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Enhancing academic performance of basic technology students through differentiated instruction strategies in Junior Secondary Schools

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ABSTRACT

This research examined the enhancement of basic technology students' performance through the application of differentiated instruction strategies in Nigerian junior secondary schools. The study employed a pre-test and post-test non-equivalent control group quasi-experimental design, which is apt for estimating the causal effect of an intervention on a target group without the need for random assignment. The researchers allocated three schools with 130 students (64 males and 66 females) to the differentiated instruction group, and three schools with 140 students (72 males and 68 females) to the traditional teaching group. The study was guided by three null hypotheses and three research questions. Differentiated instruction was used for the experimental group, while the conventional method was used for the control group over a period of eight weeks. Data was collected using the Basic Technology Achievement Test, which has a KR-20 reliability coefficient of 0.85. The results indicated that the experimental group, taught using differentiated strategies, showed a significant improvement in basic technology compared to the control group. Moreover, male students excelled over their female peers when taught basic technology using a differentiated approach, although the difference between genders was not significant when taught with the same strategy. The study found that gender did not have a significant influence on students' performance in basic technology. Additionally, the interaction between the teaching method and gender did not significantly affect students' achievement in basic technology. The differentiated approach made the lessons more engaging and straightforward. The study recommends the use of differentiated strategies as an effective alternative to traditional teaching methods.

Keywords: Academic Achievement, Basic Technology, Differentiated Instruction, Junior Secondary Schools, Learning Strategies.

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INTRODUCTION

Education can be defined as the accumulation of life experiences that equip an individual to function effectively and find satisfaction in their existence. It empowers individuals to realize their full social and personal potential. This concept supports the theory that there is an inverse relationship between a country's income level and the quality of its education (Adeoye & Olabiyi, 2011). Globally, technological innovation continues to be a measure of a country's progress. in Technology education is not only crucial for individual survival, but it also plays a significant role in a country's technological and industrial advancement (Awofala et al., 2019). It is widely

recognized that technological literacy, which can be realized via Technical and Vocational Training, is essential for a country's mechanical survival. The Nigerian education system aims to foster critical thinking skills in individuals, enabling them to find solutions to regular issues and meaningfully and significantly contribute to the growth and development of Nigerian society. In Nigerian schools there are different subjects in the school's curriculum at the pre-tertiary level of education, these subjects have been meticulously designed to produce educational benefits when properly taught and understood, thereby reinforcing the healthy ojectives of education in Nigeria as outlined in the National Policy on Education (FRN, 2014). Basic technology is one of these subjects taught at the junior secondary level.

In Nigeria, basic technology is taught and implemented as a pre-vocational subject in junior secondary schools. The Basic Technology series for these schools is designed in line with the standards set by the Nigerian Educational Research and Development Council (NERDC). This series encompasses a variety of topics including synthetic and natural materials, wood, metals, polymers, ceramics, energy, and machines, all of which are essential for robust technological development. The newly introduced basic technology curriculum for the nine-year basic education programme in junior secondary schools aims to equip students with knowledge that prepares them for a productive and self-reliant life. Specifically, junior secondary education should offer students the chance to explore their own capabilities. Basic technology is a compulsory pre-vocational subject for all students in Nigeria. The primary goal is to introduce secondary school learners to the disciplines of science, engineering, and technology. The goal of the basic technology curriculum, which promote a pre-vocational focus on technology, fundamental technological literacy, and creativity, form the foundation for an individual's and a nation's economic sustainability (Ibiwumi A., 2011). Basic technology has laid the groundwork for vocational programmes that instruct individuals on how to be productive and make positive contributions to society (Adeoye & Olabiyi, 2011), stressed that basic technology enables students to explore various technological and technical topics, thereby facilitating informed career decisions and skill acquisition. The Federal Republic of Nigeria (2014) states that the goals of basic technology encompass providing a pre-vocational orientation for further technological training, fostering basic technological literacy for everyday life, and encouraging creativity.

The basic technology curriculum encompasses a variety of topics, including technical drawing, metalwork technology, woodwork technology, automobile technology, building technology, aspects of agricultural technology, information and communication technology, home economics, and material science. With the application of suitable teaching methods, students are expected to acquire exploratory knowledge and skills in these specified areas. Consequently, to enhance students' academic performance, it is necessary to employ effective teaching methods that positively impact the students (Winified, 2022). Learning basic technology primarily occurs

through expository and ineffective instruction in a structured classroom setting (Awofala et al., 2019). This implies that abilities, expertise, and attitudes are frequently learned and acquired through retention rather than true comprehension of the principles that underlie them. Nevertheless, a number of studies indicate that students perform badly in junior secondary school subjects, particularly technology-related subjects. (Adeoye & Olabiyi, 2011); Kareem & Ma'aji, 2011). It appears that the poor performance of basic technology is due to insufficient use of instructional strategies, and that the problem arises from traditional instruction techniques used by junior secondary school teachers. (Awofala, Arigbabu, and Awofala, 2013; Olabiyi, Aiyelaowo, and Keshinro, 2013; Olabiyi, 2022).

Advocates of quality education hold the view that significant changes within a school's fundamental curriculum and teaching methods result in tangible changes in students' outcomes (Awofala & Sopekan, 2013; Awofala, Olaoluwa, & Fatade, 2013). Unquestionably, many teachers in Nigeria might not be adequately professionally competent to teach in contemporary institutions as they lack the professional training required for modern constructivist teaching.

A large number of Nigerian teachers received their education in a traditional classroom setting where teachers were the authority figures and distributors of knowledge, and students were passive recipients of memorised content, leaving them incapable of attitudinalizing what they had learned. In the twenty-first century, learners should actively participate in the creation of knowledge by integrating new information and skills into their existing knowledge base. Supporting this notion, Tomlinson (2003) opines that learners ought to not be spoon-fed but rather encouraged to explore solutions on their own. Tomlinson also stated that a teacher's role is to develop or adapt the curriculum, teaching methods, materials, learning activities, and other necessities to ensure that student learning outcomes align with their needs, thereby stimulating, challenging, and guiding their thought process.

Differentiated instruction is an instructional technique in which teachers actively plan and modify lessons to meet their students' diverse learning needs (Sherman, 2008; Winified, 2022). It entails employing a variety of strategies to assist students with diverse learning styles, skills, and backgrounds. This technique can help to ensure that all students have equal access to the same curriculum and learning opportunities, as well as adequate support and challenge for each student's needs. As a result, individualization of instruction allows teachers to address the unique needs of all students in a classroom. Differentiated instruction is an instruction technique that is based on the believe that all students can learn and achieve, and that teachers can assists them by providing instruction tailored to their specific needs in order to improve their learning performance (Othman & Amiruddin, 2010).

Students' success in education pertains to the results of teaching efforts, showcasing the extent to which teachers, learners, or institutions have met their learning objectives. In the realm of

technology education, as articulated by Olabiyi (2022a students' performance in technology subjects reflects their learning outcomes, including the knowledge, skills, and principles acquired throughout their academic journey, within and beyond traditional classroom settings. Achievements in technical and vocational education encompass the learning outcomes tied to job-specific skills, cognitive aptitudes, knowledge, and concepts imparted to prepare individuals for effective engagement in a specific area of employment.

Academic achievement and psychomotor abilities, including recalling and remembering and focusing attention, make it critical to process information swiftly as well as reason globally and logically (Kaur & Sharma, 2021). Students learning performance increases, and their confidence in their abilities grows as they learn the specific learning skills required to process, understand, recall, and apply information. However, even the most effective learning efforts can be rendered ineffective if the learner does not apply what he or she has learned later. To apply what has been learned, it must be retained in the learner's mind and saved up in some way to be used when the need arises.

Demmart (2001) discovered that the quality of original instruction, reinforcement, students' ability to recall information, and their approach to learning, which may be either passive or active, all influence student achievement. As stated by Shrun and Glinson (2001), learning takes place more frequently whenever learners apply more attention and effort to the learning process, resulting in active learners. When students are passive learners, they do not learn or comprehend materials, which can lead to memorization. Gender cannot be overlooked while studying students learning achievement. In reality, gender differences in learning performance are an important concern for educators. Gender is the societal perception of being male (masculine) or female (feminine) in a community. Gender appears to contribute to performance in technological and career-related fields (Olabiyi & Awofala, 2019). As a result, the primary objectives of this study were to determine whether differentiated learning strategies had an important impact on students' basic technology achievement due to gender. In view of this, differentiated instruction could be used to properly structure curricular content to accommodate the major concepts of creativity and skill in order to maximise progress in students' achievement (Olabiyi, 2020; Schiefele & Csikszentmihalyi, 1995).

Statement of the Problem

Nowadays, educational institutions in Nigeria are more intellectually diverse. Most classrooms comprise students from both genders with varying academic levels, as well as learners who have a wide range of characteristics, clearly different practical experiences, and diverse backgrounds. These students undoubtedly learn and perform at varying levels of preparedness. The teacher-centered approach is the most commonly used of instruction, in which the teacher takes an active role and presents a topic to the entire class, while the students' primary function is to listen. This

method ignores student diversity and prevent students from participating actively in the classroom, affecting their learning performance (Tomlinson, 1995). Basic technology as a subject requires a student-centered classroom environment in which students are able to share ideas with each other while the teacher demonstrate practical examples to the students. Using only one basic teaching style in a classroom with students of varying learning abilities will be ineffective. Basic technology shoulb be taught in a way that all students are able to comprehend. Differentiated instruction in a basic technology classroom would allow students to participate actively in the classroom, provide them with broad understanding of the subject, and ensure that all students to be fully engaged in all learning activities (Bipp, Steinmayr & Spinath, 2012; Tomlinson, 2003).

Research Questions

The study addressed three research questions, which are listed below.

1. How does treatment (differentiated instruction strategy compared to traditional instruction technique) affect students' basic technology achievement?
2. How does gender affect student's achievement in basic technology?
3. What impact does the combination of treatment methods (differentiated instruction strategy and conventional teaching method) and gender (male and female) have on students' fundamental technology performance?

Hypotheses

The study was guided by the following null hypotheses, tested at a significance level of .05.

1. H_{O1}: The primary impact of treatment (differentiated instruction and conventional teaching method) on students' performance in woodwork technology is not statistically significant.
2. H_{O2}: Gender does not have a significant impact on students' basic technology achievement.
3. H_{O3}: There is no significant interaction effect between treatment and gender on students' achievement in basic technology.

METHOD

Research Design

The study employed a quasi-experimental research design with pre-test, post-test, and non-equivalent control groups. A quasi-experimental study cannot be carried out with participants assigned to treatments at random (Nworgu, 2015). As a result, intact classes were arbitrarily assigned to the control and experimental groups. This approach was taken to avoid disrupting participants' school schedules and routine academic classes. A 2 x 2 factorial matrix with a quasi-

experimental design was used to compare treatment scores (at two levels) and gender scores (at two levels). The study's structure is shown below:

GP_1	O_1 X_1 O_2	X_1gain = $O_2 - O_1$	O_1O_3 pre-tests
GP_2	O_3 C O_4	C gain = $O_4 - O_3$	O_2O_4 post-tests

Where X_1 represents differentiated instruction strategy and C represents conventional method. Analysis of Covariance statistic, the mean difference scores between O_1 and O_2 and O_3 and O_4 were tested for statistical significance.

Participants

The study involved 270 junior secondary school second-year basic technology students (136 males and 134 females) the sampling technique employed was simple random to select one intact class from each of three streams of six equivalent coeducational secondary schools located in different parts of Lagos, Nigeria. Three schools with 130 students (64 men and 66 females) was randomly assigned to the differentiated learning technique and three schools with 140 students (72 males and 68 females) to the traditional teaching method.

Instrumentation

As a pretest and posttest, the researcher used Basic Technology Achievement Test (BTAT) was developed it was made up of 40 multiple choice question objective item alongside the answers ranging from A to D adapted from Basic Education Certificate Examination (BECE) and Basic Technology past questions of National Examination Council (NECO) in basic technology and examined topics related to first aid (materials and application of first aid), materials and their common uses (wood, metal, plastics, ceramic/glass, rubber), geometrical construction (lines, bisection of lines, angles, triangles, circles). The topics in question were selected since Nigeria students scored poorly in these subjects in school. The initial 50 BTAT items underwent face and content validation by three technology education experts at the University of Lagos, Akoka, Lagos, Nigeria. This validation process involved aligning the BTAT items with relevant topics and course content, refining language, and ensuring suitability for the target student population. Following expert feedback, five items were eliminated. The face-validated BTAT was then evaluated for difficulty index and discrimination power. Items meeting criteria of a difficulty index between 0.4-0.6, discrimination power of 0.2 or higher, and a negative distractor index were retained (Olabiyi & Awofala, 2019). This resulted in a final set of 40 BTAT items, which underwent pilot testing at a SPED International Secondary School in Oyo State. One point was assigned to each item on the BTAT, with a maximum of 40 possible. Kuder-Richardson The BTAT dependability coefficient was calculated using 20 formulas, yielding a value of 0.85. The BTAT concentrated on the first three levels of the Bloom taxonomy of the cognitive domain

(knowledge, comprehension, and application), referred to as the lower-order cognitive domain in the requirements table.

Table 1.Test Item Specifications in Basic Technology on BTAT

S/N	Topics	Levels of cognitive domain			
		Knowledge	Comprehension	Application	Total
1	First aid, materials and application	1	2	2	5
2	Wood and metal types and their uses	1	2	2	5
3	Plastics, rubber types and their uses	1	2	2	5
4	Ceramics/glass types and their uses	1	2	2	5
5	Lines, angles and their construction	1	2	2	5
6	Triangles, types and construction	1	2	2	5
7	Quadrilaterals types and construction	1	2	2	5
8	Circles construction and parts	1	2	2	5
	Total	08	16	16	40

Researchers developed two sets of plans for lessons according to the study topic identified in the specification table. Each lesson plan contains eight lessons that can be instructed over eight weeks, with every lesson lasting one hour and twenty minutes. One lesson was developed using differentiated learning strategies and was used to instruct an experimental group, while the other lesson plan was developed based on conventional methods employed to teach control group students and was developed with traditional teaching methods in mind. The experimental group's teachers were trained for one week to ensure the accuracy of the treatment, and the experiment was conducted during regular school hours. BTAT was given to both groups as a pre-test before training began on the first day of the trial. A pre-test determines students' knowledge of a topic before it is taught. Students in the experimental group take a pre-test to determine their learning style and IQ preference.

The data gathered was used to influence instructional decisions about student strengths and needs, as well as to identify flexible grouping patterns and whether students were prepared for advanced education. Flexible grouping entailed assigning students to skill work based on readiness rather than the assumption that all students required the same activity, drawing, computation skill, or writing assignment, among others. It is important to note that the grouping is flexible. In order to captalise on student' strengths and differentiate individuals based on learning profiles, interest and readiness levels. (Tomlinson, 1995; 2003). The experimental group consisted of 130 students, organized into teams of ten individuals each. These teams were intentionally diverse, comprising both high- and low-ability students, an uneven distribution of boys and girls, and students with various learning methods and intelligence preferences.

The experimental group represented a wide range of important learning styles, and each team was led by a teacher who provided instruction in a particular section of the classroom. Groups are

instructed by revolving around work stations or centres in their designated classroom areas. After working with the same lesson unit, however focusing on different skills based on their interest, both the experimental and control groups were given eight weeks to implement the lesson plan. To avoid the halo effect, the items of the BTAT were re-ordered shortly after treatment, and the re-ordered BTAT was given as post-test to both experimental and control group, the control group was taught using the conventional method with the researcher presenting the information aout the topics to the entire class, whereas learners paid attention and complete the task given after the end of the lesson. The experimental and control groups were taught using the same materials for eight weeks. The BTAT items were rearranged at the end of the treatment session in order to prevent the halo effect of overfamiliarity, and both the experimental and control groups received a post-test. Each test lasted 60 minutes and was scored using the provided answer sheet. Each question received one mark, for a total of 40 points. The effectiveness of the instructional strategies employed in the study was evaluated by comparing the scores of both groups. Consistency was maintained in the administration conditions for both the pre-test and post-test across all institutions.

RESULTS AND DISCUSSION

Research Question One: How does treatment (differentiated instruction learning strategy compared to traditional teaching technique) affect students' basic technology achievement?

Null Hypothesis One: The primary impact of the treatment (involving differentiated instruction learning strategy and conventional teaching method) on students' fundamental technology performance is found to be insignificant. Table 2 presents the statistical comparison of pre-treatment and post-treatment achievement scores between the control and experimental groups, categorized by gender.

Table 2. Results of statistical analysis of pre-treatment and post-treatment achievement scores based on gender

Treatment	N	Gender	Pre-test		Post-test		Mean
			Mean	SD	Mean	SD	difference
Differentiated learning	64	Male	31.81	10.89	48.52	6.02	16.71
Instruction	66	Female	33.18	10.40	48.13	5.82	14.95
	130	Total	32.51	10.63	48.33	5.90	15.81
Conventional Method	72	Male	30.93	11.06	33.79	10.04	2.86
	68	Female	33.59	11.38	36.21	11.96	2.62
	140	Total	32.22	11.25	34.96	11.04	2.74
Total	136	Male	31.34	10.95	40.69	11.16	9.35
	134	Female	33.39	10.87	42.07	11.16	8.68
	270	Total	32.36	10.93	41.38	11.16	9.02

Tables 2 and 3 show the responses to the first research question and the first null hypothesis. Table 2 illustrates that the experimental group, instructed in basic technology through a differentiated instruction strategy, exhibited a pre-test mean of 32.51 and a standard deviation (SD) of 10.63, with a post-test mean of 48.33 and an SD of 5.90. This yielded a mean difference of 15.81 following basic technology learning via differentiated instruction. Conversely, the control group, receiving basic technology education through traditional teaching methods, displayed a pre-test mean of 32.22 and an SD of 10.63, along with a post-test mean of 34.96 and an SD of 11.04, resulting in a mean difference of 2.74. These findings indicate that the experimental group employing differentiated instruction outperformed the control group, which adhered to conventional teaching practices. As a result, conventional methods were found to be less effective.

Upon a brief examination of the post-treatment achievement scores of both the experimental and control groups using analysis of covariance, as depicted in Table 3, there is a noteworthy disparity in means between the two groups (F (1, 249) = 433.25, p = 0.000, 2 p = 0.64). The partial eta squared, as reported by Awofala, Olabiyi, Awofala, Arigbabu, Fatade, & Udeani (2019), at 0.639, indicates that the treatment alone accounted for 63.9% of the variance in basic technology achievement. This outcome underscores the significant impact of treatment on basic technology proficiency

(Cohen, 1988; Sherman, 2014). As a result, it was concluded that the differentiated learning group had a significant treatment effect on students' achievement in basic technology.

Table 3. *Summary of Analysis of Covariance of Achievement in Basic Technology Scores by Treatment and Gender*

Source	Type III Sum of Squares	Df	Mean Square	F	Sig	Partial Eta Squared
Corrected model	2489.880a	4	6222.470	249.397	.000	.803
Intercept	9821.18	1	9821.187	393.633	.000	.616
Pre-test	13552.279	1	13552.279	543.175	.000	.689
Treatment	10809.587	1	10809.587	433.248	.000	.639
Gender	7.802	1	7.082	.313	.577	.001
Treatment ×Gender	58.110	1	58.110	2.329	.128	.009
Error	6112.776	245	24.950			
Total	458996.000	250				
Corrected Total	31002.656	249				

a. R Squared = .803 (Adjusted R Squared = .800)

Research Question Two: How does gender affect students' achievement in basic technology?

Research Hypothesis Two: Gender does not have significant impact on students' basic technology achievement .

Tables 2 and 3 outline the findings related to the second research question and the evaluation of the second null hypothesis. Male students undergoing basic technology instruction

showed improvement from a pre-test mean score of 31.34 and a standard deviation (SD) of 10.95 to a post-test mean score of 40.69 and an SD of 11.16, resulting in a mean difference of 9.35, as presented in Table 2. Conversely, female students receiving basic technology education had a pre-test mean score of 33.39 with an SD of 10.87 and a post-test mean score of 42.07 with an SD of 11.16, resulting in a mean difference of 8.68. Post-test outcomes suggest that female students who received basic technology instruction exhibited slightly superior performance compared to their male counterparts. Hence, there may persist a marginal gender discrepancy favoring female students in basic technology achievement. However, a detailed analysis of post-treatment achievement scores for both genders, as depicted in Table 3, revealed no statistically significant distinction between male and female groups ($F(1, 249) = 0.31$, $p = 0.58$, $2\ p = 0.001$). Consequently, the study concluded that gender did not exert a significant primary influence on students' attainment in basic technology.

Research Question Three: How does the combined impact of treatment (utilizing differentiated instruction strategy and conventional teaching method) and gender (male and female) influence students' performance in basic technology?

Research Hypothesis Three: The combined influence of treatment and gender on students' achievement in basic technology is not statistically significant.

The responses to Research Question Three and the testing of Null Hypothesis Three are presented in Tables 2 and 3, respectively. Male students exposed to basic technology instruction via a differentiated learning approach displayed a pre-test mean score of 31.81 with a standard deviation (SD) of 10.89 and a post-test mean score of 48.53 with an SD of 6.92, resulting in a mean difference of 6.71. Female students exhibited a pre-test mean score of 33.18 with an SD of 5.82, yielding a mean difference of 14.95. Conversely, male students taught basic technology using conventional methods had a pre-test mean score of 30.93 and an SD of 11.06, while female students had a pre-test mean score of 33.79 and an SD of 11.06, resulting in a mean difference of 2.86. Additionally, female students receiving basic technology instruction through conventional methods recorded a pre-test mean score of 33.59 and an SD of 11.38, and a post-test mean score of 36.21 with an SD of 11.96, yielding a mean difference of 2.62. These findings indicate that both genders demonstrated improved performance when taught basic technology using differentiated learning strategies compared to conventional teaching methods. This suggests that both differentiated learning and conventional instruction may be effective in narrowing the gender gap in basic technology achievement. Further analysis of students' post-treatment achievement scores by treatment and gender using analysis of covariance, as illustrated in Table 3, revealed that the interaction effect of treatment and gender was not significant ($F(1, 249) = 2.33$, $p = 0.13$, $2\ p = 0.009$). Consequently, the interaction effect of treatment and gender on students' basic technology achievement was deemed statistically insignificant.

Table 3 shows that treatment had a significant main effect on students' achievement in basic technology, resulting in 63.9% of the differences in students' achievement. The findings indicate that using a differentiated learning strategy to teach basic technology improves student performance significantly, when compared to conventional teaching methods. This finding supports previous research. (Awofala & Nneji, 2011; Olabiyi, 2022; Olabiyi, 2021; Olabiyi & Awofala, 2019; Awofala, 2011; Tomlinson & Allan, 2000; Adeoye, 2015; Olatoye, Aderogba, & Aanu, 2011). Previous research (Olabiyi & Awofala, 2019) has criticised the convention methods of instruction for overemphasising the role of the instructor in the classroom and a lack of student participation, which may have detrimental effects on students' basic technology performance (Awofala, 2011; Hill. & Dworet, 2009)

The differentiated learning strategy outperformed conventional teaching method in terms of retaining and enhancing students' basic technology performance. This learner-centered approach enabled students to recognised and value diversity in their backgrounds, abilities, and interests, fostering a sense of acceptance, appreciation and valued in the classroom. This not only boosts students' self-esteem but also improves their academic performance. Instructors feel confident and fulfilled when they see their students' progress and success and succed gives a teacher a sense of confidence and fulfilment (Tomlinson, 2019; Tomlinson, 2000), this add to their success in teaching basic technology. This agrees with Slavin's (1985, 1995) assertion that differentiated learning strategies are not only motivate students but also increase student's engagement. When students have more learning content options, they perform better. According to Slavin, the effectiveness of a differentiated learning strategy is based on its ability to boost student and teacher confidence. This is because differentiated learning allows students to learn at their own pace and level, resulting in higher performance. (Osuafor & Okigbo, 2013; Tomlinson & Allan, 2000; Tomlinson, 1995).

The study's findings are consistent with previous investigations, as the arrangement of differentiated groups encourages encouragement and social interaction among students. When students have more options for learning material, they take more responsibile for their own training. Students, on the other hand, believed that differentiated learning strategies increased instruction satisfaction, faster learning, decrease memorization and regurgitation of information, and increased learning engagement. According to reports, differentiated instruction in classrooms results to fewer disciplinary issues. Differentiated instruction engages students' intellectual and emotional abilities while increasing classroom engagement, discouraging students from avoiding responsibility, peer teaching allow people to learn more quickly, effectively, and efficiently.

The absence of a notable central impact of gender on students' attainment in basic technology (as depicted in Table 3) aligns with previous findings in mathematics, technology, and science (Olabiyi & Awofala, 2019; Olabiyi, 2022; Awofala & Anyikwa, 2014) where gender

discrepancies in student learning outcomes were not statistically significant. This lack of a statistically significant gender disparity in basic technology achievement challenges longstanding assumptions among researchers (Olabiyi, 2022a; Awofala, 2008) regarding the prevalence of gender stereotypes in Nigerian educational settings. Gender disparities in learning outcomes, in view of Schiefele and Csikszentmihalyli (1995), differences in learning outcomes based on gender are influenced by individual perceptions of abilities and societal gender role assignments. The gender-related findings of the current study suggest that both male and female students have similar experiences and exposures, both within and outside the school environment.

The absence of a significant interaction between treatment and gender regarding students' performance in basic technology in the present study echoed findings from prior research (Ojaleye & Awofala, 2018; Förster, Kawohl, & Souvignier, 2018) indicating that gender did not appear to influence outcomes when interacting with teaching strategies. This indicates that the treatment conditions in this study did not exhibit bias based on gender. Arshad and Khan (2018) noted a significant discrepancy in biology achievement between genders when employing a differentiated learning strategy. However, in another study, Adeyemi (2008) observed no statistically significant gender difference in social studies achievement among students exposed to differentiated learning strategies. Similarly, Osuafor and Okigbo (2013) and Wu (2013) found no significant gender disparity in mathematics achievement among students exposed to differentiated learning strategies. The current study's results show that differentiated learning strategies are an effective substitute for traditional teaching methods for improving learning and bridging gender differences in basic technology learning. This finding indicate that differentiated instruction is an effective teaching method for improving male and female students' learning performance by empowering them to take greater responsibility for their own learning. Teachers could use this strategy to tailor instruction to equally genders.

CONCLUSION

This study employed quantitative research to look into how to differentiated instruction and learning methods can help basic technology students in junior secondary school achieve better result in Lagos State, Nigeria. Gender was also considered as a moderator variable within the dependent measure. Results revealed that differentiated learning strategies performed better than traditional teaching methods in terms of enhancing and sustaining students' basic technology. Furthermore, the research found that gender had no significant effect on students' achievement in basic technology. While a differentiated learning strategy is used to teach basic technology, students of both gender perform better. As a result, differentiated learning strategy appeared as an acceptable substitute to conventional teaching methods during basic technology instruction in Nigerian junior secondary schools. The research concluded that implementing a differentiated

approach to learning to teach basic technology in Nigerian junior secondary schools will certainly not just make students feel accepted, appreciated, and valued in the classroom, but it would also boost students' and teachers' confidence because diverse learning allows students to work at their own pace and level and demonstrate their comprehension in a variety of ways. However, it will improve students' self-esteem and performance in basic technology exams both internal and public.

Following the findings of this study, the following recommendations were made:

1. To improve academic achievement in Nigerian schools, basic technology teachers should be familiar with differentiated learning strategies.
2. It's crucial for students to feel motivated to actively partake in classroom activities, interact openly with both teachers and peers, fostering social creativity, and enhancing their academic prowess in basic technology.
3. The Lagos State Ministry of Education, representing the government, ought to support teachers by organizing seminars and training sessions focused on differentiated learning strategies.

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