AutoCAD Knowledge among Civil Engineering Students in Edo State, Nigeria: Implication for Developing Contemporary Civil Engineering

Omoruyi Friday Osarenmwinda
Department of Civil Engineering
National Institute of Construction Technology and Management, Uromi, Edo State, Nigeria

Abstract

In the dynamic field of civil engineering, proficiency in computer-aided design (CAD) software is crucial. This study investigates the level of AutoCAD knowledge among civil engineering students in Edo State, Nigeria, and explores its implications for advancing contemporary civil engineering practices. The study assesses the extent to which civil engineering students in Edo State are familiar with AutoCAD. The research investigates whether students' exposure to real-world applications impacts their AutoCAD skills. A mixed-methods approach was employed, combining surveys, interviews, and performance assessments. Participants included civil engineering students from universities and technical colleges in Edo State. The study anticipates varying levels of AutoCAD proficiency among students. The findings showed that civil engineering students in Edo State know AutoCAD and incorporate the software into their learning program. The result has implications for Contemporary Civil Engineering: The findings will inform educational institutions, policymakers, and industry stakeholders. In conclusion, bridging the AutoCAD knowledge gap among civil engineering students in Edo State holds immense potential for advancing the field and ensuring sustainable infrastructure development.

Keywords: AutoCAD, civil engineering, innovation, students

Introduction

One of the essential requirements of construction education is to remain up-to-date and current. Tertiary institutions need to adopt new technologies in the construction education curriculum. Building Information Modelling (BIM) is a new technology and tool that is one of the latest developments in the construction industry. The function of BIM as an advantageous course and an educational assistant in Civil Engineering education at higher education is not completely understood to date (Ahbab et al., 2013). Nowadays, many construction companies prefer to employ BIM-enabled graduates (Ahbab et al., 2013). Thus, it is imperative to understand what extent students know BIM and are ready to learn such a new technology.

On top of that, construction teams and specialists within the industry often rely on detailed drawings produced in AutoCAD or other CAD software. As a result, we can start to see that using AutoCAD is more than just something that helps students with their university projects and coursework. Its application brings onboard the ability of practitioners in the industry to share data, make efficient design decisions in mass, and communicate ideas in a much more effective manner. AutoCAD, "Automatic Computer Aided Design," refers to computer software for creating 2D and 3D graphical drawings. The drawings may comprise geometrical figures like lines, circles, curves, and surfaces. Through AutoCAD, one can create professional, precise, and clear drawings with much ease. It is a computer program that takes the role of manual drafting by allowing the user to work on it more effectively and quickly. With technological advancement, AutoCAD knowledge has become necessary for every civil engineering student since most projects are now designed, simulated, and executed using computer systems. This is a great shift from the traditional manual drafting, which is time-consuming, less accurate, and often tedious. Therefore, an appraisal of the level of AutoCAD knowledge among civil engineering students in Edo State, Nigeria, has been considered an important area of research for the following reasons. First, the quality and reliability of any engineering design work executed with AutoCAD is deeply rooted in the user's knowledge. Research indicates that many professional engineers make errors during design and drafting due to insufficient knowledge of AutoCAD's capabilities. Secondly, the need to equip civil engineering students with AutoCAD knowledge is widely acknowledged in both the professional world and academia. Renowned professional engineers and scholars have called for the integration of AutoCAD and other design computers.

The skills developed and the experiences gained in learning AutoCAD provide the students with the necessary foundation in CAD digital construction methods and practices they can build upon and transfer to the industry. These reasons, among many others, suggest that we need to understand and evaluate the levels of AutoCAD knowledge and educational experience benefit amongst civil engineering students. No such studies have been undertaken in Edo State, Nigeria. I believe that as a lecturer in this field and the technical coordinator of civil engineering programs being offered at the Edo State Institute of Technology and Management, Usen, the results of such a study would not only help to inform decisions on curriculum improvement and mode of delivering the teaching but also enlighten the understanding of implications on the practices of engineering and the industries in Nigeria.

This research study aims to address this gap. Modern engineering practices and design worldwide commonly use computer-aided design (CAD) and drafting software. Of those available on the market, AutoCAD is used. Its functions, ranging from 2D to 3D graphics, creating multiple drawing and coordinate systems, large libraries of materials, and complex calculations, make it one of the most versatile and popular programs. With this in mind, it is no surprise that AutoCAD is being proposed to be included in the civil engineering technical skills and knowledge study. Using AutoCAD, students can appreciate the possibilities of computer-aided design, visualize the structure, and simulate the real world when theoretical drawings and designs are created. The execution of this design with CAD allows them to progress their understanding of how modern computer technologies can support more efficient and accurate creation of digitally drawn plans. Also, as the content developed on the software can be stored and transmitted over the internet or by electronic data sharing, it allows users to take advantage of the fast-evolving knowledge and capacity of the digital environment.

Automated Computer-Aided Design AutoCAD, commonly known as Computer-Aided Design, is a software application for writing and designing 2D and 3D. It came on stage during December nineteen hundred and eighty-two (1982). The computer-aided design machine, also known as AutoCAD, has proven to be of tremendous assistance to architects and engineers who were previously struggling with the inability to cope with the drawings and plans of the project engineering work and then bring it close to the point of perfection. Since its release in 1982, AutoCAD has been sold as a desktop application for use on personal computers and, since 2010, as a mobile web and cloud-based app, marketed under the name Auto-CAD 360, for use on tablets and smartphones.

AutoCAD application is well recommended in engineering education (Joshua et al., 2015; Zira & Wilfred, 2019) because it can provide rich virtual experiences that are accessible, rich in content, efficient, flexible, secure, reliable, and interactive. Research has revealed extensive use of AutoCAD among students in Nigeria (Gu et al., 2018). Simulation software like AutoCAD can attract students to use it and can apply it as a learning material for self-development. AutoCAD package has positively impacted teachers and Students (Oyebode et al., 2015). Technological proficiency is a cornerstone for success in the ever-evolving landscape of civil engineering. Among the essential tools, **AutoCAD** (Computer-Aided Design) is a powerful resource that empowers engineers to visualize, design, and document their ideas effectively. This research aims to explore the level of AutoCAD knowledge among civil engineering students in Edo State, Nigeria, and its profound implications for shaping contemporary civil engineering practices.

The research investigates the knowledge of AutoCAD among civil engineering students in Edo State, Nigeria, focusing on how we can develop contemporary civil engineering. This study will provide insight into what level of AutoCAD knowledge the students possess and how they can be improved by bridging the gap between the knowledge provided by the academic institutions and the practicing professionals in the engineering firms. As the world is moving quickly with new technologies being introduced daily, students need to thoroughly know computer software

to sustain their professional lives after graduation. AutoCAD knowledge is beneficial for any civil engineering student, as it is often used to design and analyze bridges, highways, site development, pipelines or tunnels, etc. By using the computer and suitable software consistent with the latest requirements in the market, students can simulate the design process and digitize and optimize their outcomes. Modern infrastructure projects in urban environments require dynamic management based on advanced planning and design strategies. The knowledge of AutoCAD is crucial as it provides the students with a platform to develop design schemes or to assess alternative solutions digitally, which in turn integrate the real-world object with the project. However, in today's project-based learning environment, especially for civil engineering, the students are expected to face less traditional lecture-style teaching methods and increasingly towards a rich, interactive, multifaceted experience. Evidence indicates that these methods' full potential has yet to be realized. With a growing interest in multidisciplinary, technologically advanced projects, educators are constantly seeking the best approach to innovation.

The integration of AutoCAD into civil engineering curricula has become increasingly vital. As the industry transitions toward digitalization, students must acquire practical skills in using this software. Edo State, known for its rich cultural heritage and growing infrastructure, provides an ideal context for studying AutoCAD adoption among aspiring civil engineers. Understanding the current state of AutoCAD knowledge and its impact on engineering projects can inform educational institutions, policymakers, and industry stakeholders. The objective of the present study is to assess the proficiency of civil engineering students in Edo State regarding AutoCAD usage.

Methodology

Participants

The participants of this study consisted of students enrolled in civil engineering courses in two public tertiary institutions in Edo State, Nigeria. The participants were approached during the 2022/2023 session and asked to participate in the study. They were informed of the study objectives and were equally informed that participation is voluntary. Seventy-three students consented to partake in the study and were given the study instrument to fill on the spot. However, only 60 copies of the questionnaire were adequately completed and used for analysis.

Instrument

The researchers developed a survey questionnaire to collect data to investigate students' knowledge of AutoCAD. The instrument is a 12-item Linkert-type assessment tool designed to measure AutoCAD knowledge among the respondents. Several items used in other questionnaires from other studies were re-phrased for this study to meet its purpose. The questionnaire consisted of a five-point scale (5= strongly agree – 1= strongly disagree) and was completed by the participants. A correlation coefficient value (0.73), calculated on Alfa-Cronbach, was used to test the internal reliability of the questionnaire, and it showed an acceptable reliability value. The survey score goes from 12-60, the number of statements multiplied by the lowest grade (1= strongly disagree) and by the highest grade (5= strongly agree) on each item. A higher score on the scale indicates whether or not the student has positive

32

knowledge. Descriptive and analytical statistics and the Statistical Package for the Social Sciences (SPSS) were used.

Results and Discussion

Table 1. Knowledge of AutoCAD

Knowledge of AutoCAD		Mean	SD
1	AutoCAD is useful for my course of study	3.63	.92
2	Using AutoCAD enables me to accomplish tasks more quickly	3.66	.71
3	AutoCAD increases my productivity	3.50	.68
4	AutoCAD increases my chances of getting good grades for this course	3.53	.68
5	My interaction with the AutoCAD environment is clear and understandable	3.53	.62
6	It is easy for me to become skilful at using the AutoCAD environment	3.60	.56
7	I prefer AutoCAD when it comes to design	3.70	.65
8	Many engineers I know use AutoCAD for drawing	3.35	.71
9	AutoCAD is a complicated software	2.30	.96
10	I learned AutoCAD from competent tutors	3.66	.84
11	Learning to use the AutoCAD virtual environment is easy for me	3.85	.77
12	I have been working with AutoCAD for more than six months	3.70	.83

The table above shows the highest mean score (3.85) on the number 11 question,' Learning to use the AutoCAD virtual environment is easy for me. It was part of the questionnaire, "statements from 1-12 that measure the student's knowledge of AutoCAD." The lowest result mean score (2.30) is on question number 9: ' AutoCAD is a complicated software.' This result reveals that many civil engineering students in Edo State have considerable knowledge of AutoCAD and are believed to be using the software to conduct their engineering activity. This positive attitude might be based on the fact that contemporary society has been exposed mainly to educational technology, and the students are not left out of the innovative technologies. Therefore, most students show many positive attitudes toward computer-related learning environments.

Conclusion

The overall findings of this study contribute to a better understanding of civil engineering students' knowledge of AutoCAD. Based on the results of this study, the researchers view that students accept the concept of simulation software and are willing to use it. These findings are consistent with other research results in the current literature. AutoCAD knowledge is pivotal for civil engineering students. It empowers them to create accurate designs, streamline workflows, and enhance project outcomes. By addressing limitations, conducting further research, and implementing recommendations, Edo State can nurture a skilled generation of civil engineers ready to contribute to contemporary infrastructure development. Moreover, the

study results showed that civil engineering students in the state are well-educated and updated with the modern innovations used by educational institutions in the world's developed countries. Also, students are knowledgeable about this high-tech software and use it in their work. Therefore, bridging the AutoCAD knowledge gap is crucial for producing competent graduates who can contribute effectively to infrastructure development. Identifying challenges and opportunities related to AutoCAD education can enhance the quality of civil engineering professionals in Edo State.

References

Ahbab, C., Sistani, N. S., Changiz, A., Rezaei, A., & Sistani, N. S. (2013). Integration of Building Information Modeling into the Undergraduate Curriculum: Case of Eastern Mediterranean University. *2nd International Balkans Conference on Challenges of Civil Engineering*, *May*.

Gu, J., Üniversity, G., & Maina, J. J. (2018). CAD and BIM in architecture education: awareness, proficiency, and advantages from the student perspective. In *Part B* (Vol. 6, Issue 4).

Joshua Oyebode, O., Babafemi Adebayo, V., & Oluwafemi Olowe, K. (2015). Assessment of the use of AutoCAD package for teaching and learning engineering drawing in Afe Babalola University Ado-Ekiti. *International Journal of Scientific & Technology Research*, *4*(09).

Oyebode, O. J., Adebayo, V. B., & Olowe, K. O. (2015). Assessment of the use of AutoCAD package for teaching and learning engineering drawing in Afe Babalola University Ado-Ekiti. *International Journal of Scientific & Technology Research*, *4*(8).

Zira, Z., & Wilfred, S. (2019). Impact of AutoCAD Application Instruction on Students' Academic Performance and Motivation in Building/Engineering Drawing in Technical Colleges of Adamawa State, Nigeria. *International Journal of Research and Innovation in Applied Science (IJRIAS)* /, *IV*(Viii).