Evaluating the Effectiveness of Team Teaching in Enhancing Learning Outcomes in Basic Technology in Ondo East Junior Secondary Schools

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Abstract
This study examined the evaluating the effectiveness of team teaching in enhancing learning outcomes in basic technology in Ondo East Junior Secondary Schools. Three research questions and three hypotheses served as the study's compass. The quasi-experimental design, which kept the students in their intact classes, involved 100 JSS II basic technology students from two sampled schools was used. The Basic Technology Achievement Test (BTAT), developed by the researcher, was employed in the investigation. The study questions were addressed using the mean, the hypotheses were examined using the t-test and the instrument was pre- and post-tested. The results demonstrated that students' proficiency with basic technology was significantly impacted by team instruction. Additionally, there was no evident difference in how gender affected pupils' proficiency in basic technology. The ministry of education and pertinent agencies should, as a matter of policy, assign teachers who specialize in various basic technology component areas to collaborate in teaching the subject in schools that offer basic technology. It was suggested that basic technology teachers should use the team-teaching approach to teach concepts in basic technology.

Keywords: *Basic Technology, Team teaching, Learning Outcomes, Technical Education, Junior Secondary School, Teacher.*

Introduction

Education relating to the workplace has existed for many years. Vocational and technical school graduates are officially prepared for the workforce, but the concept and status of vocational and

technical education vary across nations. In Nigeria, vocational and technical education is offered by technical colleges, polytechnics, post-secondary universities, and pre-vocational and vocational schools at both the primary and post-primary levels (Akpan, Usoro, Akpan, & Ekoro, 2010; National Commission for Colleges of Education [NCCE], 2020; Oviawe, Azman, Kiong, & Abilmazhinova, 2022). Vocational and technical education aims to develop the skills, abilities, attitudes, work habits, and appreciation necessary for meaningful and productive employment (Udo, 2004; Oviawe et al., 2022; Federal Government of Nigeria (FGN), 2014). At the post-primary level, pre-vocational subjects include business studies, home economics, practical agriculture, and basic technology (FGN, 2014).

A fundamental part of the junior secondary school curriculum, basic technology covers topics including metalworking, woodworking, electronics, ceramics, textiles, and technical drawing to assist pupils comprehend industrial and technological aspects of life (Obomanu, 2001). The subject equips students with informed consumption habits, guides career choices, and exposes them to the world of work. Unlike training for specific vocations, Basic Technology provides broad exposure to technology through investigative tasks, fostering positive attitudes towards science and industry (FGN, 2014). This aligns with Nigeria's educational goal of preparing individuals to adapt to change, engage with future developments, and contribute meaningfully to national progress. Through activities such as designing, testing, and evaluating products, students acquire a practical understanding of industrial processes while nurturing their interests and talents (Bamiro, Elekwa, & Anyabolu, 2010; Kaydonna & Abede, 2023).

Basic Technology introduces learners to technical knowledge in areas such as auto-mechanics, metalwork, and technical drawing, thereby laying a foundation for technological advancement in Nigeria. The effective teaching of the subject is therefore critical for achieving the national vision of technological development. Teaching itself is a complex process of imparting knowledge and skills through preparation, classroom interaction, and post-teaching evaluation (Oyekan, 2006; Okeke & Dikeocha, 2024). Approaches to teaching may be broadly categorized as teacher-centered where learners passively receive information or student-centered, which emphasizes active participation (Benderbal & Djedoui, 2024). Although no single method suits all contexts, a carefully chosen instructional approach enhances learning outcomes (Ndagana & Onifade, 2000). The traditional method of teaching, dominated by chalk-and-talk strategies, remains common in Nigeria (Nwagwu, Onwubuya, & Oko, 2022), innovative approaches such as team teaching are increasingly recommended. Team teaching involves collaboration among several teachers who jointly design learning activities, develop evaluation tools, and share responsibility for lesson delivery (Smith, Ralston, Naegele & Waggoner, 2020; Ajayi, Ajibade & Aniemeka, 2002; Nwagwu et al., 2022). This method offers diverse expertise, reduces workload, and allows for better student support through peer observation, evaluation, and differentiated group teaching. Although several studies have emphasized the importance of Basic Technology in equipping junior secondary school students with foundational technical knowledge and vocational orientation (Bamiro, Elekwa & Anyabolu, 2010; Oviawe et al., 2022), less attention has been given to the instructional methods that can enhance its effectiveness. Traditional teacher-centered approaches still dominate Nigerian classrooms, despite their limitations in fostering active learning (Nwagwu et al., 2022). Team teaching has been shown to improve learning outcomes in other contexts (Smith et al., 2020), but few empirical studies in Nigeria have specifically examined its effect on student achievement in Basic Technology at the junior secondary school level. Furthermore, in Ondo State where students' performance in science and technical subjects has been inconsistent the impact of team teaching on learning outcomes

remains underexplored.

Statement of Problem

The consistent underperformance of students in technical and vocational subjects at the junior secondary school level raises concerns about the effectiveness of current teaching methods. Basic Technology, a pre-vocational subject designed to build foundational skills for Nigeria's technological advancement, has not fully realized its objectives due in part to reliance on traditional teacher-centered methods. These methods often limit students' active participation, reduce exposure to diverse teaching expertise, and may hinder the development of practical and problem-solving skills. Team teaching has been identified as a strategy capable of addressing these challenges by pooling teachers' knowledge, sharing workload, and providing students with multiple perspectives. Despite its potential, little is known about the actual effect of team teaching on students' academic achievement in Basic Technology within the Nigerian context, particularly in Ondo East Local Government Area of Ondo State. This study therefore seeks to fill this gap by investigating the effect of team teaching on junior secondary school students' academic achievement in Basic Technology.

Purpose of Study

The purpose of this study was to evaluate the effectiveness of team teaching in enhancing learning outcomes in basic technology in Ondo East Junior Secondary Schools. Specifically, this study sought to find out whether team teaching can be beneficial to learning of basic technology in junior secondary schools.

Research Questions

In this study, answers were sought for the following research questions.

(1) What is the difference between the mean performances of students in basic technology when taught using team teaching approach and single teacher?

(2) Is there any effect of gender on learning of basic technology when taught using team teaching approach?

(3) Do male and female students perform differently when taught fundamental technologies by a single teacher?

Hypotheses

The following null hypotheses were formulated to guide the study at 0.05 level of significance.

HO_1: There is no significant difference between students' mean performance in basic technology when team taught and when taught by a single teacher.

HO_2: There is no significant difference between mean performance of male and female students' in basic technology when team taught.

HO_3: There is no significance difference between the mean performance of male and female students' mean performance in basic technology when taught by a single teacher.

Research Design

This study used a pre-test, post-test, and control group quasi-experimental research design. The researcher looked at how academic achievement was affected by two different teaching methods: team teaching and one-on-one instruction. With a non-randomized control group and non-equivalent groups, the design was exclusive. This resulted from the individuals' addition in

complete groups made up of both high and poor performers.

Population

All junior secondary school II pupils in the Ondo East Local Government Area of Ondo State, Nigeria, made up the study's population.

Sample and Sampling Technique

Schools were chosen for the study using a random selection approach. Two public secondary schools in the Ondo West Local Government Area were chosen at random for this study by balloting out of the thirty-two (32) that are currently in existence. The subjects came from the chosen schools in an entire group. Students at the sample schools stayed in their intact classrooms, whereas students from the selected schools were split into experimental and control groups at random.

Instrumentation

The "Basic Technology Achievement Test (BTAT)," which was created by the researcher and approved by the two technical education specialists at Emmanuel Alayande University of Education, Oyo, was the only tool utilized to gather data from the sample. There was only one right answer for each of the five possible answers on the test. Twenty junior secondary two students from a school that was not chosen for the study participated in a BTAT trial test to determine the instrument's reliability. The Spearman Brown formula and the split half reliability test were applied to the collected data. The instrument was considered adequately reliable for use in this investigation based on its reliability coefficient of 0.73.

Experimental Procedure

The researcher created five lesson plans covering four subjects from the Junior Secondary two third term basic technology curriculum guidelines. The experimental group received instruction employing the team-teaching approach, whereas the control group received instruction from a single teacher. Five weeks were selected for instruction. Following instruction from the researcher, the regular basic technology teachers at the chosen schools partook in the study. Prior to the start of treatment, the Basic Technology Achievement Test (BTAT) was given as a pretest, and the results were noted. A week following the conclusion of the treatment session, students were given a post-test based on the Basic Technology Achievement Test (BTAT), which included the same items as the pre-test but in a different succession. The students' scripts were marked and their scores recorded.

Data Analysis Technique

Data collected was statistically analyzed using mean and standard deviation to answer the three research questions. In testing the hypotheses, t-test was used to establish whether there was any significant difference at 0.05 significant level.

Results

The results are presented in relation to research questions and hypotheses.

Research Question1: What is the difference between the mean performances of students in basic technology when taught using team teaching approach and when taught using single teacher?

Table1: Pre-test and post-test performance of students in team teaching and individualistic teaching approaches.

Group	N	Pre-test Mean	Post-test Mean	Main Gain
Experimental	50	20.08	31.36	11.28
Control	50	18.08	25.98	7.9

Source: Field Work

The pre-test mean score of 20.08 for students taught utilizing a team-teaching strategy was higher than the mean score of 18.08 for students taught by a single teacher, as seen in table 1. Additionally, the data showed that the average post-test score for students taught basic technology by a team was 31.36, higher than the average score for students taught by a single teacher, which were 25.98. This recommends that students who were taught basic technology utilizing a collaborative teaching technique outperformed those who were taught by a single teacher.

Research Question 2: Is there any effect of gender on learning of basic technology when taught using team teaching approach?

Table 2: Male and female students' mean performance in basic technology when team taught.

Gender	N	Pre-test Mean	Post-test Mean	Mean Gain
Male	25	19.68	34.04	14.36
Female	25	20.48	28.68	8.2

Source: Field Work

According to table 2, the mean score of male students who received basic technology instruction using a team-teaching style was 19.68, which was fairly lower than the score of female students who received the same instruction (20.48). Moreover, the study shows that the average post-test score for male students taught basic technology by team teaching was 34.04, which was higher than the average score for female students taught through team teaching, which were 28.68. This reveals that male students who received instruction using a team-teaching style outperformed female classmate.

Research Question 3: Do male and female students perform differently when taught fundamental technologies by a single teacher?

Table 3: Male and female students mean performance in basic technology when taught by a single teacher

Gender	N	Pre-test Mean	Post-test Mean	Mean gain
Male	25	17.72	26.92	9.2
Female	25	19.28	25.04	5.76

Source: Field Work

Table 3 data analysis makes it obvious that male students' mean score of 17.72 and female students' mean score of 19.28 in a single teacher's basic technology subject. On the other hand,

male students in the single teacher group performed a bit better on the post-test of 26.92 than the female students in the same group of 25.04.

Hypothesis 1: There is no significant difference between students mean performance in basic technology when team taught and when taught by a single teacher.
Table 4: A comparison between post-test mean performance of Basic Technology students in team and individualistic teaching groups.

Group	N	M S	d f	t	Sig	Decision
Experimental **Control**	50 50	31.36 25.98	98	3.015	1.984	Reject H_0

Source: Field Work
The computed t-value (3.015) is showed in table 4 and is higher than the required t-value of 1.98 at $p<0.05$ with 98 degrees of freedom. Thus, the alternative hypothesis was accepted and the null hypothesis was rejected. The mean scores of the students under the two instructional modalities varied significantly.

Hypothesis 2: There is no significant difference between the mean performance of male and female students in basic technology when team taught.
Table 5: Comparison between post-test mean performance of male and female students in basic technology when taught using team teaching approach.

Gender	N	M S	df	t	Sig	Decision
Male **Female**	25 25	34.04 28.68	48	1.973	2.000	Accept H_0

Source: Field Work
Table 5 shows that the calculated t-value of 1.973 is less than the critical t-value of 2.00, the null hypothesis was accepted in the basis of no significant difference between the mean performance of male and female students when taught basic technology using team teaching method.

Hypothesis 3: There is no significant difference between the mean performance of male and female students in basic technology taught by a single teacher.
Table 6: Comparison between post-test mean performance of male and female students in basic technology when taught by a single teacher.

Gender	N	M S	d f	t	Sig	Decision
Male **Female**	25 25	26.92 25.04	48	0.845	2.000	Accept H_0

Source: Field Work
The computed t-value of 0.845 is less than its corresponding critical value of 2.00, as shown in table 6. Because there was no clear difference between the mean performance of male and

female students in a single teacher's basic technology class, the null hypothesis was accepted.

Findings of the Study

The results of the study are summarized as follows:

1. Students who received lessons in basic technology in a group setting outperformed those who received tutoring from a single teacher by a large margin.
2. Compared to male students in the single teacher group, male students in the team-teaching group had greater performance in basic technology.
3. When it came to basic technology, female students in the team-teaching group outperformed those in the single teacher group.
4. The mean performance of male and female students in basic technology did not significantly differ when taught using a team-teaching approach.
5. When taught by a single teacher, the mean performance of male and female students in basic technology did not differ significantly.

Discussion of Findings

The study findings demonstrated that there is a notable difference in the performance of male and female students taught by team teachers compared to those taught by single teacher. This result has built up the work of Jackson and Davies (2000), Rottier (2002), Karin (2000), Oyekan (2006) and Ajayi, Ajibade, and Aniemeka (2002), who have shown that team teaching promote high levels of professional development and improves school climate, both of which lead to improvements in student performance. The usefulness of team teaching over individualistic approaches has been confirmed by Whitefield (2000) and Washington (2001); Smith, Ralston, Naegele, and Waggoner (2020); and Nwagwu, Onwubuya, and Oko (2022), who reported that students' performance develops significantly when taught by a group of teachers as opposed to when taught by a single teacher. This means that the present generation of Basic Technology teachers in schools should identify the necessity of gathering to arrange and execute the subject's instruction utilizing the team-teaching methodology. The ministry of education and other relevant organizations must also provide for and encourage available technical teachers to use the team-teaching approach in basic technology. Compared to the single teacher approach, the team-teaching method offers higher growth benefits. Additionally, the mean performance of male and female students in basic technology when taught by a group of teachers and when taught by a single teacher did not vary significantly, according to the results. This suggests that in spite of whether they are taught by a single teacher or in a group, male students in basic technology do not outperform female students. The results of Nwoji (2000) were supported by the non-significant difference in the academic performance of male and female students in basic technology. The team-teaching method does not differentiate based on gender and is free of sex injustice. For this reason, it is suitable for both male and female students.

Conclusion

The findings of this study have provided convincing evidence that the team-teaching approach significantly enhances students' academic achievement in basic technology compared to the conventional single-teacher method. The improved performance observed among students taught by a team of teachers validates the claim of earlier researchers who emphasized the professional and instructive advantages of collaborative teaching strategies. Crucially, the study also found that there was no discernible difference between male and female students' academic

performance under the two teaching approaches. This shows that team teaching is reasonable and effective across gender lines, making it a gender-inclusive pedagogical method. In light of these findings, it is essential that basic technology teachers embrace the team-teaching method as a feasible means of improving instructional delivery and student outcomes. Furthermore, the Ministry of Education and other educational stakeholders should prioritize policy frameworks and capacity-building ideas that promote and support team teaching, mainly in technical and pre-vocational subjects. By controlling the strengths of many educators, schools can ensure more complete coverage of the basic technology curriculum and promote better learning experiences for all students.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Teachers of basic technology should use the team-teaching approach to teach concepts in basic technology.
2. As a matter of policy, the ministry of education and relevant organizations ought to assign teachers with know-how in various basic technology component areas to team up on teaching the topic at schools.
3. To inform technical teachers about the advantages of team-teaching methods, the state ministry of education should organize conferences and workshops for basic technology teachers.
4. For the topic to be taught in schools, the ministry of education should provide the necessary instructional materials, equipment, and basic technical amenities.
5. To handle the growing number of secondary school students, the government should utilize more skilled teachers of basic technology.

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