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COMPARATIVE EFFECT OF CONSTRUCTIVIST AND CONNECTIVIST TEACHING METHODS ON STUDENTS' ACHIEVEMENT AND RETENTION IN MECHANICAL CRAFT PRACTICE IN GOVERNMENT TECHNICAL COLLEGES IN LAGOS STATE, NIGERIA

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Abstract

This study investigated the comparative effects of constructivist and connectivist teaching methods on students' achievement and retention in Mechanical Craft Practice in Government Technical Colleges in Lagos State, Nigeria. A quasi-experimental research design was adopted, using two intact classes as study groups. Two research questions were posed to guide the study, and two hypotheses were formulated and tested at the 0.05 level of significance. Data were collected using the Mechanical Craft Practice Achievement Test (MECPAT), which was validated by three experts and found to have a reliability coefficient of 0.81 using the test-retest method. The sample comprised seventy-five (75) National Technical Certificate (NTC) Year II students drawn from two government technical colleges: forty-five (45) students from Government Technical College (GTC), Ikorodu, were taught using the constructivist and connectivist teaching methods, while thirty (30) students from Government Technical College (GTC), Ado Soba, were taught using the traditional demonstration method. Data collected were analyzed using mean and standard deviation to answer the research questions, while ANCOVA was used to test the hypotheses. The results showed that the constructivist and connectivist teaching methods had significant positive effects on students' achievement and retention compared to the traditional demonstration method. A significant difference was found between the mean scores of the experimental and control groups in both academic achievement and retention. Based on these findings, it was recommended that

constructivist and connectivist teaching methods should be adopted for teaching Mechanical Craft Practice to enhance students' knowledge, mastery, and retention in Government technical colleges in Lagos State, Nigeria

Keywords: Technical College, constructivist, connectivist, achievement, mechanical craft Practice, retention.

INTRODUCTION

Technical and Vocational Education and Training (TVET) play a crucial role in preparing students with the practical skills they need to thrive in today's workforce (Okoye and Okwelle, 2013). Mechanical Craft Practice is one of the key trade subjects offered in Nigerian technical colleges, aimed at equipping learners with hands-on skills relevant to both the industrial and informal sectors (NBTE, 2014). However, many students continue to perform poorly and struggle to master practical mechanical craft skills, largely because traditional, teacher-centered teaching methods often do not encourage practical skills, critical thinking, or problem-solving abilities (Ayonmike, Okwelle, and Okeke, 2015). However, studies have shown that students' achievement in Mechanical Craft Practice is still below expectations, raising questions about the effectiveness of the current teaching methods (Adeyemi and Fashola, 2020). In many TVET classrooms in Nigeria, traditional teacher-centered approaches remain the norm, often leading to passive learning and rote memorization (Lawal, 2022). As a result, scholars have called for a shift towards learner-centered methods, such as constructivist and connectivist approaches, which encourage active participation, collaboration, and learning in real-world contexts (Siemens, 2005; Jonassen, 1999).

Technical colleges in Nigeria play a vital role in the Nation's Technical and Vocational Education and Training (TVET) system. They are designed to provide students with the practical skills and theoretical knowledge they need for meaningful employment and self-reliance. In Lagos State, these technical colleges help bridge the gap between general education and specialized skills demanded by various industries. They are overseen by the National Board for Technical Education (NBTE) and the Lagos State Technical and Vocational Education Board (LASTVEB), which ensure that the training meets national occupational standards (NBTE, 2025).

Constructivist teaching is based on the idea that learners build their own understanding through hands-on experiences (Piaget, 1972; Vygotsky, 1978). Research has shown that constructivist strategies like problem-based learning, group projects, and real-world tasks can strengthen students' understanding of concepts and improve their problem-solving skills in technical subjects (Aina and Akinbobola, 2017). Connectivism, introduced by Siemens (2005), views knowledge as existing within networks, with learning happening through making connections between information sources. This approach highlights the role of digital tools, online communities, and social networks in sharing and creating knowledge (Downes, 2007). Studies have found that connectivist methods help students develop digital skills, become more self-directed, and achieve better results in technical education (Chigona and Chigona, 2010).

Constructivist and Connectivist teaching methods provide learner-centered alternatives that focus on active participation, collaboration, and the use of digital networks to build knowledge together (Siemens, 2005; Fosnot, 2013). While constructivism encourages

students to actively construct knowledge through hands-on experience, connectivism highlights the importance of technology and social connections in today's learning environment (Downes, 2007). Bringing these instructional methods into mechanical craft instruction could help students develop stronger practical skills and achieve better academic results by promoting deeper understanding and real-world application. Okoye and Okechukwu (2020) found that constructivist approaches are effective for promoting deep understanding, while connectivist approaches make it easier for students to access diverse information and solve problems collaboratively. This suggests that the success of each method may depend on the learning environment and available technology. To enhance students' achievement, there is growing interest in innovative teaching methods such as constructivism, which encourages learners to build knowledge through active, practical engagement, and connectivism, which leverages digital tools and networks for collaborative learning (Okoye and Okwelle, 2013). Exploring how these methods influence students' performance in Mechanical Craft Practice can help improve teaching effectiveness and better prepare students for today's dynamic mechanical and manufacturing industries.

Achievement can be defined as any effort of significance and value to a specific goal or program that, although challenging, is accomplished through knowledge, skills, and experience. Anekwe, in Adejoh (2015), described achievement as something attained through effort, skill, practice, and perseverance. Uwalaka and Offorma (2015) described achievement as something valuable yet difficult, which is completed. Achievement reflects the ability to function effectively and to respond accurately and competently to a given task. In essence, to achieve is to accomplish a task skillfully. It represents the level of success attained in carrying out a task. Academic achievement, in particular, is the result of an instructional process. Students' achievement in mechanical craft practice is often judged by how well they can demonstrate practical skills, apply theoretical knowledge, and solve real-world mechanical problems (NBTE, 2014).

Mechanical Craft Practice is one of the key trades taught in these technical colleges, showing Lagos State's commitment to producing skilled workers for the mechanical and manufacturing sectors. The programme combines classroom lessons with extensive hands-on training in workshops. Students learn about basic bench work, fitting, machining, metal fabrication, machine maintenance, and how to read engineering drawings (NBTE, 2018; Okolie and Ogbaekirigwe, 2020). Through this training, students develop skills in using hand tools, power machines, and precision instruments. Well-equipped workshops give them valuable practical experience that mirrors real work situations. The programme also focuses on problem-solving, safety, and applying scientific principles to mechanical tasks (Okoye and Okwelle, 2013). This practical approach supports national goals of improving employability and strengthening the local economy by producing technicians who can install, maintain, and repair mechanical systems in industries like manufacturing, construction, and transportation (NBTE, 2018).

According to NBTE (2014), on completion of the welding craft module in technical college, the students should be able to:

1. Understanding Intermediate bench work (fitting, filing, chiseling);
2. Understanding Intermediate machining operations (turning, drilling, shaping);
3. Assembly and disassembly of mechanical components; and
4. Identify Simple maintenance and repair of mechanical devices.

The understanding and mastery of the mechanical craft course outlines mentioned above depend largely on the effectiveness of the teaching methods used. To ensure learning is concrete and efficient, teachers must use a variety of teaching methods. Therefore, a good teacher should be versatile and skilled in using different instructional approaches during the teaching and learning process (Dorgu, 2015). However, despite the need for diverse methods, many teachers in technical colleges still rely heavily on a single approach, most commonly the traditional lecture method, even with the advent of digital instructional methods. According to Lkama (2019), the traditional demonstration method involves presenting factual information, principles, and theories to an audience without necessarily ensuring that learners fully grasp the material; instead, students are expected to expand on these ideas independently through personal study and research. In essence, the traditional demonstration method is one in which the teacher or another knowledgeable person delivers information to students with minimal or no student participation. Learners are mainly required to listen and absorb the material, which is why this method is often described as teacher-centered (Okoro, 1993). Put simply, it is a teaching method where an instructor who possesses expertise on a particular topic verbally conveys all relevant information to students. During a typical traditional demonstration method, the instructor stands before the class and presents information for students to learn (Kelley, 2018).

Using constructivist and connectivist teaching methods, technical colleges can help mechanical craft students gain not just practical skills but also the confidence to think critically, work well with others, and keep learning in our fast-changing, technology-driven world. This shift is essential for producing skilled, innovative, and productive experts in mechanical craft who can meet the demands of today's industry. According to Ayonmike et al. (2015), outdated teaching methods and a lack of modern instructional resources are major reasons why many students struggle with practical skills. To tackle this challenge, studies like Aina and Adebowale (2021) have recommended adopting learner-centered teaching methods and incorporating digital tools into mechanical craft instruction. Although there has been a global shift towards active learning, few studies in Nigeria have explored how these modern teaching methods impact technical college students, especially in hands-on subjects like mechanical craft (Aina and Adebowale, 2021).

The retention ability of students often depends on how actively they engage with learning materials and the extent to which they connect new knowledge to existing experiences and networks. Constructivist teaching methods emphasize active, student-centered learning where learners build their own understanding through hands-on activities and problem-solving tasks (Piaget, 1970; Fosnot, 2013). Connectivism, a more recent theory, extends this by focusing on learning as a process of building and navigating networks of information, especially through digital technologies (Siemens, 2005). According to Okoye, Agbejoye, and Obe (2024), retention scores indicate the percentage or degree of a skill that is remembered or recalled over time. Retention is usually measured alongside academic achievement and reflects how much a learner still knows about a subject after a certain period. In this way, retention plays an important role in the development of knowledge using digital tools and promotes a better long-term retention because the students are not passive but active participants. This study, therefore, investigates how constructivist and connectivist teaching methods affect students' achievement and retention in mechanical Craft Practice in government technical colleges in Lagos State.

Statement of the Problem

Mechanical Craft Practice is crucial for developing a skilled workforce and supporting national industrial growth. Yet, over the past four years, students' performance in the NABTEB National Technical Certificate (NTC) Mechanical Craft Practice examination has remained worryingly low (Okoye, Agbejoye, and Obe, 2024). This consistent underperformance raises questions about the effectiveness of the conventional teaching methods that many teachers in technical colleges still rely on. These traditional methods often focus heavily on rote learning and teacher-centered instruction, which do not fully engage students in practical, collaborative, and technology-driven learning that today's world demands. Despite this pressing issue, there is little research comparing how more student-centered methods, like constructivist and connectivist approaches, could help improve students' achievement in Mechanical Craft Practice in Nigeria. This study aims to fill that gap by examining the comparative effects of constructivist and connectivist teaching methods on students' achievement in Mechanical Craft Practice in government technical colleges in Lagos State, Nigeria.

Objective of the Study

The objective of the study was to find out:

1. Mean score effect of the interaction of academic achievement of students taught Mechanical Craft Practice using constructivist and connectivist teaching methods in Government Technical colleges, Lagos State, Nigeria.
2. Mean score effect of the interaction between the retention ability of students taught using constructivist and connectivist teaching methods and those taught using traditional demonstration methods in Technical Colleges in Lagos State

Research Questions

The following research questions guided the study:

1. What is the mean score effect of the interaction between the academic achievement of students taught mechanical Craft Practice using constructivist and connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges in Lagos State, Nigeria? and
2. What is the mean score effect of the interaction between the retention ability of students taught mechanical Craft Practice using constructivist and connectivist teaching methods, and those taught using the traditional demonstration method in Government Technical colleges, Lagos State, Nigeria?

Hypotheses

The following hypotheses were tested at the 0.05 level of significance:

Ho1: There is no significant difference between the mean achievement scores of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges, Lagos State, Nigeria.

Ho2: There is no significant relationship between the retention ability of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges in Lagos State, Nigeria.

LITERATURE REVIEW

Constructivist and connectivist teaching methods are two influential learner-centered approaches in contemporary education.

Research indicates that constructivism provides a strong foundation for building knowledge and developing hands-on skills, while connectivism equips students with networked problem-solving abilities and digital competencies. A comparative investigation is therefore essential to understand their relative effects on achievement and retention in practical-oriented subjects such as Mechanical Craft Practice.

Conceptual Framework

This study is based on the idea that students' achievement and retention in Mechanical Craft Practice are shaped by the teaching method used. Constructivist methods engage students in hands-on, real-world tasks, while connectivist methods use digital tools and networks to support collaboration and information sharing. The framework assumes that both methods aim to improve students' skills and knowledge, but each focuses on different ways of learning in a physical context and the other through digital connectivity.

Theoretical Framework

This study draws on three key theories: Piaget's (1972) cognitive constructivism, Vygotsky's (1978) social constructivism, and Siemens' (2005) connectivism. Cognitive constructivism explains how learners make sense of information individually, while social constructivism highlights how learning happens through interaction with others. Connectivism adds a modern perspective by showing how learning takes place within digital networks. Together, these theories provide a strong foundation for examining how different teaching methods can affect students' performance in technical skills.

METHODOLOGY

The study adopted a pre-test, post-test, nonequivalent control group quasi-experimental research design. Specifically, a non-randomized control group design was used, involving two groups: a control group and an experimental group. The study was carried out in two technical colleges in Lagos State, involving 30 students from Government Technical College, Ado Soba (Control Group) and 45 students from Government Technical College, Ikorodu (Experimental Group). This brought the total sample size to 75 National Technical Certificate (NTC) Year II students. There was no sampling of subjects, as the entire population of students offering the trade in the two colleges was included in the study. Purposive sampling was used to select the two schools based on the availability of professionally qualified staff, internet facilities for teaching, regular electricity supply, and the willingness of regular teachers to participate as research assistants. One intact class was used in each of the two schools, resulting in a total of two intact classes. Simple random sampling was then used to assign one intact class to the experimental group and another to the control group. The instruments used for data collection were the Mechanical Craft Practice Achievement Test (MECPAT) and a Retention Test on Mechanical Craft Practice, both developed by the researchers and adapted from NABTEB past examination questions from 2021 to 2024. The MECPAT consisted of 20 multiple-choice questions with four options each (A–D). Constructivist and Connectivist teaching methods were developed by the researchers to support the intervention.

The MECPAT lesson plan was validated by three experts in vocational and technical education at Ekiti State University, Ado Ekiti, Nigeria. They reviewed the content to ensure that each unit's items were appropriate for teaching and testing the intended topics, checked for errors, and suggested improvements where necessary. Based on their feedback and corrections, the instrument was revised and finalized by the researchers. Copies

of the instrument were piloted with NTC Year II Mechanical Craft Practice students at Government Technical College, Ikotun, Lagos State, who were not part of the main study population. The reliability of the instrument was determined using the test-retest method, and the scores obtained were analyzed using the Pearson Product-Moment Correlation Coefficient, which yielded a reliability index of 0.81. Data collected were analyzed using mean and standard deviation to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses.

Experimental Procedure

Permission was obtained from the authorities of the technical colleges involved to allow the participation of their students and teachers in the study. In the first week, the researchers visited the technical colleges to explain the purpose of the study and how it would be conducted. The mechanical craft practice teachers received training on how to implement the experimental treatment and were provided with prepared lesson plans. Teachers in the control group were instructed to use the traditional demonstration teaching method, while teachers in the experimental group were guided to adopt constructivist and connectivist teaching methods. Similarly, students in the experimental groups were trained to gain hands-on experience and to use the internet to create and share knowledge through emails and online learning platforms. Email addresses were created for each student in the experimental group, and they were asked to share these addresses with their teachers and classmates. A pretest was administered with the help of research assistants to determine the students' initial abilities before the experiment began. In the second week, the teaching sessions commenced and continued until the end of the fourth week. The main focus of the lessons was on:

1. Understanding intermediate bench work (fitting, filing, chiseling);
2. Performing intermediate machining operations (turning, drilling, shaping;
3. Assembling and disassembling mechanical components; and
4. Identifying simple maintenance and repair techniques for mechanical devices.

Each lesson lasted 80 minutes, and the treatment phase ran for four weeks, following the normal school timetable for NTC Year II students. In the fifth week, a posttest was administered by the students' regular class teachers to maintain familiarity and comfort for the students. This provided posttest data for each dependent variable. In the sixth week, a delayed posttest was also administered by the regular class teachers to assess knowledge retention. The experimental group took the test based on what they had learned through the constructivist and connectivist approaches. Their examinations were scored, and the results were displayed for them. The control group wrote the examination using the traditional demonstration method. Research assistants supervised the test, marked the scripts, recorded the scores, and made the results available to the researchers.

RESULTS

Research 1: What is the mean score effect of the interaction between the academic achievement of students taught mechanical Craft Practice using constructivist and connectivist teaching methods, and those taught using the demonstration method in Government Technical colleges in Lagos State, Nigeria?

Table 1: Mean and Standard Deviation for Pre-test and Post-test Academic Achievement Scores of Mechanical Craft Practice Students

Academic Achievement						
	No	Pre-test		Post-test		Mean Gain
Groups		Mean	SD.	Mean	SD.	
Experimental	45	28.44	5.33	36.88	6.07	8.44
Control	30	24.33	4.91	29.60	5.44	5.27

Table 1 shows the mean and standard deviation of academic achievement scores of students in the experimental and the control groups. The mean scores indicated that the experimental group had higher mean scores after the pretest. The mean gain for the experimental group is 8.44, while that of the control group is 5.27. The mean gain is 3.17, which shows that the experimental group achieved more than the control.

Table 2: Mean and Standard Deviation for Post-test Retention Scores of Students

Retention				
			Retention Test Groups	
	No	Mean	SD_1	Mean Gain
Experimental	45	92.15	9.60	52.42
Control	30	39.73	6.30	

Table 2 shows the mean and standard deviation of retention scores of students in the experimental and the control groups. The mean scores indicated that the experimental group had higher retention mean scores. The mean gain is 52.42, which shows that the experimental group retains more than the control group.

Hypothesis 1: There is no significant difference between the mean achievement scores of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges, Lagos State, Nigeria.

Table 3: Summary of Analysis of Covariance (ANCOVA) Results on whether there is no significant difference between the mean achievement scores of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges, Lagos State, Nigeria

Source	SS	df	MS	F	p-value
Covariate (Pre-Test)	420.15	1	420.15	16.32	0.0001
Group (Teaching Method)	310.82	1	310.82	12.07	0.001
Error	1892.14	72	26.28		
Total	-	75			

In Table 3, the F-value for the teaching method is 12.07 with a p-value of 0.001. Since $p < 0.05$, we reject the null hypothesis (Ho_1). The hypothesis that states "There is a significant difference in post-test achievement scores between students taught with Constructivist and Connectivist methods and those taught using the traditional method after controlling for pre-test score is hereby rejected. This indicates a statistically significant difference in academic achievement in favour of students taught using Constructivist and Connectivist methods. The use of Constructivist and Connectivist teaching methods had a statistically significant positive effect on students' academic achievement in mechanical craft practice compared to the traditional demonstration method in Government Technical Colleges in Lagos State, Nigeria.

Hypothesis 2: There is no significant relationship between the retention ability of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges in Lagos State, Nigeria.

Table 4: Summary of Analysis of Covariance (ANCOVA) Results on there is no significant relationship between the retention ability of students taught mechanical craft practice using Constructivist and Connectivist teaching methods and those taught using the traditional demonstration method in Government Technical colleges in Lagos State, Nigeria

Source	SS	df	MS	F	p-value
Post-Test (Covariate)	504.28	1	504.28	15.74	0.0001
Group (Teaching Method)	8482.82	1	8482.31	264.77	0.000
Error	2304.90	72	32.01		
Total	**-**	**75**			

In Table 4, the p-value of 0.000 is less than the significance level of 0.05, indicating that the null hypothesis (Ho_2) is rejected. This means there is a meaningful difference in the retention scores of students who were taught Mechanical Craft Practice using Constructivist and Connectivist methods compared to those taught through the traditional demonstration approach. Even after accounting for their post-test performance, students taught with the Constructivist and Connectivist methods retained knowledge and skills significantly better. This finding highlights the effectiveness of the Constructivist and Connectivist teaching methods in enhancing long-term learning in Mechanical Craft Practice among Government Technical College students in Lagos State, Nigeria.

DISCUSSION

As presented in Table 3, the study revealed that students taught Mechanical Craft Practice using constructivist and connectivist teaching methods performed significantly better than those taught through the traditional demonstration approach. Mechanical Craft Practice Students exposed to these student-centered methods achieved higher post-test scores, even after accounting for differences in prior knowledge. This suggests that Constructivist and Connectivist teaching methods are more effective in boosting

students' academic achievement. These findings align with previous studies by Aina and Akinbobola (2017), who highlighted the benefits of constructivist strategies like real-world problem-solving, teamwork, and hands-on experiences in deepening students' understanding of technical concepts. Similarly, Siemens (2005) and Downes (2007) emphasized the role of connectivism in promoting learning through digital networks and interactions with online communities.

The higher performance of students in the experimental group suggests that these modern approaches, such as blending digital tools, collaboration, and reflective thinking, offered diverse and engaging ways for students to build knowledge. This is particularly important in a practical subject like Mechanical Craft Practice, where both understanding and hands-on skills are essential. Active learning and digital engagement likely helped students think critically and apply theory in real-life situations (Okoye and Okechukwu, 2020). On the other hand, the lower achievement among students in the control group supports long-standing criticisms of the traditional demonstration method. This teacher-centered approach, while useful for delivering content, often fails to encourage student interaction or independent thinking (Lkama, 2019; Okoro, 1993). Kelley (2018) argued that such methods do not adequately prepare students for the evolving demands of modern industries. Hence, the findings reinforce the call for technical colleges to adopt more interactive, technology-enhanced teaching strategies that truly prepare students for today's dynamic and connected workforce.

Table 4 further supports this argument, showing that students taught with Constructivist and Connectivist approaches retained significantly more knowledge than those taught with traditional demonstration methods. The strong statistical result ($F = 264.77$, $p < .001$) indicates that these learner-centered, digitally supported strategies have a lasting impact on students' ability to recall and apply what they have learned. This reinforces the idea that retention is not just about exposure, but about meaningful and active engagement. Constructivist theories, such as those of Fosnot (2013) and Piaget (1970), emphasize that learners best understand and retain information through practical, hands-on experiences. By solving problems and engaging in real-world applications, students internalize knowledge more effectively. These findings also align with Aina and Adebowale's (2021) view that relying on outdated teacher-centered methods can hold students back, especially in hands-on practical disciplines. By contrast, student-centered methods like Constructivism and Connectivism support deeper thinking and skill mastery. Constructivist teaching fosters independence, real-world learning, and problem-solving, while Connectivism promotes continuous knowledge-building through digital networks (Siemens, 2005; Downes, 2007).

The higher retention levels in the experimental group align with studies like Okoye, Agbejoye, and Obe (2024), which view retention as a key indicator of how well learners grasp and remember concepts and skills. The hands-on learning and digital collaboration likely helped students better absorb and recall information. Conversely, students in the control group who were taught through traditional demonstration retained significantly less. This approach often involves passive listening and minimal interaction (Lkama, 2019; Okoro, 1993), which are not ideal for supporting memory or meaningful learning. Kelley (2018) noted that such methods often overlook individual learning needs and do not promote active engagement. Overall, these findings highlight the importance of modernizing teaching practices in technical education programmes. By embracing student-centered and digitally enriched teaching methods, educators can better support students in not only

understanding but also retaining and applying what they learn, which is crucial in today's ever-changing technical landscape.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study concludes that using Constructivist and Connectivist teaching methods leads to significant improvements in students' academic achievement and retention in Mechanical Craft Practice when compared to traditional demonstration methods. By engaging students with real-world tasks, encouraging collaboration, and integrating digital tools, these student-centered strategies create a more dynamic and effective learning experience. They not only deepen students' understanding of key concepts but also help build practical skills, critical thinking, and digital literacy. All of which are essential for success in today's workforce. The findings highlight the importance of modern teaching methods in Technical and Vocational Education and Training (TVET), especially in Nigerian Government Technical Colleges. As technical professions continue to evolve with advancements in technology, it becomes increasingly important to adopt instructional practices that promote active, connected, and hands-on learning. Doing so will help develop a generation of skilled workers who are both competitive and self-reliant.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are proposed:

1. Technical colleges should adopt instructional frameworks that integrate Constructivist and Connectivist teaching methods, emphasizing active engagement, collaborative learning, and digital interaction to enhance students' long-term retention of skills and concepts;
2. Continuous training should be provided for technical college teachers on how to design and implement retention-supportive teaching strategies that include problem-solving tasks, peer collaboration, and the use of digital learning platforms;
3. Government and stakeholders in education should ensure that technical colleges are equipped with the necessary digital tools, such as projectors, smart devices, internet access, and educational software to support connectivist learning environments;
4. Mechanical Craft Practice curricula should be revised to embed project-based learning, digital literacy, and networked collaboration as core instructional strategies that support not only achievement but also knowledge retention;
5. School administrators should regularly assess the effectiveness of teaching methods in enhancing retention through formative and summative evaluation tools. Longitudinal tracking of student performance can provide insights into the sustained impact of different pedagogies; and
6. Future studies should explore how these methods affect other skill domains in TVET and investigate retention outcomes across diverse socioeconomic and geographic contexts. Comparative studies involving emerging technologies such as AI, simulation, and virtual reality could also provide valuable insights.

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Disclaimer

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