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Secondary School Mathematics Teachers' Skills and Students' Achievement Using Innovative and Model Teaching Approaches

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Abstract: *The purpose of this study was to find out the effect of secondary school Mathematics teachers' skills on secondary school students' achievement in Mathematics using innovative models teaching approach. The paper describes innovation and modeling for improving teaching and learning of Mathematics that will address the barriers which make it difficult to achieve numeracy skills. The strategies are offered as a means of evaluating and aligning students' activities to promote stronger learning of Mathematics. Different innovation strategies and different picture models were used by students to promote the quality of teaching and learning in Mathematics. The study was carried out using a cooperated descriptive survey research design and quasi-experimental design approach. Its population consisted of all Mathematics teachers and students in four schools located in different Local Government Areas in Ekiti State, Nigeria. Random sampling technique was used to select a total of 160 students and all Mathematics teachers in the target schools. Three sets of instruments were used to collect data for the study: teachers' interview rating scale students' achievement test as well as attitudinal scale. Three research questions and hypotheses were formulated to guide the study. Data were analyzed using mean, standard deviation, frequency counts, t-test statistics, Analysis of Covariance (ANCOVA) and Phi - correlation. Results showed that: students who received instruction through the use of models and interaction teaching material (innovation) experience greater and more achievement gains than others who do not interact. It was also found that interaction/ modeling enhances students' learning in Mathematics, enables the students to enjoy Mathematics, and improves students' vocabulary, clearer mastery in Mathematics, bold influence future aspiration of students in Mathematics and legible writing among others. Teachers as well see the strategy as a way of boosting the quality of learning in Mathematics.*

Keywords: *Mathematics, Teachers' Skillfulness, Students' Achievement, Innovative, Modeling, Teaching Approaches*

I. Introduction

Education is a light that shows the mankind the direction to surge. The purpose of education is not just making a student's literate but to be able to think rationally, knowledgeable and sufficient in any area of choice. When there is willingness to change, there is hope for progress in any field of endeavour. Innovation can be developed to enhance creativity on the parts of students and teachers. Researchers Bruner (1996); Zimmermann, (1997); Bransford, Brown & Cocking (1999) and Zimmerman (2006) in different studies and findings opined that the learning of Mathematics at early part of secondary school education showed that students learn more by interaction. Most researchers Fennema & Franks (1992); Bould (1993); Stinson (2001) and Gutstein & Peterson (2005) argued that the learning of Mathematics depends on the skill of the teacher in handling the subject. They went further to say that teacher's method of teaching contributes much to the failure of students in the school and that most of the teachers were found inadequate in motivating students through skillful use of resources to make the subject interactive among students.

The teacher serves as agent of change through education in the society. The training he receives according to Lee & Fadd (1998) and Morrow, Gambrell & Pressley (2003); Heater, Rowan & Ball (2005) helped him to feel, think and teach the students to acquire the thinking skills used in the classroom learning. The utmost goal of a skillful teacher is to assist the learner to optimize the thinking capabilities. This in turn will perhaps increase the critical and creative thinking abilities he needs to learn Mathematics properly.

Most students actively learn by interaction, observing and performing activities involving modeling (Zimmermann, 1997; Collins, Robert & Jones, 2000 and Blum, 2002). The process of learning is increased when practical work is associated with the skilled teacher in the method of teaching. During students' self-exploration the skillful teacher assist them to actively perform better in Mathematics than non focused teacher who will just use any method that may not have any positive impact on the learner (Fennema & Franks, 1992; Lendson-Billings, 1995).

A typical classroom learning may not encourage students' participation, self expression and may not build the required involvement level on the part of the student. There is a great need to improve quality of teaching in Mathematics. This can be possible by bringing fundamental changes through innovative approaches

by which skillful teachers method can assists to improve students'-centered learning environment (Carr, 1989; Collins & Jones, 2000 and Manson, 2001).

In Nigeria Mathematics classroom, most students copy the examples in the text book as given on the board by their teachers; this does not engage them and build their mathematics vocabulary levels on concepts taught. The typical way of teaching Mathematics only promotes a small number of students and may encourage rote learning and memorization (FGN, 1997 and Popoola, 2008). Curriculum planners and educationists find this mode of teaching as limiting effective learning and less effective as the students may lose their concentration due to passive role and less participation, less collaborative method of teaching. The study uses modeling as method of instruction to reduce the problem of poor Mathematics achievement and negative attitude among secondary school students (flash cards, drawing, real objects, audio and visual aids, role play, smart board, use of abacus board drawing different shapes through measurement, discussion, quizzes etc). This method encourages interaction, improve learning, gives high intelligent, free from boredom, create deeper understanding that produces high level problem solving ability.

This study analyzed the effects of innovative approaches in modeling form used by students through interaction and, critical thinking in order to solve Mathematical problems in real life contexts. It also examines competencies needed for this approaches in order to solve inability to study Mathematics and real world problems. This type of teaching is developed through effectiveness and ability of the teacher to respond to students' misunderstanding which may be connected to the 'hows' of learning Mathematics. The skillfulness here means that teacher assists the students to develop maximum level of critical thinking in Mathematics through interaction with them while the teacher watches what goes on among the students in the classroom.

Innovation approaches using literacy by the teacher is viewed by Zimmermann, (1997); Manson (2001) and Rombberg (2001) as one of the techniques of making teaching and learning interesting, interactive, effective and collaborative. It has the capacity to identify, understand and engage the students in the process of learning Mathematics. It also makes them more grounded in judgment on the roles played by Mathematics in the individual's current, future and private life as well as interaction with peers and relatives (Watanabe, 2006 and Schunk & Hanson, 2007). They observed that a method is only considered effective and efficient by the teacher for a comprehensive coverage of the topics in predetermined sequence. The conventional method is seen as dull and frustrating. Students may therefore prefer this method in which they actively participate in the learning process. This method leads students to discover mathematics and Mathematics topics for future use in Mathematics related areas. The ability of the teacher to direct Mathematics knowledge of the learner into functional use is the focus of this study .Also, ability to solve, relate used models to solve Mathematics problems within a great variety of situation using different concepts in Mathematics to be met in the later life is part of the focus of this study.

This study further attempted to focus on functional and practical ways of impacting Mathematics to students through innovation as well as expressing themselves well in order to use it in real world situation. The study also focused on how these innovation approaches (modeling etc) can both be put into use by the teacher and students for the teaching and learning of Mathematics. This typical interaction can be expressed diagrammatically in figure 1. This shows the teacher presents or poses a problem in Mathematics to students and watch how this problem can be solved by the students in their own way through interaction (innovative approach) by grouping themselves into groups of 3 or 4 depending on the population of the class.

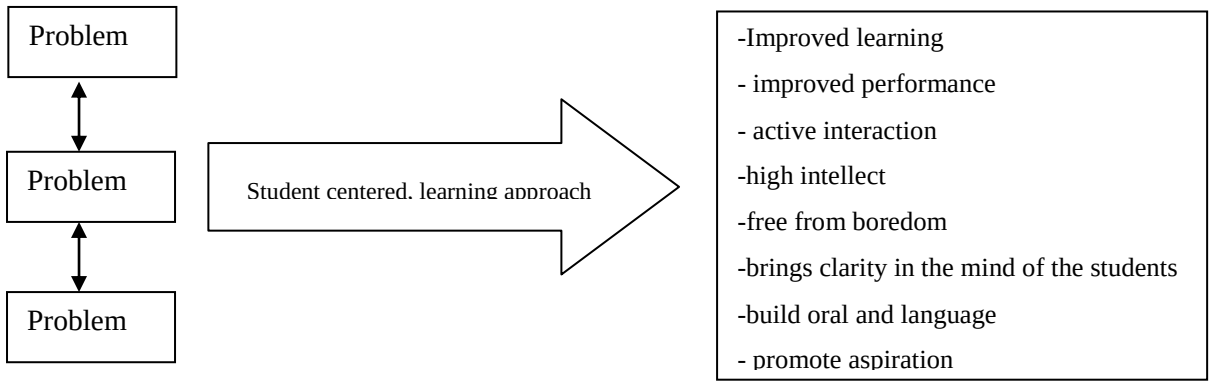


Figure I: Adapted from Bould & Feletti (1999)

Bould and Feletti were interested in the way the students learn in school. They were of the opinion that the most successful learning occurs when there are problems to be presented and students interact together while the teacher guides the students as they attempt to solve the problem. Production is the students' ability to

interact, solve and improve their thinking in order to solve similar problems in future. The interaction that existed between the presentation of problem linking with innovative approach to production will bring learner-centered learning approach which will invariably produce and brings improvement in learning, performance, active interaction, high intelligent, less boredom, clarity to solve Mathematics problems among others. This method leads students to discover Mathematics while engage in model innovation. Hence, this method is worthwhile method of teaching not only mathematics but other Mathematics related areas as well. It is at this point that the study investigated the effect of innovation in modeling teaching approach for the teaching of Mathematics.

The Study Problem

Secondary School students appear to be poor in Mathematics. These have been attributed to poor teaching and skillfulness of teachers in using different approaches during teaching. The indices of student poor achievement in Mathematics at Junior School Certificate and low turnout of successful students in Mathematics manifests itself at tertiary institutions. Most teachers do not make use of the skills acquired while in training especially those acquired during teaching practice when different materials had to be used in teaching. The teaching of Mathematics at the lower secondary school level requires how teacher is able to teach and communicate meaningfully through techniques and methods and to what extent he/she is able to involve the learners to be actively participated during and after instruction. Teaching approaches such as the use of varieties of resources and models which Mathematics teacher can readily use to enrich learning is agitated in this study.

Research Questions

The following research questions were raised for the study:

1. Will students modeling influence the learning of Mathematics?
2. Will students enjoy modeling innovation than non modeling method of teaching?
3. Will modeling influence their future aspiration in Mathematics related areas?

Hypotheses

The following research hypotheses were generated for the study

1. There is no significant difference between the pre-test mean scores of experimental and control groups in Mathematics.
2. There is no significant difference between the pre and post-tests means scores of students' using modeling and conventional approaches in Mathematics.
3. There is no significant difference between the post-test mean scores of male and female students' using modeling and conventional approaches in Mathematics.
4. There is no significant difference between the pre and post-tests means scores of students according to subject specialization in Mathematics.
5. There is no significant difference between the post test mean scores of students' according to the teachers' qualification.
6. There is no significant difference between the post test mean scores of students' according to the teachers' teaching experience.
7. There is no significant relationship between the interactions of students using modelling approach and those without.

II. Methodology

Design: The study made use of quasi-experimental design which involves pre and post tests for the subjects in both the experimental and control groups. One experimental group (using models) was exposed to treatment condition, while the control group was exposed to conventional method. This is because the teacher changed his/her teaching style to incorporate interaction and later evaluate the efficacy of the method and by changing his/her task dominating teaching strategies to a more functional and interactive which encourages students' centered approach.

Population and Sample:

The population of this study was Junior Secondary Schools two in 172 Public Secondary Schools and Mathematics teachers in Ekiti State, Nigeria, The students and teachers were distributed all over the sixteen (16) Local Government Area of Ekiti State. The sample for this study was 160 J.S.S. II students and 12 teachers. The researcher moved round the schools before carrying out the experiment to see how Mathematics teachers were teaching the subject and also to know the number of Mathematics teachers in each school. It was discovered that the maximum number of Mathematics teacher in each of the school in Ekiti State were 4 out of which only 3 were picked for the study based on the way they taught their students and the responses we got after

interviewing them. Twelve teachers from 4 schools in 4 Local Government Areas (LGA) of Ekiti State were selected based on multistage sampling techniques. Stage 1 was random selection of four LGAs out of 16 LGAs in Ekiti State, Nigeria while, stage 2 was random selection of schools/classes using purposive random sampling techniques. Two schools were used for experimental group and the other two schools for the control group who were allowed to continue their normal method of classroom learning. Forty Students and 3 teachers were selected each from 4 schools to make a total number of 160 JSS II students on an intact class basis and 12 teachers respectively. The schools selected were stratified using the following criteria: the school that are co-educational, they have presented candidates for junior secondary school certificate examinations for at least five consecutive years and they have at least two qualified Mathematics teachers and one of them handles J.S.S. II.

Instruments: The instruments used for collecting data were Students Mathematics Achievement Test (SMAT). SMAT contained 20 multiple choice standardized questions of five options which covered three selected topics treated during the experiment. The contents were selected from the schools scheme of work designed for Junior Secondary School in Nigeria which has not been taught. Students were also given attitudinal questionnaire that contained personal information on student's sex, age, school and Local Government Area and 20-item question to register their opinion on the approach used during the learning of mathematics tagged 'Modeling Approach used by Students (MAS). Teachers were also interviewed to seek their opinion on the method (model) used by their students. The research instruments were validated and the reliability determined and adjudged adequate for the study.

Data Analysis:

The data collected were pre-coded and analyzed, using Frequency Counts, Means, Standard Deviations, t -test statistic, Analysis of Covariance (ANCOVA) and Phi correlation analysis. All hypotheses generated were tested at significant level of 0.05.

Experimental Procedure

The intent of the study is to know how skillful the teachers are in the teaching and how they actually simplify their lessons to meet Mathematics students' needs. The selected teachers were interviewed before and after the experiment. Objective of the experiment was to uncover the effects of interaction techniques used by JSS 2 students in Mathematics class. The approach includes the following: Group Projects, Flash cards, Real Objects, Audio-visual aids, Role play, Work sheet, Smart board, Abacus board, Group discussion, Quiz, drawing different geometrical shapes and recording what was learnt. This is expected to encourage enjoyable learning and attract students to learn.

The experiment was conducted at the middle of the term for 6 weeks. Two schools were taken as experimental and control groups respectively. The control group was taught by the teacher who did not use the above innovation/ techniques. Classrooms arrangement was initially set in the normal row and column form after which the teacher in the experimental school rearranged the experimental classroom in group and in circular form in order to give room for students' interaction. A systematic random sampling technique was used to arrange the students into groups of 4 of different abilities each in a class, making 10 groups in each experimental class and students were rewarded on the basis of group work. This was expected to encourage cooperation among members. The qualification and experience of the teachers in both experimental and control groups were adjudged equal. Pre-test was given to both the experimental and control groups. The experimental group was taught using interactive approach in modeling form. These students were given concepts in Mathematics to interact with by molding, drawing, and cutting and do some practical works that can make them interact and learn meaningfully in the classroom. Class work was given to both groups each day of the experiment. The experiment lasted for 6 weeks. This was conducted at the middle of the term when the regular classes would not be disturbed. Three topics were taken from the Mathematics book which was meant for the class. The teacher provided teaching material necessary for teaching Mathematics before the students provided their own materials to be used by each group in the class. At the end of the experiment, post- test was administered on both the experimental and the control.

Work sheet was provided for the experimental and control groups to record their observations during the lessons. Also students were given (MAS) after the experiment to both groups. Each of the teachers was interviewed after the experiment. The purpose of the interview was to seek their observation/opinion on the way they teach and the new way the students taught themselves using modeling approach. The questions also included their present and past experiences in the hope of students' future intent to do Mathematics. Each of the teacher was asked to submit a written lesson plan based on the method used in their schools..

At the end of the experiment the students were to do the following using **EWU** below as adapted from Ogle (1989):

a. Summarizing sections of the concepts learnt, focusing on the main ideas to check their understanding.
b. Questioning: asking questions about what was learnt that was not clear. This encouraged comprehension of the work.
c. Clarifying -- the students clarified the essential problematic areas of the concepts that cannot be modelled, requiring them to evaluate their current level of understanding using modelling approach.
d. Predicting : letting the students go beyond the work of the concepts to make inference on how this model approach can be related to real life situation.

Classroom Activities

- Activities allow students to bring materials from home such as cardboards, cube of sugar to mode different shapes under the topics. Teacher gives the concepts to work on
- Discuss the concepts
- Divides the class/students into workable group of 3 or 4
- Each group provided /did the models for each concept in order to understand how it works, part of the goal is to promote understanding & tolerance to create a deeper understanding in the classroom,
- Each group was given a record sheet to discuss what was discussed during the experiment

Situation of the Research (Model Teaching)

This model includes:
i. experimentation
ii. guess statement
iii. argumentation
iv. definitions
v. structuring objects
vi. drawing

Summary of the Writing Frame:

The EWU grids teaching approach used by the students in the working sheet

E–What experience do I already have?	**W**–Which experience did I have about this?	**U**–What did I understand about this
(i) Evidence of understanding not just recall of (ii) In-depth knowledge of the topics and production (iv) Active participation that produce friendship (v) My teacher's method of teaching is not adequate (iv) My interaction with colleagues who influenced me	(i) I have the experience that if I collaborate well in the class I can learn mathematics (ii) I can learn Mathematics successfully on my own. (iii) I can use it to work other problems (iv) I have already have ability to complete tasks (v) I have developed effective solutions to problems in Mathematics	(i) I have the experience that if I collaborate, Mathematics is not difficult (ii) Mathematics requires considerable time. (iv) I understand that mathematics is enjoyable iii) I have understood that if one works harder in Mathematics one can learn it

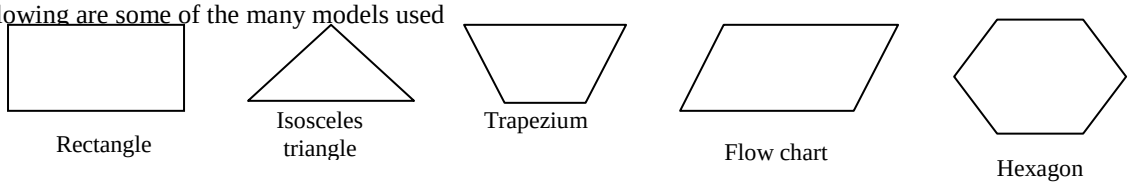
Source Figure II: Adapted from Ogle (1989)

Teachers played the role of a teacher and a spectator (watching and moving round the class while the students are doing the modeling and interacting together.

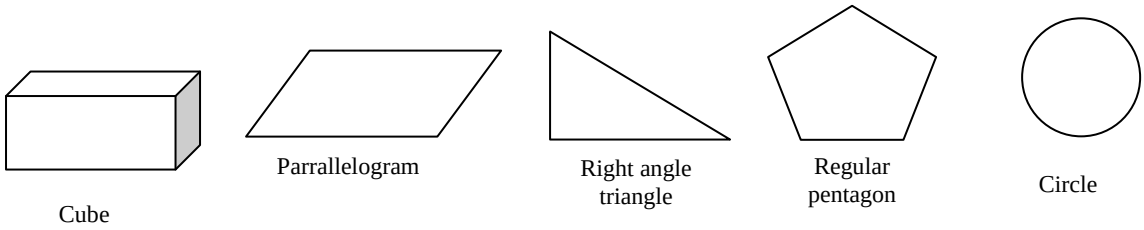
Strength of models

i. make concept Mathematics clear
ii. students develop interest to know exactly the concept
ii. create long lasting memory
iii. create correlation of the concepts
iv. take quite long time for a teacher to introduce new concepts
v. initial difficulty in understanding and how to explain a particular concept will be encouraged

Following are some of the many models used



Rectangle | Isosceles triangle | Trapezium | Flow chart | Hexagon



Research Question 1: Will students modeling influence the learning of Mathematics?

Table 1: Modeling approach and the learning of Mathematics

S/N	Items	SD	D	A	SA
1.	using modeling approach improves my Mathematics	21 (13.1)	26 (16.3)	57 (35.6)	56 (35.0)
2.	I don't know that this innovative approach exist	78 (48.8)	26 (16.3)	30 (18.8)	26 (16.3)
3.	I can explain a concept better in Mathematics to my friends	26 (16.3)	20 (12.5)	67 (41.9)	47 (29.4)
4.	My learning of mathematics improves	20 (12.5)	31 (19.4)	40 (45.0)	69 (43.1)
5.	I understand Mathematics more when using this approach	26 (16.3)	41 (25.6)	25 (15.6)	68 (42.5)

Table 1 shows the respondents modeling approach and learning of Mathematics. Twenty-one (13%) students strongly agree on modeling approach that improves Mathematics, while 56(35%) respondents strongly disagree to the item. This implies that majority of the respondents claimed that modeling approach improves their Mathematics. This is also followed by the item that says that the approach does not exist with only 78 (49%) strongly agreed and 26 (16%) agreed while, 30 (19%) and 26 (16%) strongly disagree respectively which means that the respondents who did not use the approach strongly agree that the approach does not exist. Only 26 (16%) respondents agreed that they can explain Mathematics better with the approach while, 20 (13%) respondents disagreed. 67 (42%) respondents agreed that they cannot explain concepts better in Mathematics to their friends while only 47 (29%) disagreed because they did not use the approach. Hence those who used the approach can explain concepts in Mathematics better than those who did not use the approach. Still on the same table, 26 (16%) and 41 (26%) of respondents agree that they understand Mathematics better when the approach is used, while only 25 (16%) and 68 (43%) disagree that they do not understand Mathematics because their teacher did not use any new method with them hence, innovation in the teaching of Mathematics is essential.

Research Question 2: Will students enjoy modeling innovation than non modeling method of teaching

Table 2 shows the enjoyment derived when using modeling innovation for the teaching of Mathematics

Table 2: Enjoyment in modeling innovation

S/N	Items	SA	A	D	SD
1	The model makes me to grow in vocabulary and I can express myself better.	83 (51.9)	35 (21.9)	20 (12.5)	22 (13.8)
2.	makes me to have legible hand writing and I am bold in class	56 (35.0)	42 (26.3)	35 (21.9)	27 (15.9)
3.	I am bold because I enjoy mathematics	68 (42.5)	45 (28.1)	17 (10.6)	30 (18.8)
4.	Mathematics is more clearer to me than before	47 (29.4)	58 (36.3)	35 (21.9)	20 (12.5)
5.	I don't enjoy this approach	66 (41.3)	64 (40.0)	10 (6.3)	20 (12.5)
6.	I don't enjoy Mathematic	58 (36.3)	87 (54.4)	5 (3.1)	10 (8.3)

Table 2 shows that the respondents 83 (52) and 35 (22%) shows strongly agreed and agree to the item on the expression in Mathematics because the respondents can express herself well, while only 20 (13%) and 22 (14%) disagreed on the responses. Another item that he/she is very bold in class because of the use of innovation, only 56 (35%) and 42 (26%) agreed to the response, while, 35 (22%) and 27 (17%) disagreed on the item. Another item that says I am bold because I enjoyed Mathematics only 68 (43%) and 45 (28%) disagree to the response while, 17 (11%) and 30 (19%) disagree. Yet another item that says the approach makes me love Mathematics only 47 (29%) and 58 (36%) agree to the item while, 35 (22%) and 20 (13%) responded to the item, and finally only 58 (36%) and 87(54%) agreed to the response while, 5 (3%) and 10 (8%) of the respondents disagree to the item. Hence, students who used model approach one more agreed strongly on most of the items while those who were not exposed to model strongly disagreed.

Research Question 3: Modeling influence future aspiration in Mathematics related areas

Table 3: Influence of Modeling for future aspiration in Mathematics related areas

S/N	Item	SA	A	D	SD
1	I will like to teach mathematics in future	35 (21.9)	63 (39.4)	26 (16.3)	36 (22.5)
2.	I am more confidence in Mathematics than before so I will do mathematics in future	41 (25.6)	37 (23.1)	37 (23.1)	45 (28.1)

Table 3 shows the influence of modeling on future aspiration in Mathematics related areas .35 (22%) and 63 (39%) respondents agreed to the items on likeness to do Mathematics in future, while only 26(16%) and 36 (23%) did not agree. Other items on the future aspiration included confidence to do Mathematics in future and only 41 (26%) and 37 (23%) strongly agreed on the item, while, 37 (23%) and 45 (28%) disagree on the items. Hence, students who were not exposed to model approach in the learning of mathematics did not agree to majority of the items used.

Hypotheses Testing

Hypothesis 1: There is no significant difference between the pre-test mean scores of experimental and Control groups in Mathematics

Table 4: t-test showing pretest mean scores of experimental and control group

Group	N	Mean	SD	df	t-cal	t-table
Modelling	80	4.90	0.77			
Control	80	4.78	0.84	158	0.978	1.960

$\rho > 0.05$

Table 4 shows that t-cal (0.978) is less than t-table (1.960) at 0.05 level of significance. The null hypothesis is rejected. It implies that there is no significant difference between the pretest mean scores of experimental and control groups.

Hypothesis 2: There is no significant difference between the pre and post-tests means scores of students' using modelling and conventional approaches in Mathematics

Table 5: ANCOVA showing the achievement mean scores of modelling and conventional groups

Source	SS	Df	MS	F_{cal}	F_{table}	P
Corrected model	191.609	2	95.805	140.135	3.07	.000
Covariate (pretest)	.203	1	.203	.297	3.92	.587
Group	189.290	1	189.290	276.878	3.92*	.000
Error	107.335	157	.684			
Corrected total	298.944	159				
Total	6023.000	160				

$* \rho > 0.05$

Table 5 shows the F_{cal} (F = 276.878, P<0.05) >F_{table} = 3.92) at 0.05 level of significance . The null hypothesis is rejected. Therefore, there is significant difference between the pretest and posttest mean scores of students using modeling approach and conventional approach in mathematics. This might have been due to the fact that students have been modeling expose to innovative approach and the other was not expose to it.

Hypothesis 3: There is no significant difference between the posttest mean scores of male and female students in the experimental and the control groups

Table 6: 2x2 ANCOVA of students' posttest mean scores by treatment and gender

Source	SS	df	MS	F .cal	F .table	P
Corrected model	191.833	4	31.972	45.670		.000
Covariate (pretest)	.207	1	.207	.296	3.92	.587
Sex	.168	1	.084	.120	3.92	.887
Group	25.591	1	25.591	36.555*	3.92	.000
Sex X group	.059	1	.029	.042	3.92	.959
Error	107.111	153	.700			
Corrected total	298.944	159				
Total	6023.000	160				

$\rho > 0.05$

Table 7 shows that F-cal (0.042) is less than F-table (3.92) at 0.05 level of significance. The null hypothesis is not rejected. This implies that there is no significant difference between the posttest mean scores of male and female students in the experimental and the control groups. Similarly, the effect of gender on the posttest mean scores of students is not statistically significant at 0.05 level (F = .120, P>0.05). Hence, treatment has no effect on the gender of students since everybody were exposed to modeling approach.

Hypothesis 4: There is no significant difference between the pre and post-tests means scores of students according to subject specialisation in Mathematics

Table 7: 3x2 ANCOVA of posttest mean scores of students by treatment and subject specialization

Source	SS	df	MS	F.cal	F. table	P
Corrected model	134.484	6	22.414	19.067		.000
Covariate (pretest)	2.268	1	2.268	1.929	3.92	.167
Specialization	10.071	2	5.035	4.283	3.07	.015
Group	49.253	1	49.253	41.899	3.92	.000
Specialization X group	.746	2	.373	.317	3.07	.729
Error	179.860	153	1.176			
Corrected total	314.344	159				
Total	6627000	160				

$\rho > 0.05$

Table 7 shows that Fcal = .317 < F-table = 0.07 at 0.05 level of significance. Hence, the hypothesis is not rejected. Therefore, there is no significant difference between the posttest mean scores of student according to subject specialisation. All students were exposed to modelling approach during classroom interaction so area of specialisation has no effect.

Hypothesis 5: There is no significant difference between the post test mean scores of students' according to the teachers' qualification

Table 8: 4x2 ANCOVA of post test mean scores of students by teacher's qualification and treatment

Source	SS	df	MS	Fcal	Ftable	P
Corrected model	90.215	10	9.021	14.649	1.91	.000
Covariate (prettest)	6.557	1	6.557	10.647	3.92	.001
Qualification	49.359	4	12.340	20.037	2.45	.000
Group	4.511	1	4.511	7.326	3.92	.008
Qualification X Group	5.860	4	1.465	2.379	2.45	0.54
Error	91.760	149	.616			
Corrected total	181.975	159				
Total	9152.000	160				

$\rho > 0.05$

Table 8 shows the F-cal = 2.379 <F-table = 2.45, hence the null hypothesis is not rejected. It implies that there is no significant difference between the posttest mean scores of students according to teacher's qualification. However, the effect of qualification (f = 20 .037, P>0.05) and treatment (f = 7.326, P>0.05) on posttest mean scores of students is statistically significant at 0.05 level in each case.

Hypothesis 6: There is no significant difference between the post test mean scores of students' according to the teachers' teaching experience

Table 9: 4x2 ANCOVA of posttest mean scores of students by teacher's experience and treatment

Source	SS	df	MS	Fcal	Ftable	P
Corrected model	103.241	8	12.905	6.871	2.02	.000
Covariate (prettest)	1.031	1	1.031	.549	3.92	.460
Experience	90.436	3	30.145	16.050	2.68	.000
Group	8.221	1	8.221	4.377	3.92	.038
Experience X Group	8.218	3	2.739	1.459	2.68	.228
Error	283.603	151	1.878			
Corrected total	386.844	159				
Total	6087.000	160				

$\rho > 0.05$

Table 9 shows that F.cal (1.459) is less than F.table (2.68) at 0.05 level of significance. The null hypothesis is not rejected. It implies that there is no significant differences between the posttest mean scores of student according to teacher's experience. In contrast the main effect of teacher's experience (F = 16.050, P<0.05) and treatment (F = 4.377, P<0.05) of posttest mean scores of students is statistically significant at 0.05 level in each case.

Hypothesis 7: There is no significant relationship between the interactions of students using modeling approach and those without

Table 10: Shows the relationship between the students' interaction using modelling and non-modeling in the learning of Mathematics

S/N	Items	Modeling				Non-modeling				Phi	Sig
		SA	A	D	SD	SA	A	D	SD		
1.	Modeling approach create friendship	25	30	15	10	2	18	22	38	0.502	0.00
2.	I enjoyed myself when i interaction with my friends	38	17	22	3	3	14	24	39	0.618	0.00
3.	Item I have enough time to enjoy myself with my friends as we interact.	19	30	9	22	9	8	19	44	0.412	0.00

Table 10 shows the relationship in the interaction of students in Mathematics class. The phi-cal value of 0.502 > the table value was 0.00 at 0.05 level of significance in the interaction using modeling approach for item 4, while Phi-cal (0.618) for item 10 shows a great relation between innovation approach and interaction. Also, Phi-cal value for item 7 was found to be 0.412 while, the table value showed greater relation at 0.05 level of significance. Hence, there is a positive relationship between using modeling innovation and interaction. This means that modeling approach innovation has significant influence on the interaction of students in Mathematics.

Collation of responses of teacher during interview

1. The approach is good
2. The approach makes student to be happy
3. Students find the approach to be enjoyable
4. Approach is exciting
5. When I moved around during the lesson, students expressed themselves freely and boldly
6. Makes the students to solve Mathematics better etc

III. Discussion

The study examined teacher's innovation approach in the teaching of Mathematics. The results from tables 1, 2 and 3 revealed that there exist influence of model approach on the learning and attitude of Junior secondary school students towards Mathematics. The results further sho**w** that modeling approach influences the learning of Mathematics. This implies that there is strong influence of model on students' learning which also promotes interaction. The results agree with the findings of Gupta& Sharma (2004) and Schunk & Harson (2007) that found that peer model influence children's self efficiency and achievement and attitude. This was also in line with the submission of Roggers (1995); Manson 2001; Watanable (2006) and Popoola (2008) who investigated at different times that interaction method promote better learning and retain information longer for future use in related areas.

Also shown from tables 4, 6, 8 that there was no significant difference in the pretest means scores of experimental and control groups in Mathematics in male and female students and qualification of teachers who taught the students. These results agreed with the findings o Philip, Kristy, Margaret & Ruth (2001);Popoola (2007) and Canvendish (2009) who view that the presence of other individual, during learning make, better interaction and provide enjoyment, which entrance the learning of Mathematics. Table 5 and 7 showed a significance difference in the post test achievement mean scores of students using the approach in the experimental and control groups, according to teacher experience and the use of innovation these findings are in support of manson (2001), Lendson-Billings (1995); Carr (1989) Collins & Jones (2000) who at different studies found that students learn better when using instructional materials and when interacted by skillful teachers who encouraged better expression in learning.

These findings that affect students positively indicated that this practice is capable of not only receiving better results on students' learning in Mathematics but that teacher to be skillful and know how to direct learning for future use of the learner.

IV. Conclusion

From the findings of the study, it is obvious that a number of existing factors are needed for effective teaching and learning in Mathematics.

Skills is required of the teacher to direct the teaching activities to a positive learning while, much interaction and attitude are pre-requisite of better learning for future use in Mathematics.

The results as observed from the findings showed that innovation teaching in modelling form and performed the traditional classroom teaching. The impacts are found on both the individual and group. The use

of modelling satisfied the individual learning requirements and increases attitude and interaction levels among the students.

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