

An Investigation into Group and Individualized Teaching Methods and the Performance of Male and Female Students in Mathematics

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Abstract

The design of the study is the Pre-test/Post-test, Experimental-Control Group design. The sample used for the study comprised a co-educational secondary school selected from the target population through simple randomization technique taking proximity into consideration. The control group was obtained through simple randomization while the experimental group was obtained through stratified random sampling techniques. After six weeks of treatment, a post-test was administered to both the experimental and control groups. The scores were collated and subjected to t-test analysis using statistical package. The null hypothesis stated that there is no significant difference in the performance of junior secondary students in mathematics when taught using individualized instruction and group method of teaching is retained.

1.1 Introduction

Mathematics is one of the core subjects for the 6-3-3-4 system of education in Nigeria it is indispensable in the world today; no wonder it is now a compulsory subject in secondary schools. This shows the importance attached to the subject in the efforts of Nigeria's drive toward technological development. Despite all these efforts in the Nigeria Educational system, the subject is still regarded as a difficult one, an object of fear among many students especially the females (Amosa, 1995). This trend has been reflecting in the mathematics achievement of students since the subject became compulsory in the school curriculum.

In U.S.A many studies have been carried out on sex differences in mathematics, the result generally revealed that girls are superior to boys in some aspects of mathematics and that girl's performance declined as they moved up to the adolescent stage of their lives.

Studies carried out on the attitude of students towards mathematics; reveal that the method of teaching mathematics and the acute shortage of trained and qualified

mathematics teachers in most of the schools have great influence on students' attitude and performance in mathematics.

There is a growing demand of mathematics oriented professions like Engineering occasioned by industrial revolution, and high demand of manpower in the communication industry, The growing scare, poor performance and non-interest of secondary school pupils in mathematics calls for concern, hence this investigation.

2.1 Why Students Struggle With Mathematics

Mathematics is not an easy subject to learn. Everyone has trouble with mathematics. Sometimes even-good mathematicians are not spared. But some people seem to have trouble with mathematics all the time more than others.

There is more to learning mathematics than just having a teacher explain something and following this up with exercise. Using and applying mathematics must always be at the heart of the learning the subject.

The following learning characteristics represent substantial barriers to mathematics success for these students.

Learned helplessness is the result of students' continued failure with mathematics and the temptation we as educators have to get them through a current set of problems without teaching them the underlying concept of the skill they are procedurally working. This results in both dependence on help from someone else and non-understanding.

- Attention problems: Students with attention problems often 'miss' important information about solving; they have gaps in their knowledge base, which become barriers for accurate problem-solving.
- Application of effective teaching practice for students with learning problems: Ale (1990) observed that the method of presenting mathematics in clear and understandable form must be taken into consideration.

3. Group Method of Teaching

Among the oldest methods of teaching is the group teaching method sometimes referred to as the class teaching method. Group method of teaching occurs when the teacher instructs the pupils in a group collectively as a unit. Many a time the group is usually a class of 35-40 pupils; all the pupils are taught the same thing at the same time in the

same way. This means that all the pupils in that group are treated equally.

Students are grouped in various ways according to the prevailing situation and set objectives. Thus the grouping may be by ability, sex, interest, mixed ability, random and need Grouping:

4. Individualized Instruction

Individualized instruction is defined as a process in which the student learns all on his own a field of study or topic broken into bits, according to his interest and ability, using special prepared programmed books, cards and electrical or electronic teaching machines. This means that in teaching and learning, each child is considered in line with his/her individual difference.

Individualized instruction is based on the principles of operant learning theory developed by B.F. skinner and series of researches had been conducted to find the best method of application. The major characteristics of individualized instruction are;

- The learner determines his instructional objectives.
- The instruction is broken into bits according to the needs, capabilities and interest of the individual learner.
- The learner works in his own pace. He is not 'held up' or 'pulled forward' by the others
- The immediate feedback received motivates the learner to learn more.
- Individualized instruction is relatively a new approach to teaching.

5.1 Research Design

Research Hypothesis

HO₁:

There is no significant difference in performance of Junior Secondary students (J.S.S) in mathematics when taught using individualized instruction and group method of teaching.

HO₂:

There is no significant correlation between gender and performances of Junior Secondary students (J.S.S) in mathematics when taught using individualized instruction and group method of teaching.

The design of the study is the Pretest-Posttest, Experimental-Control Group design. The experimental and the control groups were selected from one secondary school consisting of male and female students of comparable academic level. Comparability of the two groups was established through analysis of the pretest data, which showed no significant difference in academic ability between them that is, the two groups as at the time the investigation started.

Table 1: Samples from Targeted Population

Class	Control Group		Experimental Group	
J.S.S 1 ^A	8		2	
J.S.S 1 ^B	8		2	
J.S.S 1 ^C	8		2	
J.S.S. 1 ^D	8		2	
J. S. S.1 ^E	8		2	
TOTAL	40 students		2	10 (5 males, 5 females)

5.4 Instrument

The researcher constructed the instrument used for the study. It comprised 100 multiple choice mathematics questions drawn from past question on common entrance examination questions this was used as pretest questions. The posttest instrument comprised 100 multiple choice mathematics questions drawn from topics treated during the period of experimentation.

5.5 Validation of Instrument

The instruments were validated by three experienced secondary school mathematics teachers.

5.2 Sample and Sampling Procedure

The sample used for the study comprised a co-educational secondary school selected from the target population through simple randomization technique taking proximity into consideration. The school thus selected is Ahmadu Bahago Junior Secondary School Minna, Niger State, Nigeria.

5.3 Sampling Procedure

Simple random procedure was used to select the samples from the target population. 50 students were selected from the school 10 from each arm of JSS 1 (A, B, C, D, E) 2 students from each class made up the experimental group while the other 8 served as part of the control.

The control group was obtained through simple randomization while the experimental group was obtained through stratified random sampling techniques, giving 5 male and 5 female students.

Table 2: Comparison of the Performances of the Experimental and Control groups in mathematics

Variable	N	\bar{O}	SD	SE	df	t-value (calculated)	t-value (critical)
Experimental group	10	6.8			48	1.16*	2.01
Control group	40	7.5	1.72	0.25			

*Significant at $P \geq 0.05$

6.0 Data Analysis

After six weeks of treatment, a posttest was administered to both the experimental and control groups. The scores were collated and subjected to t-test analysis using statistical package

Table 3: Comparison of the Performances of Male and Female subjects in the Experimental group

Variable	N	\bar{O}	SD	SE	df	t-value (calculated)	t-value (critical)
Male	5	7.8	1.3	0.46	8	1.737*	2.306
Female	5	6.8	1.9	0.31			

*Significant at $P \geq 0.05$

6.1 Results

The results obtained from the analysis carried out on the posttest results are presented in tables 2 and 3

6.2 Discussion of the Results

The results presented in Table 2 shows a calculated t-value of 1.16, which is lower than the critical t-value of 2.01. This shows that there is no statistically significant difference between the mean scores of the experimental group (6.8) and the control group (7.5). Thus the null hypothesis H_{01} which says there is no significant difference in performance of junior secondary students in mathematics when taught using individualized instruction and group method of teaching is retained. While the individualized instruction afforded each student the opportunity of bringing out his best at his own pace,

the positive effect of the crowd in the group class was instrumental to the progress of the students.

The result in Table 3 shows that the calculated t-value was 1.737 while the critical t-value was 2.306. Since the calculated t-value is found to be significantly lower than the critical t-value, the null hypothesis H_{02} was retained. This shows that there was no significant difference between the performances of the male and female students in the experimental group with respect to mathematics when taught with individualized instruction. The findings from the study of other scholars, pointed in similar direction.

Thus the use of individualized instruction in teaching mathematics holds a promise for at least reducing gender-related difference amongst male and female students in the learning of mathematics in schools.

7.0 Conclusion

Based on the findings and analysis carried out in this investigation, it is concluded that:

- (a) There is no significant difference in performance of junior secondary students in mathematics when taught using individualized instruction and group method of teaching.
- (b) With the limitations individualized instruction holds, good performance in mathematics can still be obtained for students if teachers can pay more emphasis on particular content.
- (c) Gender differences are not a significant factor in so far as it relates to junior secondary students performance in mathematics. This indicates, at least from this study, that the individualized instruction method of teaching mathematics is gender friendly.

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