



## Research Article

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## Blended Collaborative Learning/Technology Interactive Strategy with Conventional Lecture Technique and its Effects on Students' Learning Outcomes in Mathematics

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**Abstract:** This study investigated the effects of blended collaborative learning/Technology interactive strategy with conventional techniques on students learning outcome in mathematics A non-randomized pretest posttest control group design was used for the study. A total of 188 senior secondary two (SS2) mathematics students were involved in the study. From the findings, it was observe that mathematics students blended collaborative performed significantly better than those taught by conventional lecture method.

The results also showed an insignificant difference existing between the achievement of male and female mathematics students taught with blended collaborative.

Conclusion from the findings led to the recommendation that blended collaboration collaborative/technology interactive strategy should be introduced in all the secondary schools in Nigeria to help boost students' performance.

**Keywords:** Leaning, Technology, Student, Mathematics and Strategy.

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## INTRODUCTION

Mathematics is the science of number, space and the language of science and technology. It is an essential requirement for every field of intellectual endeavour and human development. It is usefulness cut across the school curriculum (Akpan, 2007) mathematics is a school subject that influences all aspects of human life at different levels, for instance, mathematics is relevant in economics, politics, statistics, Accounts, Engineering to mention but a few.

The knowledge of mathematics is basic to science and technology. It is a pillar upon which scientific and technological advancement react (Popoola, 2008). It serves the unique premise of being the foundation upon which all forms of the scientific discoveries are built, Akinsola (1994) opined that most of the scientific and technological discoveries are found to be mathematically oriented. Well-equipped mathematically laboratory presently has enormous impact on science and the society. The influence may be silent and appear hidden but has shaped our world in many ways' mathematical ideas have helped to make possible the revolution in electronics, which has transformed the way we think and live today (Spencer, 2002).

The information technology (IT) of today has transformed the world into a global village. The advancement in science and technology is made possible by the numerous developments in pure mathematics. However, the need for sound knowledge of mathematics is no longer restricted to mathematicians, engineers and

physic. Biologists find statistics and biomathematics very useful in such topics as mended an genetics. In the field of Geography, the use of mathematics includes Map projections, statistic of settlement, patterns of villages and towns, analysis of surfaces shapes and network as well as prediction of population while Economics analysis cannot be completed without mathematical input.

In spite of all the advantages derived are the recognition given to mathematics as one of the core subjects at all levels of education and as a pivot of technological and economic development.

The poor performance of students in mathematics at all levels of education has been a matter of concern to the entire citizenry (Bamidele, 2002)

The concern is justified because of the place of mathematics in the academic future of students and technological advancement of the country.

Several scholars such as Akinsola (1994) at different times highlighted some contributing factors to students underachievement in mathematics to include among others, large class, anxiety, lack of preparation among candidates, poor understanding of mathematical language by both teachers and learners, overloaded mathematics contents, stereotype teaching method, inadequate number of qualified mathematics teacher poor mathematics classroom environment and gender associated problems

Researchers such as Kolawole (2017) at different times have also identified the source of

problems to include the use of lecture method which is characterized as monotonous in teaching the subject.

Iyang (2001) traced the origin of lecture method back to the middle ages. The ancient view of teaching was that the teacher knew everything and that the learner was blank. In the lecture method, the teacher would come to class pour out facts, may be pause a little while, for one or two questions at the end of his lesson. This method is the component method used at all levels of education.

For Johnson & Aragon (2003) posited that students' performance is directly improved by the quality of instructional design Chem (2009) suggested a modification of the instructional design strategy in order to improve quality of learning. Chan used a blended approach, combining objectivists and constructivist instructional strategy in her design of intensive summer online course. The study found that students had positive learning experiences and were highly satisfied with their learning outcome. In another study by Dean & Associates (2001) as reported in Holm (2011), research showed that providing online options in addition to traditional classroom environment actually increased what students learned. Yet, another study showed students interaction and satisfaction improved along with students learning more in subjects that incorporated blended learning (Holm, 2011).

Collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product (Beckman, 1990). Collaborative learning is based on the idea that learning is a naturally social act in which themselves. It is through the talk and hands-on that learning occurs.

In collaborative learnings, learning is an active process whereby learners assimilate the information and relate this new knowledge to a framework of prior knowledge.

Yusuf (2004) carried out an investigation unto the effects of Collaborative learning on a sample of 93 junior secondary student's performance in social studies. A quasi-experiment non-equivalent pre-test control group design of the form 2x2x3 factorial was adopted for the study. The findings showed that students taught using collaborative learning instructional strategy performed significantly better than their counterpart taught using the conventional instructional strategies the concluded the collaborative learning instructional strategy is one teaching method that consistently results in their achievement.

In a collaborative learning setting students have the opportunity to discuss with process, present and defend ideas, exchange diverse beliefs, question other conceptual frameworks. Collaborative learning according to (Lymna, 1981). Collaborative learning is

based on the idea that learning is naturally social act in which the participants among themselves. It is through the talk that learning occurs in the collaborative learning environment, the learners are challenged both socially and emotionally as they listen to different perspectives and are required to articulate and defend their ideas. In that respective the learners begin to create their own unique conceptual frameworks and not rely solely on an experts. This is an instruction that involves students working in terms to accomplish a common goal.

### Statement of the Problem

Many studies have been directed at finding out collaborative learning, technology interactive learning of effective mathematics teaching and learning at the secondary school level some of the problems identified for the poor performance of students in mathematics include inadequate professionally trained teaches, non-availability and initialization of resources and poor teaching methods.

Presently, the method adopted in teaching mathematics like any other science subject in schools is for a teacher to teach all the contents/topics in a particular class could there be any appreciable change in the achievement of students in mathematics if they are using collaborative learning.

What teaching method should be adopted in order to produce the desired aspects of learning outcomes in a classroom teaching?

### Purpose of the Study

The purpose of this study is to investigate the effect of blended learning approaches (cooperative/technology interaction) and conventional lecture method on learning outcome of senior secondary school students in mathematics.

This study also investigated the effect of blended approaches on students' academic outcomes in mathematics with respect to gender.

### Research Hypotheses

The following hypotheses were postulated and tested:

- **Ho1:** There is no significant difference between the achievement of mathematics students using the blended collaborative/technology interactive and conventional lecture strategy.
- **Ho2:** there is no significant difference between the achievement of male and female mathematics as students using the blended collaborative learning
- **Ho3:** There is no significant difference between the achievement of mathematics students with positive and negative attitude taught using blended collaborative learning

## METHODOLOGY

### Research design

The 2x2 quasi-experimental non-equivalent pre-test and post-test control design was employed in the study

### Population

The population of the study was made up of all the SS2 mathematics students in the 6 co-educational secondary schools in Ondo West Local Government Area of Ondo State. The size of the population was used to select schools from the population

### Sample and Sampling Technique

A total of one hundred and eighty-eight (188) mathematics students took part in the study mathematics students took part in the study. A criterion-sampling technique was used to select schools from the population.

### The Criteria are

- School that have at least three graduate mathematics teachers with at least three years of teaching experience.
- Schools that have mathematics instructional materials

### Instrumentation

The instruments used in gathering data for the study were developed-one as a pre-test and the other as a post test. The instruments were each a 40 item multiple choice pre and post mathematics achievement test respect (PEMAT and POMAT) respectively developed by the researchers based on an already developed table of specification

### Validity and Reliability of Instrument

The instruments were face and content validated by two experts in test construction and three experienced mathematics teachers to ensure represent activeness of the items based on the table of specification.

The instruments were trial tested to establish its reliability with 40 students in a school within the population but not used for the main study.

Kuder-Richardson formal 21 was used to establish the reliability of MAT and the result showed reliability coefficient of 0.90 while the reliability coefficient of MAT was 0.85 using cronbach alpha.

### Procedure

During the pre-treatment stage, the researcher having selected the schools visited the schools to discuss the purpose of the study with the principals and through them got in touch with the mathematics teachers and students in the schools for the administration of the pre-test.

During the treatment stage, students in experimental group one, were exposed to a mix of collaborative and technology assisted materials in an interactive manner. Students were first arranged in small groups of 7-8 members according to the number of computers available in the school with the research assistant, students embarked on interactive activities with the computers to view and discuss. The control group was taught the same topic using the conventional method where the students were taught through verbal explanation using no instructional material. The interaction between the teacher and the students was minimal

## RESULTS

### Hypothesis one (Ho1)

There is no significant difference between the achievement of mathematics students taught using the blended collaborative/technology interactive and conventional lecture strategy.

This analysis is as shown in Table 1

**Table 1.** One way Analysis of Covariance (ANCOVA) of post test scores of mathematics students taught using blended cooperative/technology interactive strategy and conventional Lecture method.

Source of Variation	Sum of Squares	Df	Mean Squares	F	Significance
Covariates	33, 616	1	33, 616	1.526	
Pre-test	33, 616	1	33.616	1.526	
Main effects	3908.34	1	3908.34	178.94	
Treatment	3908.34	1	3908.34		
Explained	11872.36	1	5936.18		
Residual	8516.57	185	46.04		
Total	20388.94	187	109.03		

Using pretest scores as covariates = significant at  $p < 0.05$  alpha level critical F-value at  $p < 0.05$  alpha level 3.89 as shown in Table 1, the calculate F-value of 84.90 is greater than the critical value F-value of 3.85. thus, the null hypothesis which stated that there is no significant difference between the achievement of mathematics students using the blended collaborative/technology

interactive and conventional lecture method was reject consequent upon the existence of significant difference in main effects, multiple classification Analysis (MCA) is consideral to determine the specific contribution of the levels of teaching strategies to the gain in students' achievement in Mathematics in Table 2

**Hypothesis 2**

There is no significant different between the achievement of male and female mathematics students

using the blended collaborative learning Analysis of covariance was carried out and the result presented in table 2

**Table Title is missing**

Source of variation	SS	DF	MS	F	Decision p<.05
Pretest	Missing	Missing	Missing	Missing	Missing
Main Effects	Missing	Missing	Missing	Missing	Missing
Explained	Missing	Missing	Missing	Missing	Missing
Residual	Missing	Missing	Missing	Missing	Missing
Total	Missing	Missing	Missing	Missing	Missing

Summary Analysis of Covariance mathematics Achievement scores of male and female students taught using blended cooperative interactive strategy.

**Table Title is missing**

Sources of variation	Sum of squares	Df	Mean squares	F	Sign
Covariantes	9.636	1	9.636	2.065	.143
Pre-test	9.636	1	9.636	2.065	.143
Main effects	1157.908	1	1157.908	226.969	.000
Gender	1157.908	1	1157.908	118.184	.000
Explained	1167.908	2	1167.908		
Residual	558.528	97	4.613		
Total	1639.470	99	15.436		

Significant at .05 level; alpha level critical f-value at p <.05 level 3.89

Table 2 shows that gender has a significant difference on students achievement scores f (919) = 226.969, p < .05 when exposed to the lecture learning strategy with male performing better (x=52.44) than their female counterparts (x=44.83)

**DISCUSSION**

The results of hypothesis one showed that a significant difference was found to exist between the achievements of mathematics students using the blended collaborative/technology interactive and conventional lecture method. The multiple classification analysis as shown in Table 1 indicated that mathematics students taught with collaborative achieved better than those taught by lecture method. This findings is in line with Arbaght (2008); Ranwanch (2011) Halm (2011); & Okoli & Egbunonu (2011) who all found that students taught using the blended approach had enhanced performance which also made them to have higher scores and outperformed their counterparts, collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves.

Smart & Capped (2006); & Akinbobola (2008) who all found that students taught using collaborative approach had enhanced performance which also made to have higher scores and outperformed their counterparts.

The results of hypothesis two indicated that there was no significant difference between the achievement of male and female mathematics students

taught using collaborative teaching. This may be so because any good teaching strategy adopted in the teaching of mathematics does not discriminate gender. Therefore, collaborative teaching is an adequate teaching strategy for boys and girls. This finding is in line with Akinbobola (2004) that there was no significant gender difference in the performance of students in physics when taught using advance organizers instructional strategy.

The results of hypothesis three indicated that there was no significant difference between the achievement of mathematics students with positive and negative attitude taught using collaborative teaching. This might be due to the fact that exposure to views of peers permits students to gain a mature level of understanding knowledge.

**CONCLUSION**

Based on the above findings the following conclusions have been reached

- Collaborative learning approach is more effective than the conventional learning methods
- It is also revealed that there is no significant difference in the performance of male and female taught with either the collaborative learning approach
- Mathematics students with positive attitude performed significantly better than those with negative attitude

### Recommendations

The findings of the study makes the researcher to recommend that students should not be limited to only conventional method of teaching, rather efforts should be made to incorporate the collaborative learning strategy. To improve the performance of both boys and girls, it is important that both sexes should be encourage to take mathematics more seriously and whatever strategy is needed to captures their attention should be used more mathematics teachers should be trained and employed to cope with the increase in population of students

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