



Analyses of the Responses of Staff and Students on Mathematics Mentoring in Isuikwuato Local Government Area, Abia State, Nigeria

Silas A. Ihedioha

Government Secondary School Bwari, Federal Capital Territory, Abuja, Nigeria
Email: silasihedioha@yahoo.com

Received 23 November 2015; accepted 8 December 2015; published 14 December 2015

Copyright © 2015 by author and OALib.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

The search for what will motivate the students to have a better attitude towards learning Mathematics led us to choosing mentoring. Despite the generally accepted belief that only positive effects can result from the implementation of planned mentoring programs, little research has been conducted evaluating mentoring programs, hence this effort to assess the schools' Mathematics Mentoring exercise in Algebra by sounding the opinions of both staff and students. The present study examines the opinions of staff and students on the change of attitude of students in Isuikwuato Local Government Area, Abia State, Nigeria. Sixteen (16—10 male and 6 female) teachers and sixty-six students (66—36 male and 30 female) completed the questionnaires. They were asked to indicate their opinion on how the mentoring exercise has imparted on the students' performance in Algebra. The validity of the questionnaire was approved by three experts in the field of educational Psychology. The percentage analyses show that majority of the teachers and students agree that the schools' mentoring program has made positive impact. The chi-square analyses indicate no significant difference between male and female teachers' and students' opinions on Declarative, Conceptual and Proportional/Spatial Knowledge of the students. Also, fourteen students (six female students, and eight male students) of the very weak group took both the pre-test and post-test. A t-test was conducted and both groups (the male students and the female students) had significance levels less than 0.05, so there was a statistically significant difference in the scores from the pre-test to the post-test, showing that Mathematics mentoring exercise in Algebra imparted positively on the student. Proponents of mentoring programs hypothesize that mentoring programs could be part of the answer to the problems children/students; however, little research has been conducted evaluating the effectiveness of mentoring programs. Therefore, it is recommended that teachers should go extra mile in doing all they can towards students academic development.

How to cite this paper: Ihedioha, S.A. (2015) Analyses of the Responses of Staff and Students on Mathematics Mentoring in Isuikwuato Local Government Area, Abia State, Nigeria. *Open Access Library Journal*, 2: e2035.
<http://dx.doi.org/10.4236/oalib.1102035>

Keywords

Exploration, Impact, Mentoring, Declarative Knowledge, Conceptual Knowledge, Proportional/Spatial Knowledge

Subject Areas: Education

1. Introduction

Mentoring exercise has been on in the school for more than two academic sessions without evaluation or seeking the opinion of either the students or staff on its success. Such important effort to the development of the students needs re-examined to assert successes for its continuation or failures for the reorganization of its implementation, hence this study.

Freedman [1] described traditional concept of mentoring as one in which older men assist boys with the tricks and intricacies of learning trades or skills. A one-to-one relationship between a pair of unrelated individuals, usually of different ages that is developmental in nature is a more useful and contemporary definition of mentoring. A mentor is an older, more experienced person who seeks to develop the character and competence of a younger person, [1].

There are basically two types: Informal (natural) mentoring and Formal (planned) mentoring Floyd [2].

Informal mentoring refers to naturally occurring, supportive relationships children/youths have with older and more experienced individuals such as parents, extended family members, neighbors, teachers, ministers, and others with whom children/youths have regular contact. Informal mentoring involves the provision of general guidance and support and, in some instances, helping a child/youth learn something new. It also promotes students' sense of well-being by challenging the negative opinions they may have of themselves and demonstrating that they can have positive relationships with adults, Rhodes *et al.*, [3]. The relationship may be short- or long-term, but in both instances mentoring has a lasting positive impact on the student. Informal mentoring relationships are far more common than formal ones.

A survey of mentors found that 83 percent of those responding indicated their relationships with students were established informally, while only 17 percent worked through formal mentor programs, McLean [4]. Natural mentoring occurs through friendship, teaching, coaching, and counseling. Traditionally, certain institutions such as families, churches, neighborhoods, and schools have provided opportunities for natural mentoring. These institutions have changed and thus reduced the ability of adults to provide assistance and guidance to youths. Specifically, there are fewer adults in families because of the increase in single-parent homes and many extended family members do not live in the same town. Neighborhoods have changed and neighbors tend to keep more to them. In addition, higher teacher/student ratio exists in public schools, Tierney *et al.* [5].

Formal (planned)-Formal (planned) mentoring programs emerged because of the decline in informal (natural) mentoring. Formal mentoring involves a structured and intentional approach to offering students those experiences and benefits similar to the ones provided by informal mentors. Such initiatives are often facilitated by an agency or program, dedicated to this purpose and encompass both one-on-one relationships between an adult and the child and youth, or an older more experienced peer and a younger peer, as well as small groups of children and youths working with an adult or older peer on a particular goal. In all instances, mentoring activities take place at regularly scheduled times over an extended period, and are most often only one component of a comprehensive program, Sipe [6]. Formal mentoring programs place a strong emphasis on positive youth development, reducing the likelihood that students will engage in risky behaviors such as poor school attendance or drug use, and community concerns such as civic engagement and college and career exploration. They can be school-based, community-based, and occasionally workplace-based. The sponsoring entity recruits and trains the mentors, matches them with their mentees, and provides support over the duration of the relationship, Allen and Eby [7].

Mentoring focuses and motivates students toward achieving learning goals, Gandara [8]. An effect of mentoring is that youths who perceive high-quality relationships with their mentors experience the best results, Funk and Ek [9].

According to DuBois *et al.* [10], discussing college with mentors, especially those who have attended themselves can generate interest in going to college among students whose parents have not gone to college

Mentors provide students Preparatory courses, financial aid and the college admissions process and other important information about college can be provided by mentors, (Gandara and Mejorado [11]; Stanton-Salazar [12]).

The theory of planned youth mentoring programs is that mentoring can be implemented systematically. Planned mentoring occurs through structured programs in which an adult and a youth are selected and matched through formal processes. The purpose of the programs is to provide the children/youths with assistance and guidance to enable them grow into responsible adults, and to fill the gap created by the diminished opportunity for natural mentoring Freedman [1].

Evaluation of mentoring programs is imperative to determine if they offer a possible solution to the problems affecting children/youths. Flaxman [13] stated that mentoring programs should be evaluated for both their process and impact; however, only a few studies have been completed.

Possible reasons for the lack of research are that most program administrators would rather use money and staff resources to provide more services than to complete an evaluation, many programs have not been in operation very long, and potential outcomes are difficult to quantify. Research has focused more on the process of mentoring (Mecartney *et al.* [14]; Schneider [15]; Slicker and Palmer [16]), especially the formation of the relationships, than the impact of the mentoring.

[5] reported positive results in the areas of decreasing alcohol and drug use, improving peer relationships, and improving parent/child relationships.

2. Mentoring and Academic Achievement

Conflicting research results on the impact of mentoring on the academic achievement of children and youths has been conducted and rendered. A longitudinal study of 220 students showed that those with mentors completed more years of education, Torrance [17]. More specifically, men with a mentor completed 17.8 years compared to 15.8 years of education for men without a mentor. Women with a mentor completed 18.1 years compared to 14.9 years for women without a mentor. A major limitation of this study was that the participants were mostly middle class and would not be looked at as children/youths.

The impact of a school-based mentoring program on 86 at-risk tenth grade students indicated initial results of no differences in the dropout rate or grade point average between the treatment and control groups, . When the differences between those students who were effectively mentored versus those who were ineffectively mentored were evaluated, they found that effectively mentored students had a lower dropout rate than ineffectively mentored students.

Effective mentoring was defined by self-report from the student receiving the mentoring. Although differences were found in dropout rates, they were not found for grade point averages. McPartland and Nettles [18] evaluated the academic outcomes of middle school students who were involved in Project Raise, a well financed, multi-faceted, structured program in Baltimore, Maryland, designed to provide mentors and advocates to very high risk children. One of the major goals of the program was improving academic progress. The researchers compared participants in Project Raise with non-participants from the same school. They found two statistically significant positive effects for students involved in the program. First, there was a reduction of nearly 3% in the school absence rate of youths involved in the program when compared to students in the same school, who did not have a mentor.

The authors noted that the absence rate of participants in the program was still higher than the overall district average. Second, students involved in Project Raise received better grades on their report cards than other students at their schools did. Once again these grades were still below the district average. Additional findings indicate that students' participation in Project Raise had no impact on promotion rates and no impact on achievement, measured by scores on the reading and mathematics sections of the California Achievement Test. The study by McPartland and Nettles [18] is significant because it was one of the first to use comparison groups and statistical tests to evaluate the students' school outcomes after they were involved in a well-financed, structured mentor program.

The study of Big Brothers and Big Sisters by [5] evaluated the effectiveness of mentors on academic achievement for 959 youths involved in eight Big Brothers/Big Sisters programs (487 youths were in the treat-

ment group and 472 youths were in the control group). Those involved in the Big Brothers and Big Sisters programs were significantly less likely to skip classes or days of school. The students who had mentors skipped 52% fewer days and 37% fewer classes. The impact was greater for girls in that Little Sisters skipped 84% fewer days of school than did girls in the control group. An additional finding was that girls in the treatment group (*i.e.*, had a mentor) reported 3% better grades than girls in the control group.

[5] demonstrated that treatment group members felt more confident of their ability to complete their schoolwork than did control group members and minority girls were most positively impacted. The study also investigated other school-related outcomes such as hours spent each week reading and doing homework, number of times youth visited a college and went to a library, and the number of books read, and found no overall statistically significant differences between the control and treatment group members.

To summarize, the research on the impact of planned mentoring on the academic achievement of children/youths had varied results. School absence rates and dropout rates did decline. However, promotion rates and scores on a standardized achievement test did not improve significantly. Also, the effect of mentoring on grade point average showed conflicting results. [18] found significant improvement, while Slicker and Palmer (1993) did not.

Ours is to assess the impact of mentoring exercise on the students' development in the three domains of development using the opinion of the teachers and students represented in their responses on the questionnaires, having been involved in mentoring exercise for more than two academic sessions now.

2.1. Purpose of the Study

The purpose of this study is to evaluate the opinion of the academic staff and students on the impact of mentoring on the students' change of attitude towards Mathematics with emphasis on Algebra. Specifically, the question is whether involvement in the mentoring program, has a significant impact on the students' change of attitude, as measured by the responses of the staff and students to the questions asked in the questionnaires administered.

The hypothesis is that the students, who have mentors, will show greater improvement than those who do not have mentors. Mentors are supposed to provide the extra, individual attention that the students require. Additionally, mentors provide positive role model for the students. These conditions help to reduce some of the academic risks that these students encounter.

2.2. Significance of the Study

The current study is important because there are little impact studies on Algebra mentoring, and on the opinion of either the students or the teachers, concerning Isuikwuato Local Government Area, Abia State, Nigeria. It will help in improving the Mathematics mentoring exercise as the mentors, students, schools' administrators, all parties co-operating, know the areas require improvement.

2.3. Research Question and Hypotheses

Quantitative method of collection data was used and the research was guided by the following research question and hypotheses:

What are the teachers' and students' responses on the schools' Algebra mentoring exercise regarding each Knowledge level and aspect of Algebra?

The following null and alternative hypotheses were also stated:

1) H_{01} : There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Declarative Knowledge.

H_{11} : There is statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Declarative Knowledge.

2) H_{02} : There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Conceptual Knowledge.

H_{12} : There is statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Conceptual Knowledge.

3) H_{03} : There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Procedural/Spatial Knowledge.

H_{13} : There is statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding Procedural/Spatial Knowledge.

3. Methodology

3.1. Population for the Study

The study is conducted in Government Secondary Schools in Isuikwuato Local Government Area, Abia State, Nigeria and the population for the study is all Mathematics teachers and students of the schools.

3.2. Sample and Sampling Technique

The study used a sample of Mathematics teachers (16 - 10 male and 6 female) that were available and sixty-six final year (SS3) students (66 - 36 male and 30 female) selected using simple random sampling.

Table 1 shows that about 87% of the teachers have obtained the required teaching qualification. Therefore 13% of them would need to be trained for better performance by acquiring teaching qualifications. Also, all female teachers have teaching qualifications.

Table 2 shows that there are more male students than the female students involved in this study with majority within the ripe age group; 16 - 18 years. Only about 11% of the students 19 years and above, while 25.8% is in the age bracket of 13 - 15 years.

3.3. Data Collection Method

Instrument

A simple random sampling technique was used to select the teachers and students. The instruments were questionnaires with questions drawn in sections-A, B and C in both cases. Section-A has questions on Declarative Knowledge, while Sections B and C contain questions on Conceptual Knowledge and Procedural/Spatial Knowledge, respectively.

A reliability test is carried out to determine the internal consistency of items in the questionnaires using Cronbach's Alpha reliability test. The reliability coefficients of the teachers' questionnaire are 0.77, 0.81 and 0.78 for Declarative Knowledge, Conceptual Knowledge and Procedural/Spatial Knowledge respectively and that of the students' questionnaire are 0.78, 0.79 and 0.81 for Declarative Knowledge, Conceptual Knowledge and Procedural/Spatial Knowledge, respectively. According to Kline (2005), alpha value of 0.90 is considered

Table 1. Demographics of respondent teachers by qualification.

Gender	Qualification			Total	Percentage
	B.Sc.	B.Ed.	B.Sc. & PGDE		
Male	2	3	5	10	62.5
Female	-	3	3	6	37.5
Total	2	6	8	16	100
Percentage	12.5	37.5	50.0		

Table 2. Demographics of respondent students by age.

Gender	Age			Total	Percentage
	13 - 15	16 - 18	19 - Above		
Male	11	20	5	36	54.5
Female	6	22	2	30	45.5
Total	17	42	7	66	100
Percentage	25.8	63.6	10.6		

excellent, 0.80 very good and 0.70 acceptable. In this study, the observed variables in both teachers' and students' questionnaire have acceptable internal consistency for Declarative Knowledge, Conceptual Knowledge and Procedural/Spatial Knowledge.

4. Data Analyses and Discussion

4.1. Procedure for Data Analysis

The data gathered were analyzed using frequency counts of the subjects' (students and teachers) responses to the questionnaire items determined based on students' and teachers' gender and percentage scores. The hypotheses 1 to 3 were tested using chi square (χ^2) analysis.

A frequency count of the subjects' responses to each questionnaire item is carried out. The percentages of response to each of the items are then calculated as shown in **Tables 3-5**. Similarly, results of chi-square analyses to test for the research hypotheses (1 - 3) are reflected in **Tables 3-5**.

Table 3. Students' and teachers' responses: Declarative knowledge.

IMPROVEMENT AREAS	GENDER	TEACHERS				STUDENTS				χ^2				
		NO	%	UND	%	YES	%	NO	%		UND	%	YES	%
Linear Algebra	MALE	4	40	1	10	5	50	14	38.89	3	8.33	19	52.78	1.36
	FEMALE	2	33.3	1	16.7	3	50	11	36.67	1	3.33	18	60.00	
Quadratic Algebra	MALE	3	30	2	20	5	50	13	36.11	5	13.89	18	50.00	0.75
	FEMALE	2	33.3	1	16.7	3	50	10	33.33	3	10.00	17	56.67	
Transposition Algebra	MALE	3	30	1	10	6	60	13	36.11	1	8.33	22	55.56	3.77
	FEMALE	2	33.3	2	33.3	2	33.3	8	26.67	3	8.33	19	65.00	
Vector Algebra.	MALE	2	20	4	40	4	40	12	33.33	4	11.11	20	55.56	1.66
	FEMALE	2	33.3	1	16.7	3	50	10	33.33	2	6.67	18	60.00	
Combined Responses	MALE	3	30	2	20	5	50	13	36.11	4	11.11	19	52.78	0.91
	FEMALE	2	33.3	2	33.3	2	33.3	10	33.33	2	6.67	18	60.00	

Table 4. Students' and teachers' responses: Conceptual knowledge.

IMPROVEMENT AREAS	GENDER	TEACHERS				STUDENTS				χ^2				
		NO	%	UND	%	YES	%	NO	%		UND	%	YES	%
Linear Algebra	MALE	2	20	2	20	6	60	11	30.56	2	5.56	23	63.88	1.43
	FEMALE	2	33.3	1	16.7	3	50	7	23.33	3	10.00	20	66.67	
Quadratic Algebra	MALE	3	30	2	20	5	50	10	27.78	4	11.11	22	60.11	1.89
	FEMALE	2	33.3	1	16.7	3	50	8	26.67	1	3.33	21	30.00	
Transposition Algebra.	MALE	2	20	3	30	5	50	9	25.00	5	13.89	22	61.11	0.62
	FEMALE	1	16.7	2	33.3	3	50	6	20.00	4	13.33	20	66.67	
Vector Algebra.	MALE	3	30	3	30	4	40	12	33.33	3	8.33	21	58.34	1.90
	FEMALE	2	33.3	2	33.3	2	33.3	6	20.00	3	10.00	21	70.00	
Combined Responses	MALE	2	20	2	20	6	60	11	30.56	4	11.11	21	58.33	1.63
	FEMALE	2	33.3	2	33.3	2	33.3	7	23.33	3	10.00	20	66.67	

Table 5. Students’ and teachers’ responses: Proportional/spatial knowledge.

IMPROVEMENT ITEMS	GENDER	TEACHERS				STUDENTS				χ^2				
		NO	%	UND	%	YES	%	NO	%		UND	%	YES	%
Linear Algebra	MALE	2	20	3	30	5	50	12	33.33	3	8.33	21	58.34	1.12
	FEMALE	1	16.7	2	33.3	3	50	7	23.33	3	10.00	20	56.67	
Quadratic Algebra	MALE	2	20	2	20	6	60	9	25.00	4	11.11	23	63.89	2.29
	FEMALE	1	16.7	2	33.3	3	50	5	16.67	5	16.67	20	66.66	
Transposition Algebra	MALE	3	30	3	30	4	40	9	25.00	4	11.11	23	63.89	2.11
	FEMALE	2	33.3	1	16.7	3	50	8	26.67	1	3.33	21	70.00	
Vector Algebra.	MALE	3	30	3	30	4	40	11	30.56	2	5.56	23	63.88	2.52
	FEMALE	2	33.3	1	16.7	3	50	6	20.00	4	13.33	20	66.67	
Combined Responses	MALE	3	30	2	20	5	50	10	27.78	3	8.33	23	62.89	0.56
	FEMALE	2	33.3	1	16.7	3	50	7	23.33	3	10.00	20	66.67	

Results from **Table 3**, concerning students’ Declarative Knowledge, indicates that less than 41% (male-40.0% and female-33.3%) of the teachers are of the opinion that the students have not improved on their abilities on Linear Algebra, while less than 39% (male-38.89% and female-36.67%) of the students opined same as the students. Only 30% of the male and 33.3% of female, teachers and 36.11% of the male and 33.33% of female students do not agree that mentoring has contributed the improved abilities the students in Quadratic Algebra. Also, 30% male and 33.3% of female teachers and 36.11% male and 26.67% of female students indicate that mentoring has not helped the students in the area of Transposition Algebra

Further, 20% of male and 33.3% of female teachers and 33.33% of both male and female students indicate that Vector Algebra abilities of the students have not been sharpened because of mentoring. 40% and 50% of male and female teacher, respectively and 55.56% and 60% of male and female students, respectively indicate otherwise.

Finally, the combined responses for this section, shows that 30% of male and 33.3% of female teachers and 36.11% of male and 33.33% of female teachers opine that the students have no improvement on their Declarative Knowledge of Algebra. These results show that the opinion of the teachers and students do not differ as most of them (students and teachers) agree on the students having improved.

Chi-square (χ^2) statistical analyses indicate that all the χ^2 -values are less than critical χ^2 values of 11.071 at five degrees of freedom and 0.05 level of significance. This means, there is no significant difference between male and female students’ and teachers’ views about the students. The hypothesis that there is no significant difference in the opinions of male and female students and teachers regarding Declarative Knowledge is therefore accepted.

Results from **Table 4** concerning the students’ Conceptual Knowledge of Algebra indicates that less than 35% (male—20% and female—33.3%) students and less than 31% (male—30.56% and female—23.33%) of the students do not agree that mentoring has helped the students to improve on Linear Algebra. Only 30% of the male and 33.3% of female teachers and 27.78 % of the male and 26.67% of female students opined that the students have not gained on improving Quadratic Algebra abilities. Also, 20 % male and 16.7% of female teachers and 25% male and 20% of female students indicated the students having no improvement on Transposition Algebra. Further 30% of male and 33.3% of female teachers and 33.33% male and 20% of female teachers indicated that the students have not improved on Vector Algebra.

The combined responses for this section, shows that 20% of male and 33.3% of female teachers and 30.56% of male and 23.33% of female students do not agree that the students have improvement on their Conceptual Knowledge of Algebra.

Chi-square (χ^2) statistical analyses indicate that all the χ^2 -values are less than the critical χ^2 value of 11.071 at five degrees of freedom and 0.05 level of significance. This means, there is no significant difference between male and female students’ and teachers’ views about the students’ improvement on Conceptual Knowledge of

Algebra. Therefore, we accept the hypothesis of no significant difference in the opinion of male and female students and teachers regarding the students’ improvement on Conceptual Knowledge of Algebra.

Table 5 presents data on students’ and teachers’ opinion on the students’ improvement on Proportional/ Spatial Knowledge of Algebra.

It indicates that the male teachers have 20% opinion of no improvement, 30% undecided, while the male students opined 33.33% of no improvement, 8.33% undecided about the students’ improvement on Linear Algebra. The female teachers’ responses show that 16.7% do not agree to improvement, 33.3% undecided and 50% agreement.

In the case of Quadratic Algebra, 20% of male teachers indicate a No response, 20% Undecided, while 60% has Yes for response. The male students’ opinion are, 25% No response, 11.11% Undecided, while 63.39% Yes response. For female teachers 16.7% indicates No, 33.3% undecided and 50% Yes, while female students’ opinion are, 16.67% No, 16.67% Undecided and 66.66% Yes.

The male teachers’ responses on Transposition Algebra show 30% No, 30% undecided and 40% Yes response, while the male students records, 25% No, 11.11% undecided and 63.89% Yes. The female teachers rate 33.3% 16.7% and 50% for No, undecided and Yes, respectively, while the female students results are 16.89%, 16.89% and 66.22% for No, undecided and Yes, respectively.

The combined responses for the male and female teachers show 30% No, 20%, 50% and 33.3% No, 16.7% Undecided and 50% Yes, respectively. The male and female students’ responses are, 27.78% No, 8.33% Undecided 62.89% and 23.33% No, 10 % Undecided, 66.67 Yes% respectively.

The χ^2 statistical analyses show that all the χ^2 -values are less than the critical χ^2 value of 11.071 at five degrees of freedom and a level of significance of 0.05. This means that there is no statistical significant difference between students’ and teachers’ opinion on the students’ improvement on Proportional/Spatial Knowledge of Algebra. Hence, we accept the null hypothesis of no significant difference in the opinion of the students and teachers on the students’ Proportional/Spatial Knowledge of algebra.

To assert the opinions of the staff and students, test items were drawn covering the various aspects and knowledge levels of Algebra and administered on the students. The analyses of the results are as in **Table 6** and **Table 7** below.

4.2. The Test Items Results

Fourteen students of the very weak group took both the pre-test and post-test. Six were female students, and eight male students. Five of the female students improved their grades from the pre-test to the post-test, while seven of the male students improved their grades from the pre-test to the post-test. The statistics for the fourteen students’ scores for the pre-test and post-test is displayed in **Table 4**. The maximum possible score for both the pre-test and post-test was 30 points. The mean score increased by nine points, and the median increased eight points from the pre-test to the post-test. However, the measure of spread about the mean (the standard deviation) also increased from 2.618 to 8.170.

In order to determine how significant the increase in scores was, a t-test was run on the data. For each student the post-test score was first subtracted from the pre-test score to obtain their difference in score. These differences were then used in the t-test. The results of the paired samples t-test performed on the differences found by subtracting the post-test scores from the pre-test scores is shown in **Table 6**.

Table 6. Summary of test items scores.

	N	Mean	Median	St, Dev.	Minimum	Maximum
Pre-test	14	4	4	2.58	0	11
Post-test	14	12	11	8.20	4	25

Table 7. Test items scores difference t-test.

N	Mean	St Dev.	St. Error Mean	df	95% Conf. interval	t	Sig. (2-tailed)
14	-8.91	6.77	1.18	13	(-12.83, -5.07)	-4.84	0.0031

Since the significance level is much less than 0.05, the difference in pre-test and post-test scores is highly statistically significant. This suggests that the Mathematics mentoring exercise in Algebra helped the students improve their understanding of Algebra, considering the knowledge levels and aspects, was successful.

Table 7 compares the statistics from the pre to the post-test of both male and female students. The mean for the male students went up by 7.51 points, while the mean for the female students went up by 10.10 points. The median for the male students went up by 5.5 points, while the median for the female students increased by 12.05 points. These changes seem to indicate that the Mathematics mentoring exercise in Algebra made more impact on the female students; however, a t-test on the data was performed to determine which group (the male students or the female students) had statistically significant difference in scores from the pre-test to the post-test.

The t-test on the differences in scores from the pre-test to the post-test for the two individual groups was carried out in the same manner as that of the two groups combined (**Table 8**). The post-test scores of each student were subtracted from the pre-test scores. These differences were then tested using the same paired samples t-test; the results of these two t-tests are shown in **Table 9**.

Both groups (the male students and the female students) had significance levels less than 0.05, so there was a statistically significant difference in the scores from the pre-test to the post-test. The female students had a smaller significance level, so the difference in this group was more highly statistically significant than the difference in the male students. This indicates that though the increase in mean and median scores for the female students were higher, the male students, having more statistically significant results, learned and understood just as much if not slightly more than the female students as a whole during this study. Either way, the results point to Mathematics mentoring exercise in Algebra being successful.

4.3. Students’ and Teachers’ Interview Results

Six students and six teachers are randomly selected and interviewed.

The questions asked are:

- 1) Are the students (Do have) having fun participating in the schools’ mentoring exercises on Algebra?
- 2) At the completion of the sessions of the mentoring exercises, were you able to detect changes in the students (you)?
- 3) Are the students (Are you) excited about the mentoring exercises?
- 4) Was there a time you noticed students (you) become disinterested in the mentoring exercises?
- 5) Do you think the mentoring exercise was related to real life problems the students encounter?
- 6) Do you feel the mentoring exercise was relevant to the students’ studies?
- 7) Do you feel the students are (Are you) more confident handling their problems having been involved in the mentoring exercises?
- 8) Would you think the students would like to choose their mentor?

Table 10 displays the results of the student interviews:

We found that both staff and students agreed the students had fun participating in the schools’ mentoring exercise.

Table 8. Summary of individual gender test items scores.

	N	Mean	Median	St. Dev.	Mini.	Max.
Pre-test (male)	8	3.45	3.05	3.25	0	10
Post-test (male)	8	10.96	8.55	7.96	0	22
Pre-test (female)	6	3.33	3.00	1.86	0	5
Post-test (female)	6	13.43	15.05	9.05	4	26

Table 9. Test items scores difference t-test for individual gender.

	N	Mean	St. Dev	St. error mean	df	95% Confidence Interval	t	Sig (2-tailed)
Male	8	-7.40	6.128	2.17	7	(-12.71, -2.38)	-3.457	0.010
Female	6	-11.02	7.820	3.16	5	(-19.11, -2.89)	-3.494	0.017

Table 10. Students' and teachers' interview results.

	Students						Teachers						Summary			
	S1-fm	S2-fm	S3-m	S4-fm	S5-m	S6-m	T1-m	T2-fm	T3-m	T4-m	T5-fm	T6-fm	Students		Teachers	
													N	Y	N	Y
Q1	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	3	3	0	6
Q2	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	2	4	0	6
Q3	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	2	4	0	6
Q4	Y	N	Y	Y	Y	N	N	N	N	N	N	N	2	4	6	0
Q5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	0	6	0	6
Q6	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	0	6	0	6
Q7	Y	Y	N	Y	N	N	Y	N	Y	Y	N	Y	3	3	2	4
Q8	Y	Y	Y	N	Y	Y	N	N	Y	N	N	N	0	5	4	2

S: Student (m—male and fm—female); T: Teacher (m—male and fm—female); Y: Yes; N: No; Q: Question.

The results tabulated above show that the students felt the schools' mentoring exercise was related to real life problems. Also, it was found that the students felt more confident handling their problems having been involved in the schools' mentoring exercise.

An interesting response that we found was that the students who became disinterested at some point during the schools' mentoring exercises, all did so for essentially reasons that were not connected to the mentoring exercise. Another interesting aspect of the responses was that regardless of whom the mentors were, all the students felt more confident handling their problems. The students' indication of the willingness to choose their mentors was supported by both staff and students as the result shows. From the above results, it can be claimed that the schools' mentoring exercise on Algebra has yielded positive results.

4.4. Results of Further Interviews

Further interviews with the staff and students led to the following statements:

1. Mentoring has made most students to improve! You can now see majority of them closer to their teachers, discussing. This improved relationship will definitely lead to better performance of the students in Mathematics generally and Algebra in particular.
2. A teacher stated, "Class participation of my students improved after this mentoring exercise".
3. A student stated, "I now have the confidence to walk up to my teacher and show him what I have done, wrong or right. I wish this mentoring exercise can be done more often".
4. "I'll no longer hide my ignorance. Whenever I'm stuck, I'll meet a classmate or any available teacher to help me", said a student.
5. "I used to be afraid of, especially, plotting and drawing graphs. Now, I am confident when doing it"

4.5. Findings

Based on the results of the study, the following findings are made:

1) Majority of students in Isuikwuato Local Government Area, Abia State, Nigeria, have gained much from the mentoring exercise. Their ability to practice what they have been told could be a predominant factor.

2) The interviews show that the students realised the importance of mentoring and would gain more should they take the activity more seriously.

3) There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding cognitive domain.

4) There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding affective domain.

5) There is no statistical significant difference between the teachers' (male and female) and the students' (male and female) responses on the schools' mentoring exercise regarding psychomotor domain.

5. Discussion

The above findings show that both staff and students accept the fact that mentoring has improved the students' lot in the aspects investigated- cognitive, affective, and psychomotor domains. This is as a result of the mentors' position, considering these students as people that actually need help.

It is realised that fear is a strong factor barring our students from performing up to well in Mathematics. So, they should be helped when noticed.

In view of these, an expand study should be carried out integrating students at all levels and teachers who are not graduates of Mathematics but are teaching Mathematics.

6. Conclusions

This study is a survey on the opinion of staff and students of secondary schools in Isuikwuato Local Government Area, Abia State, Nigeria, on the impact of mentoring exercise on the students' learning and understanding of Mathematics. Sixteen teachers (10 male and 6 female) and sixty-six students participated in completing the questionnaires used for the study. They were asked to indicate their opinion on how the mentoring exercise has imparted on the students' learning and understanding of Mathematics.

The study showed that most of students have gained much from the mentoring exercise. Their ability to practice what they have been taught could be a predominant factor. The interviews show that the students realise the importance of mentoring and would gain more should they take the activity seriously.

The result of this study is line with, Ihedioha and Osu [19] and Ihedioha and Lawal [20], in which it was found that mentoring has positive effect on students' overall development.

7. Recommendations

Based on the findings, the following recommendations are made among others:

- 1) Mentors and students should put more effort towards achieving higher percentage of success if not hundred percent.
- 2) Mentoring should be broad based so that successful people in all works of life will be invited to mentor the students.
- 3) There should be a clear cut curriculum for mentoring as it is the practice in other parts of the world and should include visitations and civic education.
- 4) There should be room for flexibility in mentoring where mentees will be allowed to choose their mentors. However, mentees should adopt measures that will help them to co-operate with the mentors they have considering mentor-mentee ratio in the school.
- 5) Mentors should strive for impeachable character for the success of the mentoring exercise.

References

- [1] Freedman, M. (1993) *The Kindness of Strangers: Adult Mentors, Urban Youth, and the New Voluntarism*. Jossey-Bass, San Francisco.
- [2] Floyd, N. (1993) Mentoring. *Education Consumer Guide*, October (7), 1-4.
- [3] Rhodes, J.E., Grossman, J.B. and Resch, N.L. (200) Agents of Change: Pathways through Which Mentoring Relationships Influence Adolescents' Academic Adjustment. *Child Development*, **71**, 1662-1671. <http://dx.doi.org/10.1111/1467-8624.00256>
- [4] McLean, K.T (1998). Mentoring Makes a Difference: Findings from The Commonwealth Fund 1998 Survey of Adults Mentoring Young People. The Commonwealth Fund. <http://www.commonwealthfund.org>
- [5] Tierney, J.P., *et al.* (1995) *Making a Difference: An Impact Study of Big Brothers/Big Sisters*. Public/Private Ventures Philadelphia.
- [6] Sipe, C.L. (1999) Mentoring Adolescents: What Have We Learned? In: Grossman, J.B., Ed., *Contemporary Issues in Mentoring*, Public/Private Ventures, Philadelphia, 10-23.
- [7] Allen, T.D. and Eby, L.T. (2007) Definition and Evolution of Mentoring. In: *The Blackwell Handbook of Mentoring: A Multiple Perspectives Approach*, John Wiley and Sons, Sussex, 7-20. <http://dx.doi.org/10.1111/b.9781405133739.2007.00002.x>
- [8] Gandara, P. (1998) *Capturing Latino Students in the Academic Pipeline*. Chicano/Latino Policy Project, Berkeley.

- [9] Funk, E. and Ek, N. (2002) Mentoring Youth in Brandon: Successes, Challenges, and Best Practices. <https://www.brandonu.ca/rdi/publications/ruralnorthern-health-well-being>
- [10] DuBois, D.L., Holloway, B.E., Valentine, J.C. and Cooper, H. (2002) Effectiveness of Mentoring Programs for Youth: A Meta-Analytical Review. *American Journal of Community Psychology*, **30**, 157-197. <http://dx.doi.org/10.1023/A:1014628810714>
- [11] Gandara, P. and Meorado, M. (2005) Putting Your Money Where Your Mouth Is: Mentoring as a Strategy to Increase Access to Higher Education. In: Tierney, W.G., Corwin, Z.B. and Colyar, J.E.D., Eds., *Preparing for College: Nine Elements of Effective Outreach*, SUNY Press, Albany, 89-110.
- [12] Stanton-Salazar, R. (2001) Manufacturing Hope and Despair: The School and Kin Support Networks of U.S.-Mexican Youth. Teachers College Press, New York.
- [13] Flaxman, E. (1992) Evaluating Mentoring Program. Institute for Urban and Minority Education Briefs, June (1), 1-4.
- [14] Mecartney, C.A., Stiles, M.B. and Morrow, K.V. (1994) Mentoring in the Juvenile Justice System: Findings from Two Pilot Programs. Public Private Ventures, Philadelphia.
- [15] Schneider, S. (1995) Young Leaders Mentoring Troubled Children. *Journal of Emotional and Behavioral Problems*, **3**, 31-39.
- [16] Slicker, E.K. and Palmer, D.J. (1993) Mentoring At-Risk High School Students: Evaluation of a School-Based Program. *School Counselor*, **40**, 327-334.
- [17] Torrance, E.P. (1984) Mentor Relationships: How They Aid Creative Achievement, Endure, Change and Die. Beady Limited, Buffalo.
- [18] McPartland, J.M. and Nettles, S.M. (1991) Using Community Adults as Advocates or Entors for At-Risk Middle School Students: A Two-Year Evaluation of Project RAISE. *American Journal of Education*, **99**, 568-586. <http://dx.doi.org/10.1086/443998>
- [19] Ihedioha, S.A. and Osu, B.O. (2012) The Opinion of the Academic Staff on the Effect of Mentoring on Students' General Development in Government Comprehensive Secondary School Bwari, Abuja Nigeria. *The International Journal of Engineering and Science*, **1**, 143-150. www.theijes.com
- [20] Ihedioha, S.A. and Lawal, A.B. (2013) Analysis of Students Opinion on the Impact of Mentoring Exercise on Students' General Development in Nigeria: Case Study—Government Comprehensive Secondary School Bwari, Abuja Nigeria. *Inventi Journals (P) Ltd.*, No. 1, 6-11.