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RELATIONSHIP BETWEEN SELF-EFFICACY AND STUDENTS' ACADEMIC PERFORMANCE IN TECHNICAL DRAWING IN EDO STATE TECHNICAL COLLEGES

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Abstract
This study investigated the relationship between self-efficacy and student's academic performance in technical drawing in Edo State technical colleges. A correlational research design was adopted for the study. The population of the study consisted of 834 technical drawing students from the six Edo State technical colleges. Purposive sampling technique, was used to obtain a sample size of 322 from the total population, two research instruments were used which include standardized Technical Drawing Achievement Test (TDAT), and Academic Self-Efficacy Scale (ASES). Standardized TDAT was adopted from the National Technical Certificate Examination past questions. The instrument on TDAT, was a standardize instruments and as such does not need any validation, however the instrument for (ASES) was validated by three research experts, two in Vocational and Technical Education Department of Ambrose Alli University, (AAU) Ekpoma and one from Measurement and Evaluation Department, University of Benin (UNIBEN), both from Edo state. Cronbach Alpha was used to determine the reliability coefficients of' ASES questionnaire which yielded the reliability coefficient values of 0.84. One research question and one null hypothesis guided the study, the hypothesis was formulated and tested at .05 level of significance. 303 returned instruments were used for data analysis. Pearson Product Moment Correlation Co-efficient (PPMCC) was used for data analyses to answer the research question and linear regression was used to test the hypothesis at 0.05 level of significance. Results revealed a high positive correlation and relationship between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges. Based on this finding, it was recommended a system for early identification of disengaged students, providing targeted academic support and personalized mentorship pairings with experience teacher be implemented.

Keywords: Academic performance, technical drawing, self-efficacy

Introduction

Education, universally acknowledged as a fundamental pillar of progress, equips individuals with critical skills and knowledge, thereby enabling personal achievement and contributing to community prosperity (Lavin, & Kapur, 2019). As such, it is a driving force behind national advancement and societal evolution. Nigeria's educational framework comprises three key levels: higher education, senior secondary education (inclusive of vocational training), and universal basic education, which integrates primary and junior secondary schooling.

Nigeria's Federal Republic (FRN, 2013) defines Technical Vocational Education and Training (TVET) within its education policy as a holistic educational approach. This encompasses general education alongside the study of technologies, related sciences, and the acquisition of practical skills, attitudes, understanding, and knowledge pertinent to various economic and social sectors. The FRN outlines the objectives of vocational education as follows: (a) to introduce students to the technological landscape, fostering appreciation and informing career choices post-junior secondary school; (b) to cultivate technical proficiency; (c) to provide career awareness through exploration of workplace relevant options; and (d) to facilitate a comprehensive understanding of technological advancements. The curriculum at the junior secondary and technical college levels is structured to cultivate strong and lasting vocational skills. This empowers graduates to directly enter employment, create their own businesses and generate jobs, or pursue further education in specialized domains.

The government's articulated goals highlight its understanding of TVET's crucial function in providing individuals with the necessary skills for personal success and national development. TVET could be a driving force in creating the skilled artisans, craftsmen, workmen, technicians, and technologists, needed to stimulate Nigeria's economic recovery. By promoting technological progress, TVET is essential for Nigeria's shift from a developing, consumer-driven economy to a developed, production-focused nation. Within the broad spectrum of TVET subjects, technical drawing is a fundamental and universally applicable subject.

Technical drawing is the bedrock of global technological progress, Nigeria included, making it a non-negotiable element of technical education, especially in vocational programmes. It provides a precise and efficient language for communicating complex ideas through detailed diagrams, dimensions, and specifications, bridging the gap between concept and creation. Acknowledging this criticality, the National Board for Technical Education (NBTE) mandates technical drawing as a core subject in all technical colleges, crucial for students targeting careers in engineering and construction. To ignite student passion for technology and cultivate an entrepreneurial spirit geared towards national technological advancement, the strategic recruitment of highly competent technical drawing instructors is essential. These professionals could foster engaging learning environments, unlocking students' potential and providing hands-on experience throughout their three-year technical college, if the students have the desired self-efficacy

Self-efficacy, as defined by Schunk (2023), is the cultivated ability to self-regulate, enabling students to strategically plan, monitor, and evaluate their task performance and learning outcomes. Zhang and Wang (2020) highlight self-efficacy as an individual's conviction in their capability to achieve desired goals. A strong sense of self-efficacy fosters the belief in one's capacity to succeed and surmount challenges, significantly influencing academic achievement and real-world performance. Students with high self-efficacy are inclined to set ambitious goals, demonstrate diligence, and persevere despite difficulties. Furthermore, they exhibit greater resilience in recovering from setbacks. Importantly, self-efficacy is not a static attribute but rather a dynamic construct molded by personal experiences and self-perception. Rooted in social cognitive theory, self-efficacy profoundly impacts an individual's perseverance in self-regulated tasks including academic performance (Zimmerman, Schunk, & DiBenedetto, 2017).

Academic performance is the result that shows how well a person has performed in relation to particular objectives that were the main focus of activities in learning environments, particularly in schools. According to Tella, as stated in Eze, Obidile, and Okotubu (2020), academic performance is used to gauge a student's achievement in educational institutions or how well they meet the standards set by the institution or testing organizations. Academic performance is the result that shows how well a person has performed in relation to particular objectives that were the main focus of activities in learning environments, particularly in schools. The academic performance of students to a large extent could explain the self-efficacy of the students as observed in related studied.

Healther, Ampomah, Takyi, and Adondza, (2023) investigated the connection between academic self-efficacy, self-regulated learning, and academic success among first-year students at a Southeastern technical college. Their study of 104 students who persisted from fall 2021 to spring 2022, utilizing an academic self-efficacy survey, revealed several key predictors positive correlation: The ability to meet homework deadlines, effectively organize schoolwork, and create a distraction-free study environment were all positively associated with academic achievement. Surprisingly, the ability to plan schoolwork demonstrated a negative relationship with academic achievement. Racial Disparity: Black/African American students reported significantly lower GPAs compared to other ethnic groups, indicating a negative correlation between this demographic and academic achievement.

In a similar study, Bwenvu (2023) investigated the correlation between self-efficacy and academic outcomes among Makerere University students. Employing a cross-sectional survey design, data was gathered via an online instrument from 117 students within the College of Education and External Studies. Analysis using IBM SPSS version 21.0 revealed high mean scores for both self-efficacy and academic performance (equivalent to a 2nd class upper division). However, the study found no statistically significant relationship ($\rho > .05$) between students' self-efficacy and academic performance across constructs like perceived control, competence, persistence, and self-regulated learning. This suggests that while students demonstrated high self-efficacy, it did not directly translate into improved academic results. Despite this, the study emphasizes the importance of continued focus on developing students' self-efficacy. The conclusion advocates for maintaining academic programmes that foster student well-being and equip them with relevant experiences and skills throughout their university journey. In essence, while not directly linked to current performance, cultivating self-efficacy remains a valuable endeavor.

Honicke, Broadbent, and Tyszkiewicz, (2023) investigated the reciprocal relationship between self-efficacy and academic performance, focusing on the moderating effects of task difficulty and baseline achievement on learner trajectories. Their study, involving 261 university students (118 females, 143 males, aged 18-67 and 18-64 respectively), revealed a significant positive influence of prior academic achievement on subsequent self-efficacy. However, the reverse pathway – self-efficacy influencing subsequent performance – was not supported. Further analysis using repeated measures ANOVA indicated that initial task performance moderates the relationship between task difficulty and achievement over time. The research underscores the value of strategically scaffolding learning experiences to foster mastery, particularly for students demonstrating lower initial performance levels, as a means of boosting self-efficacy in acquired skills.

In another vein, Fakhrou and Habib (2022) investigated the correlation between academic self-efficacy and academic achievement. Utilizing a validated and reliable self-efficacy questionnaire, they surveyed 43 students from the Department of Special Education. Their findings revealed a positive correlation between the two variables, suggesting that students with higher self-efficacy tend to achieve greater academic success. In a study by Matovu (2020), that investigated the correlation between academic self-efficacy and performance in undergraduate university students. The study specifically aimed to confirm the relationship and any disparities between these two factors. A stratified sample of 293 students (140 females, 153 males) was drawn from three faculties (Education, Humanities, and Science) across both public and private universities, selected through purposive sampling. Participants completed a questionnaire assessing their academic self-efficacy, and their Cumulative Grade Point Average (GPA) was recorded. Data analysis employed descriptive and inferential statistics to determine the relationship and differences between academic self-efficacy and academic performance. The findings indicated a statistically significant positive correlation between academic self-efficacy and academic performance ($r (293) = .816$, $p < .01$) among the undergraduate student population studied.

In their study, Hayat, Shateri, and Shokrpour, (2020) explored the interconnectedness of academic self-efficacy, metacognitive learning strategies, learning-related emotions, and academic performance among 279 medical students at Shiraz University of Medical Sciences. Utilizing the Academic Emotions Questionnaire (AEQ), Metacognitive Learning Strategies (MLS) questionnaire, and the Academic Self-Efficacy Questionnaire (ASEQ), the researchers employed SPSS and Smart PLS3 for data analysis and structural equation modeling. The findings indicated a significant influence of students' self-efficacy on both their learning-related emotions and their application of metacognitive learning strategies. Furthermore, these emotions and strategies, in turn, demonstrably affected academic performance. The study also revealed a sequential mediation: learning-related emotions influenced the adoption of metacognitive learning strategies, which subsequently mediated the impact of these emotions on academic performance. In essence, Hayat et al.'s research underscores the mediating role of metacognitive strategies and learning-related emotions in the relationship between

a student's belief in their academic abilities (self-efficacy) and their actual academic outcomes. These findings highlight the complex interplay of cognitive and emotional factors in shaping academic success.

Furthermore, Chanana (2018) investigated the correlation between self-efficacy and academic achievement among undergraduate students. The research involved a sample of 130 students (42 female, 88 male) from various semesters. Statistical analysis, including correlation and t-tests, indicated a significant positive relationship between self-efficacy and academic performance. However, the study found no significant association between self-efficacy and academic performance when considering student age within the undergraduate programmes.

Additionally, Talsma, Schüz, Schwarzer, and Norris, (2018) conducted a meta-analysis of longitudinal studies ($k = 11$, $N = 2688$) examining the reciprocal relationship between academic self-efficacy and academic performance. Their cross-lagged path analysis revealed a significant reciprocal effects model. Notably, prior academic performance had a stronger positive impact on subsequent self-efficacy ($\beta = 0.205$, $p < 0.001$) than the reverse ($\beta = 0.071$, $p < 0.001$). Moderator analysis indicated this reciprocity held for adult learners, while in children, performance primarily influenced later self-efficacy. Furthermore, studies adhering more closely to established self-efficacy measurement methodologies demonstrated stronger cross-lagged effects.

Khan (2023) investigated the interplay between academic self-efficacy, stress-coping mechanisms, and academic achievement among 66 undergraduate students (17 male, 49 female) at a Northwestern U.S. University. Academic performance, self-efficacy, and stress coping were evaluated using GPA, the Academic Self-Efficacy Scale and the COPE Inventory, respectively. Results indicated a positive correlation between GPA and both academic self-efficacy ($r = .49$, $p < .01$) and the Planning subscale of the COPE Inentory ($r = .32$, $p < .05$). Furthermore, academic self-efficacy demonstrated positive correlations with several COPE Inventory subscales: Positive Reinterpretation and Growth ($r = .36$, $p < .01$), Acceptance ($r = .46$, $p < .01$), and Planning ($r = .25$, $p < .05$). Conversely, a negative correlation was observed between academic self-efficacy and the Substance Use subscale of the COPE Inventory ($r = -.32$, $p < 0.1$).

From the review of related literature that have been done as regards self-efficacy and academic performance a gap still exist in the study as there is no study on relationship between self-efficacy and academic performance in technical drawing among students in Edo state technical colleges, using this population and sample size, this is the gap the study intends to bridge.

Statement of the Problem

Edo State's technical colleges grapple with a chronic deficiency in technical drawing proficiency. National Board for Technical Education (NBTE) assessments consistently reveal student underperformance in this crucial subject. NABTEB Chief Examiner reports spanning 2015-2021 expose a troubling reality: failure rates routinely surpass credit pass rates, with overall mean scores languishing between 28.7% and 45.8% (NBTE, 2022). This situation, as emphasized by the NBTE, intimates that resource-scarce and demotivating learning environments within these colleges may be undermining student capabilities. Despite governmental interventions via the Ministry of Education and the Post Primary Education Board aimed at nurturing resourceful and motivating learning environments, Edo State technical college students continue to demonstrate challenges in technical drawing.

The fundamental reasons for the persistent decline in performance of technical drawing students in Edo state technical colleges could be attributed to a number of factors. Oviawe, Ezejie, and Uwameiye (2015) found that low teaching methods and instructional strategies, students' lack of confidence in the subject (Abkpa & Iji, 2011), and unfavorable learning environments (Olunloye, 2010) are just a few of the factors that contribute to students' poor performance in science and technology areas. Nonetheless, a wealth of research indicates that certain learner personality traits, like interest, may affect students' learning outcomes independent of the instructional approach employed (Keter, Barchok, & Ngene, 2014). Consequently, it is necessary to investigate academic performance in technical drawing from several angles and determine how it links to one's self-efficacy.

Therefore, the goal of the study was to find out how students' academic performance in technical drawing at Edo State's technical colleges correlated with their self-efficacy. The study seeks to generate empirical evidence regarding the specific relationship between self-efficacy and academic performance in technical drawing within Edo State's technical colleges.

Research Question

The following research question was raised to guide the study:

is there any relationship between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges?

Research Hypothesis

In this study, the null hypothesis was formulated and tested at .05 level of significance:

there is no significant relationship between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges.

Methodology

To investigate the relationship between self-efficacy and students' academic performance in technical drawing, a correlational research design was implemented within Edo State technical colleges. Data were collected to determine the strength and direction of the association between these variables. The study population comprised 834 technical drawing students from engineering and construction trades across six Edo State technical colleges. A purposive sample of 322 second-year (Tech II) students was selected, as final-year students were preparing for external examinations and first-year students were deemed too early in their coursework. Data collection instruments included a standardized Technical Drawing Achievement Test (TDAT) and an Academic Self-Efficacy Scale (ASES). The TDAT consisted of 40 objective questions adapted from past National Technical Certificate Examination papers, covering topics within the students' curriculum. The ASES utilized a 10-item questionnaire, derived from the instrument developed by Schwarzer and Jerusalem (1995). The questionnaire was structured into three sections: personal data (Section A), TDAT questions (Section B), and the ASES (Section C). TDAT responses were scored with 2 points for each correct answer and 0 for incorrect answers. Performance levels were categorized as follows: 70-80 (Strongly Agreed), 50-69 (Agreed), 40-49 (Undecided), 30-44 (Disagreed), and 0-28 (Strongly Disagreed). For the ASES, a five-point Likert scale was used: 5 (Strongly Agree), 4 (Agree), 3 (Undecided), 2 (Disagree), and 1 (Strongly Disagree), with a benchmark score of 3.00. While the TDAT was a standardized instrument, the ASES underwent validation by three experts: two from the Vocational and Technical Education Department at Ambrose Alli University, Ekpoma, and one from the Measurement and Evaluation Department at the University of Benin. Feedback from the experts were integrated into the final version of the ASES. Internal consistency of the instruments was assessed using the split-half reliability technique. The instruments were administered to a sample of 20 Tech II engineering and construction trade students from technical colleges in Asaba, Delta State (outside the study area). The resulting data were split into odd and even numbered items, and Cronbach's alpha was calculated to determine the correlation between the two halves, yielding a reliability coefficient of 0.84. Data analysis involved the Pearson Product Moment Correlation Coefficient (PPMCC) to address the research question and simple linear regression to test the hypothesis at a significance level of 0.05. The null hypothesis was rejected if the p-value was less than 0.05 and accepted if the p-value was greater than 0.05.

Data Analysis and Results

Research Question: what extent self-efficacy correlates with students' academic performance in technical drawing in Edo State technical colleges?

Table one: Coefficient of Relationship between Self-Efficacy and Students Academic Performance in Technical Drawing.

S/N	Variables	N	Mean	Standard Deviation	R	P	Remark
1	Self-Efficacy	303	3.88	.49	.161**	.000	Significant
2	Academic Performance		55.44	11.63			

**. Correlation is significant at the .01 level (2-tailed).

Table one reveals the coefficient of relationship between self-efficacy and students' academic performance in Technical Drawing. The mean score and standard deviation for self-efficacy are 3.89 and .49 respectively. The mean score and standard deviation for academic performance are 55.44 and 11.63 respectively. The analysis reveals (r = .161), that there is a positive significant correlation between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges. It therefore denotes that increase in self-efficacy will lead to increase in academic performance in technical drawing in Edo State technical colleges.

Hypothesis: There is no significant relationship between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges.

Table two: Linear regression on the relationship between self-efficacy and students' academic performance in technical drawing in Edo State technical colleges.

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	11.074	10.996		1.007	.314
	Self-Efficacy	1.141	.282	.161	4.038	.000

a. Dependent Variable: Academic Performance

Note: R^2 = .026, Df = 1, 301, F = 16.306, P < .05, t = 4.038, β = .161

Table two reveals that self-efficacy (F (1, 301) = 16.306, β = .161, t = 4.038) had a significant positive influence on students' academic performance in Technical Drawing. The R-square (.026) reveals that 2.6% of the variance in students' academic performance in Technical Drawing is influenced by students' self-efficacy. The null hypothesis (P < .05), is therefore rejected. This implies that there is a significant relationship between students' self-efficacy and students' academic performance in technical drawing in Edo State technical colleges.

Discussion

Analysis of data pertaining to research question one demonstrated a statistically significant, positive correlation between self-efficacy and technical drawing academic performance among students in Edo State technical colleges. Hypothesis testing confirmed this significant relationship. This implies that enhanced self-efficacy in students is associated with improved academic performance in technical drawing. This observation suggests that students possess an awareness of their capabilities and effectively manage drawing-related tasks through planning and preparation. Evidenced behaviors include increased perseverance, practical comprehension, and efficient time and effort management in the context of technical drawing.

This study's findings align with existing research, specifically corroborating Healther et al. (2023) who investigated the connection between academic self-efficacy, self-regulated learning, and academic success among first-year students at a Southeastern technical college and revealed several key predictors positive correlation. Again, the study is in line with that of Honicke et al (2023) that investigated the reciprocal relationship between self-efficacy and academic performance, focusing on the moderating effects of task difficulty and baseline achievement on learner trajectories and revealed a significant positive influence of prior academic achievement on subsequent self-efficacy. The finding of the study is in congruent with that of Fakhrou and Habib's (2022) who revealed a positive correlation between academic self-efficacy and academic achievement. The study is in consonance with that of Khan (2023) that revealed a positive correlation between academic self-efficacy and

academic achievement. Furthermore, the study is in agreement with that of Matovu (2020), whose analysis of university undergraduates confirmed a statistically significant relationship between self-efficacy and academic achievement.

However, the finding of the study is not in tandem with that of Bwenvu (2023) that investigated the correlation between self-efficacy and academic outcomes among Makerere University students and found no statistically significant relationship between students' self-efficacy and academic performance. Furthermore, the study is not in harmony with that of Chanana (2018) that investigated the correlation between self-efficacy and academic achievement among undergraduate students and found no significant association between self-efficacy and academic performance

Conclusion and Recommendations

A study conducted in Edo State Technical Colleges revealed a significant positive correlation between students' self-efficacy and academic performance in technical drawing. This indicates that students who demonstrate a higher level of self-efficacy in technical drawing tend to achieve greater academic performance.

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

1. Implement a system for early identification of disengaged students, providing targeted academic support and personalized mentorship pairings with experience teacher.
2. Integrate participatory psycho-educational programmes and workshops that directly connect students' individual passions with the practical applications and career pathways within technical drawing.

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