including 53 from Trust Academy (made up of 23 female and 30 male students) and 47 from Peniel College (made up of 27 females and 20 males). The research thus studied 50 female and 50 male students both of whom were exposed to the solving quadratic equations with use of the method.

The study obtained data by using the Quadratic Equation Roots Test (QERT) instrument made up of 10 essay questions out of which 4 were to be solved in 40 min by both groups of students after being exposed to completion of squares method. The QERT instrument had been validated by one expert each in test and measurement and in mathematics education in the Faculty of Education Benue State University who assessed and certified its face and content validity. The instrument was also confirmed to be reliable based on the inter-rater Cohen’s Kappa K reliability test as two experts in mathematics education in the Faculty of Education Benue State University in rating the instruments were in complete agreement thus giving a $k = 1$ reliability ratio.

The result of the study is presented in Table 1 which shows that female students’ mean score was 23.9 with variance of 302.3367 while the males’ mean score was 32.2 with variance of 410.3673. The data’s t-calculated is 2.984 being higher than two-tailed t-distribution table of 1.98 at 0.05 alpha level. Table 1 also answers the null hypothesis H₀: There is no significant gender difference in Nigerian secondary students’ achievement in algebra. The hypothesis is answered with t-calculated of 2.984 being higher than t-distribution table of 1.98 at 0.05 alpha level two tailed, which indicates that there is significant difference in the means of male and female students thus rejecting the null hypothesis.

The findings show that there is gender difference in the achievement of Nigerian secondary school students in algebra and hence mathematics. This confirms findings by James (2007) who notes that there are gender differences in the United State of America in higher proficiency mathematics which includes algebra.

The study however contradicts reports by the American Psychology Association (2010) that there are no significant differences in the performance of boys and girls in mathematics and contradicts findings by Alkhteeb (2001) that in the United Arab Emirates high school females outperformed males in a mathematics achievements study.

The findings show however that there is generally low performance of students in algebra as both means (23.9 for female students and 32.2 for male students) is low and below the pass mark 45. This confirms observations by Obodo (2004) and Odili (2007) who point out that Nigerian students have difficulty in solving mathematics problems. Similarly, James (2007) laments that only a few students either male or female graduate from high school with ability to understand basic algebra.

**DISCUSSION OF FINDINGS AND CONCLUSION**

Table 1 answers the research question: Do Nigerian male students perform higher than their female counterparts in algebra? The results show that male students performed higher in solving quadratic equations with use of completion of squares method. This implies that male students achieve higher in algebra than female students.

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**Contribution to knowledge:** The research was carried out in 2010 to identify gender trends in algebra achievement of secondary school students in Nigeria and specifically studied 100 students made up of 50 males and 50 females in two schools in Makurdi, Nigeria on solving quadratic equations using the completion squares method. The study found out that there are gender differences in Nigerian students’ achievement in algebra with males performing higher than females.
REFERENCES


