Effects of Self-Awareness on Woodwork Students' Academic Performance in Technical Colleges

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ABSTRACT

This study was designed to determine the effects of self-awareness on the academic performance of Woodwork Trade students in Technical Colleges in Niger State, Nigeria. A pre-test, post-test, non-equivalent control group quasi-experimental design was employed. Four out of seven technical colleges in the state and four intact classes were sampled. The study involved 68 students in total, with 37 students assigned to the experimental group and 31 to the control group. Cognitive constructivist instructional techniques based on students' self-awareness was used as treatment for the experimental groups while Lecture method was administered to the control groups. Three research questions and one null hypothesis was tested at the 0.05 level of significance to guide the study. The research instruments were validated by three experts from the Department of Industrial and Technical Education, Federal University of Technology, Minna. The reliability coefficient of the instrument was established at 0.76 using the test-retest method and Cronbach's alpha statistics. Mean scores were used to answer the research questions, while independent t-test statistics were used to analyse research data and test the null hypothesis. The findings revealed that students taught Woodwork Trade using the cognitive constructivist instructional techniques based on students' self-awareness approach achieved higher mean scores than those taught using the conventional teaching method in both cognitive and psychomotor achievement tests. In all cases, the higher mean scores were found to be statistically significant. Furthermore, male students taught using the self- awareness approach recorded higher mean scores than female students in the cognitive achievement test. Based on these findings, it was recommended that the National Board for Technical Education (NBTE) should review the curriculum for Technical Colleges with the aim of integrating the self- awareness instructional approach into the teaching of Technical Trades.

Keywords: Self-Awareness, Constructivism, Academic Performance, Woodwork Trade, Technical College Students.

INTRODUCTION

Across the globe, and especially within West African nations, governments are intensifying initiatives to advance technical education, driven by the conviction that the development of practical skills strengthens productivity and maintains competitiveness in the global economy. As noted by Tsado (2020), many African countries, especially Nigeria (FRN, 2025), in recent times have expressed growing concern over the shift toward positioning technical education as a complementary component of post-basic education. The demand to equip students with essential skills for the twenty-first-century workplace has prompted a transition from instructional methods grounded in behavioural learning theories to those anchored in cognitive psychological perspectives, among which constructivist approaches are prominent (Avvolua-Efebo, 2022), self-regulated learning. Constructivism, as described by Epstein and Ryan (2022), rests on the idea that learning is an active, constructive process in which individuals develop internal representations of knowledge through personal interpretation of experiences. It is a learning theory that emphasises that knowledge is not passively received but actively built through mental engagement. Central to this perspective are two key principles of metacognition and self-regulated learning as highlighted by Demmert (2021). Self-awareness as a metacognitive skill reflects on deliberate understanding of one's body, thoughts, emotions, sensations,

confusion, habits, motivations, values, strengths, and weaknesses, that helps learning become more effective. It is a foundation for meta cognition, which involves recognizing oneself as a distinct individual and having clear insight into personal experiences, feelings, and actions.

Self-awareness also support self-regulated learning which hinges on learners actively managing their own learning by planning, monitoring progress, controlling by paying attention and effort and evaluating results. This makes learning relevant, practical, self-directed, connected to prior experience and problem centred. First, learners form new understandings by connecting them to their existing knowledge. Second, learning is inherently active rather than passive. In practice, learners continually test and apply their understanding in new contexts. When new experiences conflict with prior knowledge, learners adjust their thinking to accommodate the new information. Throughout this process, learners remain actively involved—applying prior knowledge, identifying relevant aspects of new experiences, evaluating consistency between old and new ideas, and refining their understanding and skills accordingly.

The present study highlights various investigations of self-awareness across different contexts (Hwang et al., 2020). The application of self-awareness can improve individuals' ability to navigate life in an era shaped by increasingly advanced technologies. Cleminson (2020) notes that, with the evolution of computer technology, self-awareness continues to grow and develop in innovative ways. In the educational context, self-awareness supports students in strengthening both mathematical and cognitive abilities. Popenici and Kerr (2017) emphasised that technology serves to enhance human thinking and enrich the learning process. Through self-awareness, students are able to locate answers more quickly and efficiently, as learning materials become readily accessible via intelligent technological tools. In today's generation, where learners are more inclined toward independent exploration, such tools empower them to acquire knowledge without constant reliance on instructors. However, Cope *et al*. (2020) argue that these technologies will not replace the role of educators. Additionally, the integration of such innovations into teaching, learning, student support, and administrative processes continues to face several challenges especially in Technical Colleges in Nigeria (Popenici & Kerr, 2017).

For many years, trade and vocational subjects in Technical Colleges have largely been taught using methods rooted in behavioural learning theory, despite the growing demands of modern industry for graduates equipped with essential workplace skills such as critical thinking, problem-solving, and collaboration—competencies necessary for adapting to evolving work environments. Technical colleges are post-basic education (Primary and Junior Secondary) responsible for training tradespeople in various crafts, construction and engineering trades at ordinary and advanced Technical Certificate levels. These tradespeople form the lower and middle level manpower in various industries. Rojevvski (2022) observes that lecture and demonstration methods, which align with behavioural principles, remain the dominant approaches for curriculum delivery in technical colleges. However, these methods are continuously being criticised as predominantly teacher-centred, offering limited opportunities for active student engagement during instruction (Jimoh *et al*., 2022; Lkama & Dabo 2019; Okwelle & Ojotule, 2018). As a result, learning tends to focus on the transfer of knowledge from teacher to largely passive learners, often promoting rote memorization rather than acquisition of knowledge and skills common to technical trades. Scholars (Boyle *et al*., 2023 & Farauta, 2022) also noted that such approaches, commonly used in technical education, do little to foster the development of higher-order thinking skills, problem-solving and collaboration required in contemporary workplaces.

Furthermore, instructional approaches grounded in behavioural learning theories tend to isolate learners from meaningful social interaction, viewing education largely as an individual engagement between the learner and the subject matter (Epstein and Ryan, 2022). A major drawback of applying such methods in trade and vocational subjects like technical education is that students often struggle to retain knowledge and transfer it to new or practical situations. Rusbult (2015) asserts that these traditional approaches are insufficient for developing higher-order thinking, collaboration, and problem-solving skills, whereas constructivist approaches are better suited to fostering such competencies. It is therefore conceivable that integrating elements such as critical thinking, oral discourse, authentic or situated learning, collaborative activities, and well-structured instructional strategies could significantly enhance students' cognitive and problem-solving abilities in Technical Colleges. Such an approach may also improve the effectiveness of learning processes. The prevailing teaching methods in these institutions appear inadequate in equipping students with the essential

workplace skills required in the building industry, which continues to evolve rapidly due to technological advancements.

According to Doolittle and Camp (2020) constructivist learning environments provide opportunities to situate learning within real-life contexts and practical problem-solving situations. Such environments also support curriculum integration by linking classroom learning with workplace experiences. It is anticipated that the adoption of cognitive constructivist instructional techniques supported by students' self-awareness may facilitate their development of essential workplace competencies, including collaboration, problem-solving, and critical thinking skills. These abilities are crucial for functioning effectively in dynamic technical environments and for transferring knowledge across diverse technological settings. This situation raises an important question: beyond the traditional teacher-centred methods, could students' self-awareness when used as a background to cognitive constructivism positively influence students' academic achievement in technical education? In light of this, the central problem of the study was to examine the effects of the integration of Technical College students' self-awareness skills with cognitive constructivist approach on their academic performances in Woodwork trade.

Purpose of the Study

The purpose of this study was to determine the effects of the self-awareness on academic achievement of learning of technical education students in Tertiary Institution in Niger state. Specifically, the study sought to:

1. determine the differences in cognitive achievement scores of students taught Woodwork trade with the self-awareness/cognitive constructivist approach and those taught using the conventional teaching methods.

2. determine the differences in psychomotor achievement scores of students taught Woodwork with the self-awareness/cognitive constructivist approach and those taught using the conventional teaching methods.

3. compare the cognitive achievement scores of boys and girls taught Woodwork using the self-awareness/cognitive constructivist approach.

Research Questions

The following research questions were formulated to guide this study:

1. What are the mean cognitive achievement scores of Woodwork students taught with the self-awareness/cognitive constructivist approach and those taught using the conventional teaching methods?

2. What are the mean psychomotor achievement scores of Woodwork students taught with the self-awareness/cognitive constructivist approach and those taught using the conventional teaching methods?

3. What are the mean cognitive achievement scores of boys and girls taught Woodwork using the self-awareness/cognitive constructivist approach?

Hypotheses

The following null and void hypotheses guided the study:

H_{o1}: There is no significant difference between the mean cognitive achievement scores of students taught Woodwork with the self-awareness/cognitive constructivist approach and those taught using conventional teaching methods.

METHODOLOGY

The study adopted a quasi-experimental research design and was carried out in six technical colleges in Niger State. The population consisted of 100 second-year Woodwork students across the six functional Technical Colleges in the state. Using a simple random sampling technique, four colleges were selected and used for the study. One intact class from each of the four schools with a total sample of 68 students were used for the study. Four regular class teachers were used as research assistants for the study. The reason for the use of intact class with the regular teachers as research assistants was to avoid teacher and experimental bias. Data were collected using two instruments: the Woodwork Cognitive Performance Test (WCPT) and the Woodwork Psychomotor Performance Test (WPPT). The WCPT and WPPT were subjected to face validation by three experts from the Department of Industrial and Technology Education at the Federal University of Technology, Minna. The reliability of the WCPT and WPPT were determined through the test–retest method alongside Cronbach's alpha statistics using 18 students from Federal technical college Garki, Abuja, Nigeria. The research assistants administered the pre-test, treatment, and post-test to the students. Data obtained from both the pre-test and post-test were computed for mean and standard deviation using SPSS version 27 to answer the research questions and analysed to test the null hypotheses using t-test at 0.05 level of significance.

RESULTS

Research Question 1:

What are the mean cognitive achievement scores of students taught Woodwork with self-aware and those taught using the conventional teaching methods?

Table 1: Pre-test and post-test mean scores of Experimental and Control groups in the cognitive achievement test.

Group	N	pre-test $\bar{x}$	post-test $\bar{x}$	Mean Gain
Experimental	37	23.04	33.60	10.56
Control	31	22.86	28.26	5.40

N= Number of respondents

The results presented in Table 1 indicate that the experimental group recorded a mean score of 23.04 in the pre-test and 35.60 in the post-test, resulting in a mean gain of 10.56. In contrast, the control group had a pre-test mean score of 22.86 and a post-test mean of 28.26, yielding a mean gain of 5.40. Based on these findings, it can be inferred that students in the experimental group performed significantly better in the cognitive achievement test than those in the control group.

Research Question 2:

What are the mean psychomotor achievement scores of Woodwork students taught with self-aware and those taught using the conventional teaching methods?

Table 2: Mean of Pre-Test and Post-Test Scores of Woodwork Students' Psychomotor achievement in Experimental and Control Groups.

Group	N	Pre-test $\bar{x}$	Post-test $\bar{x}$	Mean Gain
Experimental	37	21.92	34.41	12.49
Control	31	22.04	26.31	4.27

N= Number of respondents

The data presented in Table 2 reveal that students in the experimental group obtained a pre-test mean score of 21.92 and a post-test mean score of 34.41, resulting in a mean gain of 12.49. In comparison, the control group recorded a pre-test mean of 22.04 and a post-test mean of 26.31, with a corresponding mean gain of 4.27. These results indicate that students in the experimental group outperformed their counterparts in the control group in the psychomotor achievement test.

Research Question 3:

What are the mean cognitive achievement scores of boys and girls taught Woodwork with the self-aware?

Table 3: Mean of Pre-Test and Post-Test Scores of Boys and Girls Taught Woodwork with the Self-aware

Group	N	Pre-test $\overline{x}$	Post-test $\overline{x}$	Mean Gain
Male	53	25.64	30.03	4.39
Female	15	21.48	23.98	2.50

N= Number of respondents

The results indicate that male students recorded a post-test mean score of 25.64 and a mean score of 30.03 in the test for learning, while female students obtained a post-test mean score of 21.48 and a higher mean score of 23.98 in the academic achievement test. This suggests that, although the difference is marginal, female students performed slightly better than their male counterparts in terms of learning achievement.

Hypothesis

H_{o1}: There is no significant difference between the mean cognitive achievement scores of students taught Woodwork with the self-aware and those taught using conventional teaching methods

H_{a1}: There is significant difference between the mean cognitive achievement scores of students taught Woodwork with the self-aware and those taught using conventional teaching methods.

Table 4: Summary of t-test of Significance between the Mean Scores of Experimental and Control Groups in Cognitive Achievement Test

Group	N	$\bar{X}$	SD	df	t-value calculated	t-value critical	P
Experimental	37	64.24	1.59	2			
Control	31	41.70	1.76	66	28.45	1.68	0.00

Significant at the 0.05 level ($P < 0.05$).

Note: N = Number of respondents; $\overline{X}$ = Mean; SD = Standard Deviation; df = Degree of freedom and P = Significance.

The result presented in the table shows that the calculated t-value of 28.45 is higher than the critical t-value of 1.68 at the 0.05 level of significance. This implied that a significant difference exists between the performance of students taught Woodwork using the self-awareness/cognitive constructivist approach and those taught with conventional instructional methods. It further suggests that the approach had a positive effect on students' academic achievement in Woodwork. Consequently, the null hypothesis was rejected, while the alternative hypothesis was accepted, indicating a significant difference in the mean cognitive achievement scores of the students.

DISCUSSION OF FINDINGS

The data presented in Table 1 answered research question one. The findings revealed that students taught using the self-awareness/cognitive constructivist approach recorded higher cognitive mean scores than those taught with the conventional teaching method in the cognitive achievement test. This difference may be attributed to the treatment administered to the experimental group. The result therefore indicates that self-aware strategies have a more positive effect on students' cognitive achievement in technical education. This suggests that instructional elements such as collaborative learning, oral discourse, thinking skills development, authentic tasks, and structured learning frameworks are more effective than conventional teaching methods in enhancing students' cognitive outcomes in technical education (Lkama & Dabo, 2019). The finding that self-aware improves students' achievement is consistent with the study of Becker and Maunsaiyat (2022), who reported that the use of self-aware in teaching vocational technical education students in Thailand significantly improved their achievement compared to those taught using traditional instructional methods.

The findings of the psychomotor achievement test presented (Table 3), which addressed research question three, revealed that students taught using the self-aware approach obtained higher mean scores than those taught with the conventional teaching method in the psychomotor achievement test. This suggests that self-aware has a positive effect on the psychomotor achievement of technical college students in technical education. This outcome may be attributed to the fact that students exposed to the self-aware approach engaged in authentic tasks within realistic environments, using real tools, machines, and materials. In recent times, there has been considerable emphasis on authentic activities as a key influence of constructivist philosophy. According to Boyaci (2016), authentic activities refer to any learning tasks students are required to perform beyond merely receiving information through reading or listening, in order to learn, practice, apply, evaluate, or otherwise engage with curricular content. Similarly, Cabrera and Nassa (2022) explain that authentic activities not only encourage learning but also actively engage learners to respond meaningfully to classroom instruction rather than remaining passive recipients of knowledge.

The result of the t-test analysis further confirmed that the difference between the mean scores of students taught using the self-aware approach and those taught with the conventional teaching method was statistically significant ($P < .05$). It was also established that students in the experimental group who received treatment through self-awareness/cognitive constructivist outperformed those in the control group. This finding aligns with the studies of Hwang, Xie, Wah, and Gašević (2020) as well as Boyle, Duffy, and Dimcavy (2023), who investigated learning approaches and academic outcomes in British higher education institutions. Their results indicated that self-awareness strategies were more effective than conventional teaching methods. This effectiveness may be attributed to features such as collaborative learning, oral discourse, thinking skills development, authentic tasks, and structured learning frameworks embedded within the self-awareness approach.

The result on gender revealed that male students obtained a post-test mean score of 30.03 and a mean score of 23.98 in the test for learning. However, the findings indicated that female students performed better than male students in the achievement test. These findings are consistent with those of Becker and Maunsaiyat (2022), who conducted a comparative study of students' achievement and attitudes in constructivist and traditional classroom environments within vocational electronics programmes in Thailand. Their study revealed that constructivist learning environments led to higher student performance than conventional instructional settings. The similarity between both studies may be attributed to the fact that they were conducted within technical education institutions, where learning conditions and instructional demands share comparable characteristics.

CONCLUSIONS

This study set out to examine the effects of the self-awareness approach on the academic achievement of Woodwork students in technical colleges. The self-awareness strategies—comprising collaborative learning, oral discourse, thinking skills development, authentic tasks, and instructional framing—had a significant influence on students' learning outcomes in Woodwork. This was evident in their cognitive and psychomotor performance. In essence, students demonstrated better understanding and skill acquisition in Woodwork when they were actively engaged in the teaching and learning process through interaction with the teacher, their

peers, and the learning environment, as well as through group-based activities. Furthermore, their ability to think critically about solutions while participating in practical tasks involving real tools, materials, and machines in a collaborative setting have improved. It is therefore anticipated that if the self-awareness approach is integrated into the teaching of technical education in Technical Colleges, graduates will possess stronger cognitive understanding, psychomotor competence, problem-solving abilities, creative thinking skills, collaborative work habits, and independent decision-making capabilities. These competencies will enable them to adapt effectively to the evolving demands of the building industry driven by technological advancement. Consequently, such graduates will not only perform better in their NABTEB examinations but will also contribute meaningfully to national industrial development and potentially become job creators rather than job seekers.

RECOMMENDATIONS

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

1. Technical College teachers should adopt the self-awareness/cognitive constructivist approach in the teaching of technical education trades to enhance students' academic achievement and practical skills development.

2. The National Board for Technical Education (NBTE) should consider reviewing the technical education curriculum to integrate self-awareness/cognitive constructivist approaches into the teaching of technical education programmes.

3. The government should ensure the provision of adequate tools, equipment, and modern facilities required for effective teaching and learning of up-to-date technical education practices in Technical Colleges.

4. The Ministry of Education, in collaboration with Technical College administrators, should organise seminars, conferences, and workshops to sensitize technical education teachers on the effective use of the self-awareness/cognitive constructivist approach.

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