

**PERCEPTIONS OF TECHNICAL COLLEGE STUDENTS ON THE  
UTILIZATION OF ARTIFICIAL INTELLIGENCE IN TEACHING OF  
AUTOCAD IN ENUGU STATE**

**BY**

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***Abstract***

*This study investigates technical college students' perceptions of Artificial Intelligence (AI) in AutoCAD instruction in Nkanu West LGA, Enugu State. A descriptive survey design was utilized, incorporating both quantitative and qualitative data. The study's population comprised 573 senior students, with a purposive sample of 163 SS3 students (91 males, 72 females) from two technical colleges. Data was collected via the "Students' Perception AI Enhanced AutoCAD Teaching Questionnaire (SPAETQ)," with a reliability coefficient of 0.75. The study aimed to answer two research questions and test one null hypothesis. Findings revealed significant negative perceptions toward AI, largely due to discomfort, lack of awareness, inadequate infrastructure, and misconceptions about AI's educational role. Students feared AI could replace teachers and devalue hands-on skills essential to vocational training. Both male and female students demonstrated similar perceptions. Recommendations include implementing AI training to improve awareness, upgrading technological infrastructure, and gradually incorporating AI awareness in the scheme and into AutoCAD instruction.*

**Keywords:** AI, AutoCAD, technical education, perceptions, infrastructure, vocational skills.

**Introduction**

AutoCAD represents a sophisticated computer-aided design application that has been developed by the organization Autodesk, which is reflected in its

nomenclature. This software facilitates the rapid and efficient creation and modification of digital two-dimensional and three-dimensional designs, surpassing manual methods in terms of speed and ease. These features comes with numerous advantage, in that the generated files can be conveniently saved and stored in cloud systems, enabling access from various locations at any given time (Charter 2019).

The advantages of AutoCAD are extensive, with numerous professionals across diverse fields utilizing this CAD application. Architects prominently use AutoCAD for creating blueprints and sketches for various structures. The software includes tools for analyzing and addressing architectural design vulnerabilities. Interior designers employ AutoCAD for conceptualizing interior spaces, such as retail and hotel lobbies. Fine artists utilize the software for initial drafts of their artistic creations. Engineers, particularly in mechanical disciplines, apply AutoCAD for manufacturing processes and component designs. Electrical and civil engineers also use AutoCAD for delineating electrical systems and infrastructure planning, respectively (Kriti, 2024).

Technical Colleges primarily prepares its students for skills needed to become architects, interior designers, fine artists, electrical engineers, and civil engineers. These institutions are crucial to vocational education. Vocational schools prepare students for skill-oriented careers. The government recognized a shortage of technical personnel during the third National Development Plan (1975-1980) as a barrier to development. Consequently, the National Science and Technology Development Agency was established in 1972, which evolved into the Federal Ministry of Science and Technology. This agency created a Working Committee focused on Scientific and Technical Manpower and Science Education. The Committee recommended the establishment of the National Board for Technical Education to oversee the implementation of its proposals. The Board, established by Act No. 9 of 1977 and its amendments, advises the Federal Government and coordinates all aspects of technical education, making essential training recommendations for skilled workers (National Board for Technical Education, NBTE, 2024). Technical colleges governed by the NBTE provide students with essential practical skills for industry employment, as mandated by the Act. These colleges play a crucial role in developing vocational skills critical for Nigeria's economic growth (Katelyn, 2016). They also lay the groundwork for producing skilled workers in construction, manufacturing, and technology. These institutions deliver specialized training in engineering, construction, and technical drawing, with AutoCAD being integral to design and drafting curricula. However, technical colleges in Nigeria face challenges, including gender disparities, outdated

curricula, inadequate facilities, and a shortage of qualified instructors. all of which impact the effectiveness of teaching and learning processes(Lawal, 2013)

A study in Chile reveals enduring gender disparities in educational preferences, with women inclined towards service sectors and men towards industrial fields (María, 2019). In Ghana, despite improved access to Technology education for females, many still perceive it as male-dominated. Understanding gender-specific educational choices is essential for addressing the gender gap. Research in Nigeria indicates that technical and vocational education perpetuates gender segregation in labour markets, as programs are frequently tailored to specific genders, reinforcing existing stereotypes (Owodunn, Igwe, Sanni & Onatunde, 2016). Moreover, Alinea and Reyes (2023) contend that the objective of gender mainstreaming in technical and vocational education and training (TVET) remains unmet. Gender disparities and biases persist despite progress in various areas. Furthermore, TVET educators often lack awareness or the willingness to address gender disparities, reflecting a gap in knowledge regarding gender issues in practice.

In addition to gender issues, a significant challenge for technical colleges in Nigeria is the shortage of qualified instructors, particularly in AUTOCAD. Notably, AUTOCAD is the sole focus of the Information and Communication Technology (ICT) Uniform Scheme of work for the entire first and second terms for senior secondary school 3 (SSS3) in Enugu State, as is the case for the Uniform scheme for computer craft studies SS3 (Onah, 2016). Thus, effective instruction in AutoCAD is imperative to enhance students' competencies and competitiveness in the labour market, necessitating a departure from traditional face-to-face teaching methods to accommodate diverse student needs, thereby suggesting a role for artificial intelligence (AI) in revolutionizing AutoCAD education.

Artificial Intelligence entails the development of computer systems capable of performing tasks traditionally requiring human intelligence. The integration of AI in teaching serves to bridge the divide between theoretical knowledge and practical application. AI facilitates the development of innovative curricula by identifying educational content trends and suggesting updates or improvements (Anih & Ukeh, 2024). Within the teaching context, various established types of AI exist, each with unique properties, strengths, and applications. The classifications of AI range from narrow, specialized systems handling specific tasks to the advanced concept of super intelligent AI that exceeds human cognitive capabilities (Walkme, 2023). This study emphasizes AI based on its capabilities.

The capabilities of AI are categorized into three distinct types: Narrow or weak AI, which is specialized for specific tasks; General or strong AI, which emulates human cognitive abilities; and Super intelligent AI, a futuristic concept envisioning AI that surpasses human intelligence. Each category possesses unique capabilities and implications for the future (Chang, 2020). This underscores the necessity for integrating modern technologies, such as this Artificial Intelligence (AI), to enhance educational outcomes in technical colleges. From the foregoing, effort is being made to for all to see the need for AI enhancing teaching of AUTOCAD, however one concept remains unattended to and that has to do with the perception of the students in technical collegetowards this notion of enhancing teaching of AUTOCAD using AI .

Students' perceptions of educational technology are pivotal for the effective integration of innovative teaching methodologies. Positive perceptions enhance engagement and performance, whereas negative perceptions impede technological adoption (Ubaidillah, Baharuddin, Nurizwani & Ismail, 2020). In technical education, students' views on AI's role in AutoCAD instruction are particularly significant. Factors like prior technology exposure, perceived ease of use, and usefulness affect AI acceptance and application in learning (Kahveci, 2010). Grasping these perceptions is vital for educators and policymakers to create supportive interventions that promote favorable attitudes towards AI in technical education curricula.

The implementation of AI in education, especially in developing nations such as Nigeria, encounters obstacles like insufficient technology access, inadequate digital literacy among educators, and infrastructural deficits (Rosé, Martínez-Maldonado, Hoppe, Luckin, McLaren, Mavrikis, Porayska-Pomsta, & du Boulay, 2018 & Afolabi, 2024,). This study's results may significantly influence the encouragement of AI usage in AutoCAD instruction within technical education. For example, a positive perception of AI among students in Nkanu West LGA could facilitate broader AI technology adoption in technical colleges across Enugu State. Policymakers may utilize these findings to formulate strategies that enhance AI implementation in technical education, including infrastructure development, educator training programs, and curriculum initiatives (Sanusi, Agbo, Dada, Yunusa, Aruleba, Obaido, Olawumi, & Oyelere, 2024). Conversely, negative student perceptions may necessitate targeted interventions, such as awareness campaigns and pilot programs, to bolster confidence in AI tool utilization. Thus, the researcher is motivated to investigate students' perception of AI's utilization in AutoCAD instruction, focusing on whether these perceptions are favorable or unfavorable, as detailed in the study titled, Technical College

Students' Perception on the Utilization of Artificial Intelligence in Teaching of AutoCAD in Nkanu West LGA of Enugu State.

Despite the increasing global focus on AI integration in education, numerous technical colleges in Nigeria, particularly in Nkanu West LGA of Enugu State, continue to depend on conventional teaching methods. This technological lag may hinder students' development of essential digital and technical skills crucial for thriving in a rapidly changing job market. Research indicates significant concerns regarding students' readiness to adopt AI in educational settings. It remains uncertain whether students in Nkanu West LGA are acquainted with AI technologies and if they perceive AI as beneficial for enhancing their AutoCAD competencies. Additionally, students' access to technology, availability of AI resources, and educators' readiness to incorporate AI in the curriculum may exhibit considerable variability, complicating the integration of AI in teaching, especially AutoCAD. Moreover, there is a lack of empirical data on students' perceptions, particularly concerning gender differences appears as well to be creating a barrier to the effective integration of AI in AutoCAD teaching. If these perceptions and challenges are not understood, the full potential of AI to improve learning outcomes and reduction in gender inequality in technical education may not be realized. The above therefore is the rationale behind the choice of this research topic; Technical College Students' Perception on the Utilization of Artificial Intelligence in Teaching of AutoCAD in Nkanu West LGA of Enugu State.

The purpose of this study generally is to ascertain the Technical College Students' Perception on

the Utilization of Artificial Intelligence in Teaching of AutoCAD in Nkanu West LGA of Enugu

State. Specifically, this study sought to :

Examine the perceptions of technical college students in Nkanu West LGA of Enugu State on the utilization of Artificial Intelligence (AI) in the teaching of AutoCAD; Investigate gender differences in students' perceptions of AI utilization in AutoCAD teaching in Nkanu West LGA of Enugu State.

### **Research questions**

1. What are the perceptions of technical college students in Nkanu West LGA of Enugu State on the utilization of Artificial Intelligence (AI) in the teaching of AutoCAD?

2. What are the significant differences in the perceptions of male and female students' of technical college in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching?

### **Hypotheses:**

**H<sub>01</sub>** : There are no significant differences in the mean perceptions of male and female technical college students in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching.

### **Methodology**

Descriptive survey research was utilized for this investigation. This methodology integrates quantitative and qualitative data to yield pertinent and precise insights. A time-efficient approach, descriptive survey design centers on the subjects relevant to the research aim. Survey research facilitates the accumulation of extensive data amenable to frequency, average, and pattern analysis (Shona, 2019 & Steve, 2021). The study's population comprised 573 senior students from Technical colleges in Nkanu West for the 2023/2024 academic year. The choice of Nkanu West was based on the fact that Nkanu West by chance has two Technical Colleges which is a rare occurrence, because normally it has always been one technical college per LGA not even all the LGA has one. The two technical colleges are, Technical College Obinagu Uwani Akpugo and Technical College Obe. A purposive sampling method was employed to select 163 Senior Secondary Students in SSS 3, as AutoCAD is exclusively taught in SS3 ICT and Computer Craft studies for secondary education in Enugu State. The sample comprised 91 males and 72 females. Data collection utilized a structured "Students Perceptions AI Enhanced AutoCAD Teaching Questionnaire (SPAETQ)" developed by the researcher. The instrument consists of two sections: Section A addresses demographics, while Section B encompasses the main questionnaire items. The odd-numbered items were positively framed, contrasting with the negatively framed even-numbered items to confirm comprehension. Validity of the SPAETQ was established via face and content validation, and reliability was assessed with a sample of 30 students from a non-Technical College, yielding a Cronbach's Alpha reliability coefficient of 0.75. The SPAETQ was administered to SS3 students with the assistance of their form teachers. Out of 163 distributed questionnaires, 158 were completed and returned; resulting in a return rate of 96.9%, with research questions analyzed using mean and standard deviation. The decision rule was predicated on the real limit of numbers, with response options assigned numerical values: Strongly Agree (SA) = 3.50-4.00; Agree (A) = 2.50-3.49; Disagree (D) = 1.50-

2.49; Strongly Disagree (SD) = 0.00-1.49. A mean above 2.50 was interpreted as “Agreed,” while below 2.50 was deemed “Disagree,” and hypothesis testing employed a z-test at a significance level of 0.05, rejecting the null hypothesis when the significance value was below 0.05.

**Results**

**Research Question 1:**

What are the perceptions of technical college students in Nkanu West LGA of Enugu State on the utilization of Artificial Intelligence (AI) in the teaching of AutoCAD?

**Table 1: Response on the perceptions of technical college students in Nkanu West LGA of Enugu State on the utilization of Artificial Intelligence (AI) in the teaching of AutoCAD**

Item	Statement	X	SD	Decision Ruled
1	AI will make learning AutoCAD easier as well as more engaging.	2.92	1.12	Agreed
2	Students will not feel more comfortable if AI tools are used in teaching of AutoCAD lessons.	3.38	0.97	Agreed
3	Integrating AI into AutoCAD teaching activities will improve students design skills.	1.96	0.61	Disagree
4	AI will not provide clearer explanations compared to traditional methods in AutoCAD teaching.	3.17	0.94	Agreed
5	I think AI will help me learn AutoCAD concepts faster than traditional teaching methods.	2.00	1.23	Disagreed
6	AI cannot help me become more proficient in AutoCAD.	3.03	1.22	Agreed
7	The use of AI in AutoCAD classes will increase my interest in technical subjects.	3.48	1.45	Disagreed
8	AI will not allow me to receive instant feedback on my AutoCAD designs.	3.37	0.93	Agreed
9	Inadequate infrastructure may hinder effective utilization of AI in teaching complex AutoCAD topics more effectively.	3.13	1.19	Agreed
10	AI in AutoCAD teaching will not encourage creativity and innovation in my designs.	3.13	0.90	Agreed
11	AI tools will make AutoCAD lessons more interactive	3.02	0.90	Agreed
12	Utilizing AI in AutoCAD teaching will not motivate me to pursue a career in technical design and engineering.	3.42	1.03	Agreed

Data in Table 1 illustrates the analysis of technical college students' perceptions in Nkanu West LGA, Enugu State, regarding the application of Artificial Intelligence (AI) in AutoCAD instruction. The overall mean scores varied from 2.00 to 3.42, with a clustered mean of 2.51 and a standard deviation of 0.90. The similar standard deviations suggest homogeneity in respondents' answers. The cluster mean result implies that technical college students in Nkanu West LGA of Enugu State possess a negative perception toward the application of AI in improving AutoCAD instruction.

**Research question 2**

What are the significant differences in the perceptions male and female students' of technical college in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching?

**Table 2 Response on** the differences in the perceptions male and female students’ of technical college in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching

Item	Statement	X	SD	Decision
1	Male students will find AI tools more helpful in learning AutoCAD than female students.	2.29	1.23	Disagreed
2	Female students do not feel equally confident as male students when using AI in AutoCAD classes.	2.00	1.25	Disagreed
3	Male students believe AI will enhance their creativity in AutoCAD more than female students do.	2.05	0.99	Agreed
4	Female students do not consider AI a useful resource in AutoCAD learning, just as much as male students do.	2.68	1.35	Agreed
5	Male students feel AI will provide them with better job opportunities in AutoCAD than female students do.	2.22	0.97	Disagreed
6	Female students are not more open to using AI for AutoCAD than male students.	3.05	1.02	Disagreed
7	There is no significant difference in how male and female students perceive the role of AI in AutoCAD.	3.34	1.03	Agreed

Data in Table 2 examines the perception differences between male and female technical college students in Nkanu West LGA, Enugu State, concerning AI utilization in AutoCAD instruction. The overall mean scores also ranged from 1.25 to 3.34, with a cluster mean of 2.53 and a standard deviation of 0.97. The similar standard deviations further indicate homogeneity among respondents. The cluster mean outcome reveals no perceptual differences between male and female technical college students in Nkanu West LGA, Enugu State, regarding AI application in AutoCAD teaching, reflecting analogous apprehensions and interests towards AI technologies.

## Hypothesis



**H<sub>01</sub>:** There is no significant difference in the mean perceptions of male and female technical college students in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching.

**Table 3: Summary of z-test Analysis of the Mean Ratings of perceptions of male and female technical college students in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching.**

Group	n	$\bar{x}$	SD	df	Level of Sig	Z <sub>cal</sub>	Z <sub>crit</sub>	Decision
Male	90	3.19	0.89	156	0.05	1.01	1.96	Not Rejected
Female	68	3.04	1.12					

Data from Table 3 indicate that with 156 degrees of freedom, Z<sub>cal</sub> 1.01 exceeds the 0.05 significance threshold established for the study. Consequently, the null hypothesis remains unchallenged, suggesting no significant difference in the mean perceptions of male and female technical college students in Nkanu West LGA of Enugu State on the utilization of AI in AutoCAD teaching.

**Discussion of Findings**

The findings of this study reveal negative perceptions among technical college students in Nkanu West LGA, Enugu State, regarding the use of Artificial Intelligence (AI) in teaching AutoCAD. Many students expressed discomfort with AI tools, indicating a lack of awareness of what AI is all about and apprehension towards adopting such advanced technology. This aligns with existing research showing that inadequate exposure to digital tools in technical education creates barriers to AI adoption (Attaran, Attaran, & Kirkland, 2019). The students expressed concerns about AI’s complexity, viewing it as overly challenging and inaccessible due to their limited prior exposure to advanced technologies. This aligns with Reuben, Samuel, and Lawal, (2024)., who found that students in Nigerian technical institutions often lack the necessary digital skills to engage effectively with AI tools.

The study highlights as well that, students misgiven AI could replace human teachers, leading to a reduction in personalized instruction. This is consistent with the work of Brynjolfsson, McAfee, and Vemuri, (2014), who argue that AI’s integration in education is often misunderstood, leading to resistance based on fears of human redundancy. Students seem to misunderstand AI’s potential to complement traditional teaching, instead perceiving it as a threat to their learning experience. The lack of adequate infrastructure was another significant issue

raised by students. They pointed to insufficient access to AI-compatible tools and technology, which limited their ability to utilize AI in AutoCAD effectively. This finding is supported by Nwaimo, Njoku, Ugwu, Akujor, Ejiogu, Nwoko, Ozurumba, and Ubah, (2024), identified infrastructure deficits as a major barrier to the adoption of educational technology in Nigerian institutions.

Also students expressed skepticism about the relevance of AI in practical, hands-on fields like AutoCAD. They believed AI's role could undermine the value of manual skills, which are central to their vocational training. Hisham and Samir (2023) stated that this fear of automation replacing skilled labor contributes to the reluctance to embrace AI in technical fields. In conclusion, the study highlights significant obstacles, including a lack of digital literacy, fear of teacher displacement, inadequate infrastructure, and concerns about automation, which hinder AI adoption in AutoCAD instruction. This worry could undermine efforts to modernize technical education, particularly in regions like Nkanu West, where job security is a primary concern. In conclusion, the study indicates a need for better infrastructure, training, and awareness to shift these negative perceptions of AI in technical education. Without addressing these concerns, the potential benefits of AI in enhancing AutoCAD instruction may remain unrealized.

The findings of this study suggest no significant differences in the perceptions of male and female technical college students in Nkanu West LGA, Enugu State, regarding the utilization of Artificial Intelligence (AI) in teaching AutoCAD. Both male and female students demonstrated similar levels of apprehension and interest toward AI technologies. This aligns with studies such as those by Adigun and Ishola (2021), which found that gender, does not significantly influence students' attitudes toward adopting educational technologies, including AI. The lack of gender-based differences could be attributed to equal exposure (or lack thereof) to technological tools within the technical education curriculum. Studies by Alimi, Buraimoh, Aladesusi, and Omolafe (2021). Support this, indicating that when male and female students have access to the same educational resources and learning environments, their attitudes toward technology, including AI, tend to converge. Moreover, both genders in this study expressed similar concerns about infrastructure and teacher replacement by AI, reinforcing the notion that broader systemic issues, such as insufficient resources and training, affect all students regardless of gender Eteng-Uket, & Eteng, (2024). Again, this study aligns with broader research, indicating that male and female students share common perceptions of AI in education, particularly when exposed to similar learning conditions.

## **Conclusion**

In conclusion, this study reveals a negative perception of AI enhanced teaching idea among technical college students in Nkanu West LGA, Enugu State, regarding its role in AutoCAD instruction as not applicable. Identified barriers include student discomfort with AI tools, stemming from suspected lack of AI awareness, inadequate infrastructure, and misconceptions about AI's educational role. Concerns were raised about AI replacing teachers and undermining essential hands-on vocational skills. These perceptions highlight systemic challenges in Nigeria's technical education, such as insufficient technological infrastructure and limited exposure to advanced technologies. Additionally, the study corroborates existing research indicating similar perceptions of AI in education among both male and female students in equivalent learning environments.

### **Recommendations**

- 1 To mitigate discomfort with AI tools, technical colleges should implement comprehensive AI training and awareness initiatives. These programs should aim to enhance digital literacy, illustrate AI's supportive educational role, and clarify its complementarity to hands-on skills and educators.
- 2 The government and educational institutions must invest in upgrading the technological infrastructure of Nkanu West LGA's technical colleges. Providing access to AI-compatible tools will facilitate students' effective engagement with AI in AutoCAD and other disciplines.
- 3 To facilitate AI adoption, educators should gradually incorporate AI components into AutoCAD instruction, allowing students to learn at a manageable pace. This strategy would alleviate automation concerns and enhance understanding of AI's vocational training benefits.

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