

Effect of Revit Software on Students' Retention in Building Drawing in Colleges of Education in North - West Nigeria

Ahmad Suleman Mamman Dee¹; Samalla Hamza²; Haruna Angulu³; Garba Dahiru⁴

¹Department of Technical Education School of Secondary Education Vocational and Technical Isa Kaita College of Education Dutsin – Ma Katsina State

²Department of Construction Technology Education Faculty of Technology Education Abubakar Tafawa Balewa University Bauchi

³Department of Construction Technology Education Faculty of Technology Education Abubakar Tafawa Balewa University Bauchi

⁴Department of Library and Information Technology Faculty of Technology Education Abubakar Tafawa Balewa University Bauchi

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Abstract: This study investigated the effect of Revit software on students' retention in Building Drawing. The study adopted a quasi-experimental non-equivalent control group design involving an experimental group taught using Revit software and a control group taught using the conventional teaching method. The sample consisted of experimental group with intact class of 25 students and control group with an intact class of 21 students. The instruments used for data collection was developed by the researchers tag retention test (RT). It was pilot tested using test-retest method yielding correlation coefficient of 0.876. Data collected was analyzed using mean, standard deviation, and independent sample t-test. The study found that students exposed to Revit software (experimental group) had better retention of knowledge and practical skills than student in (conventional group). The study concluded that Revit software is an effective instructional tool that enhances students' retention. It was recommended that Revit software be integrated into the teaching of Building Drawing, teachers be trained on its use, and schools be equipped with adequate ICT facilities.

Keywords: Revit Software, Retention, Building Drawing, Building Information Modelling, Conventional Teaching Method.

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I. INTRODUCTION

Building drawing is a fundamental component of technical and vocational education, particularly in disciplines related to construction and architecture. It involves the representation of building structures through graphical means, enabling students to communicate design ideas effectively. Traditionally, building drawing has been taught using manual drafting techniques, which often limit students' ability to visualize complex structures and may reduce their engagement in the learning process.

The level of awareness of Revit is becoming increasingly massive globally both in advanced countries and developing nations of the world Architecture, Engineering, and Construction (AEC) professionals are beginning to key

into this new paradigm shift, which is becoming more versatile with steady technology improvements. The benefits are endless and new frontiers of the tool are being discovered. Autodesk (2020) defined Revit software as the holistic process of creating and managing information for a built asset through an intelligent model and enabled cloud platform that helps integrate structured multi-disciplinary data to produce a digital representation of an asset across its lifecycle. It's also a sustainable and integrated collaborative process that unites all project stakeholders through its digital information storage and editing systems to facilitate seamless design documentation, construction, and building operations for shared benefits of improved accuracy, productivity, communication, decision-making, waste reduction and efficiency of time, energy and water resources,

Building on the above, Revit not only offers a more accurate representation of a building design, but it also pulls documents into a single database that several people can work on at the same time allowing for instant updates. Using a Revit model also allows you to provide clients with much more insight into the project than they would previously have had. However, there is still a lack of widespread adoption of Revit software in the industry at the moment, and so there may be problems with partnering up with people if you are using Revit software and they are not. There is also a lack of experts in the space at the moment as the technology is so new, therefore training can be somewhat of an issue too. So, to sum up, although there are some parallels between CAD software and Revit software, they are two very different things. CAD software deals with the process of designing floor plans and models mostly while Revit software can be used for this but also for so much more as well. Revit software is based around models used for the planning, design, construction, and management of building and infrastructure projects.

➤ *Statement of the Problem*

Traditionally, the teaching and learning of building drawing have relied heavily on manual drafting methods. However, these conventional approaches are often associated with several challenges, including students' weak retention of concepts. Many students find manual drawing tedious, time-consuming, and difficult to master, which negatively affect their overall learning outcomes. Furthermore, there is a growing concern about students' Poor retention of learned concepts also remains a critical issue, as students often struggle to recall and apply previously learned skills in subsequent tasks or real-life situations.

Although studies have examined the use of computer-aided design tools in education, there is still insufficient empirical evidence on the specific effect of Revit software on retention in building drawing at the NCE level. This gap is knowledge gap which makes it necessary to investigate whether the use of Revit software can significantly improve students' learning outcomes compared to conventional methods.

➤ *Objective of the Study*

The aim of this study was to determine the Effect of Revit software on Students' Retention in Building Drawing in Colleges of Education in North West, Nigeria.

Specifically, the study seeks to:

- Find out the difference between the mean retention scores of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North West, Nigeria.

➤ *Research Question*

The following research questions were formulated to guide the study:

- Find out the difference between the mean retention scores of students taught Building Drawing using Revit software

and those taught using conventional teaching method in Colleges of Education in North West, Nigeria.

➤ *Hypothesis*

The following null hypothesis was formulated for the study and tested at 0.05 level of significance

- H_{01} : There is no significant difference between mean retention scores of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North - West, Nigeria.

➤ *Significance of the Study*

This study will be of significant to several stakeholders, including school administrators, researchers, and government agencies.

➤ *Scope of the Study*

This study focused on the effect of Revit software on students' retention in Building Drawing in Colleges of Education in North West Nigeria. To determine the effect of Revit software in teaching Building drawing as against conventional method.

II. LITERATURE REVIEW

The integration of Information and Communication Technology (ICT) into education has become one of the most significant developments in contemporary teaching and learning environments. Across the world, educational institutions increasingly utilize digital technologies to improve instructional delivery, students' engagement, collaborative learning, practical competencies, and knowledge retention. ICT integration involves the application of technological tools such as computers, internet systems, multimedia platforms, simulation software, digital communication technologies, and virtual learning environments to facilitate effective teaching and learning processes. Contemporary scholars emphasized that ICT has transformed educational systems from traditional teacher-centered environments into interactive, learner-centered, and technology-supported instructional settings capable of improving students' cognitive participation and practical understanding (Dwivedi et al 2023, Petko 2025, ElSayary 2026, Gupta et al 2026). Similarly, recent educational technology studies revealed that ICT integration significantly improves students' motivation, collaborative interaction, creativity, problem-solving abilities, and academic performance across different fields of study (Nikolopoulou et al 2021, Bervell & Umar 2023, Alenezi, 2024, Turk et al 2022).

Among modern digital instructional technologies, Revit software has gained significant recognition within technical education because it supports intelligent three-dimensional modelling, collaborative design activities, virtual simulation, and integrated construction documentation. Contemporary BIM education studies revealed that Revit-supported instructional systems significantly improve students': spatial visualization, technical creativity, psychomotor

competencies, collaborative learning, and conceptual understanding (Agirbas 2020, Oyesode et al 2023, Bui et al 2023, Sacks et al 2021).

Recent studies further revealed that digital instructional technologies significantly improve retention because interactive learning environments encourage repeated engagement and deeper cognitive processing of instructional content (Nikolopoulou et al 2021, Turk et al 2022, Bervell & Umar 2023, Alenezi, 2024). Within Building Drawing education, Revit-supported instructional systems enable students to repeatedly interact with virtual models, modify designs, simulate construction activities, and practice technical procedures, thereby improving conceptual retention and long-term understanding. Contemporary BIM education research established that visualization-based instructional systems enhance students' retention because learners are able to connect theoretical concepts with practical virtual representations (Oyesode et al 2023, Bui et al 2023, Agirbas, 2020, Sacks et al 2021). Scholars further argued that technology-supported instructional systems reduce cognitive abstraction and improve students' ability to remember technical concepts over extended periods.

➤ Research Design

This study adopted a quasi-experimental non-equivalent control group design.

➤ Area of the Study

The study was conducted in North-West Nigeria. The region consists of seven states namely: Kaduna, Kano, Katsina, Kebbi, Jigawa, Sokoto, and Zamfara.

➤ Population of the Study

The population of the study comprised all NCE III Building Technology Education students in Colleges of Education within North-West Nigeria.

➤ Sample and Sampling Techniques

The sample for the study consisted of selected NCE III Building Technology Education students from sampled Colleges of Education within North-West Nigeria. Purposive selection of Colleges of Education offering Building Technology Education. Selection of intact classes for experimental and control groups and assignment of institutions into experimental and control groups.

➤ Instrument for Data Collection

The study employed one (1) instrument for data collection as follows:

The Instrument for the Retention test was drafted by the researcher based on the NCCE (2020) Minimum standard course content of Building Technology Education. The instruments have one (1) section with two (2) questions from Building Drawing topic and Sub topic of Building plan, and Elevations.

➤ Validation of the Instrument

The Retention Test instrument was subjected to face and content validation to ensure its suitability and effectiveness in measuring what it was intended to measure.

➤ Reliability of the Instrument

A pilot study of the research instruments was carried out in two Colleges of Education in North-Central. This is to ensure that instrument measure what is expected to measure based on the research objective and research question.

➤ Method of Data Collection

Direct approach was employed in collecting data from the participants.

➤ Method of Data Analysis

The data collected was analyzed using Mean and Standard deviation to answer research question and Null hypotheses was tested at 0.05 level of significance.

➤ Research Question One

Find out the difference between the mean retention scores of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North-West, Nigeria.

A descriptive statistics was performed to find out the difference between mean Retention scores of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North-West Nigeria. The results in Table 1, revealed that there was a difference in the Retention scores of Experimental group ($M = 3.85$, $SD = 0.316$) and that of those in conventional group ($M = 2.79$, $SD = 0.330$). This indicated that Experimental group have better Retention ability than their counterpart in conventional group.

Table 1 Descriptive Statistics of Mean Retention Scores of Students Taught Building Drawing Using Revit Software and those Taught Using Conventional Teaching Method in Colleges of Education in North-West, Nigeria

Variable	Group	N	Mean	Std. Dev	MD
Retention	Experimental	25	3.85	.316	
	Conventional	21	2.79	.330	
	Total	46			1.09

Note: N=Number of Students, Std. Dev= Standard Deviation, MD=Mean Difference

➤ Test of hypothesis 1

- H_{01} There is no significant difference between mean retention scores of students taught Building Drawing using Revit software and those taught using conventional

teaching method in Colleges of Education in North-West, Nigeria.

The statistical evidence of Independent sample t-test presented in Table 2 indicated that there was a statistically

significant difference between the mean Retention scores of students in Experimental group ($M = 3.85$, $SD = 0.316$) and those in the conventional group ($M = 2.79$, $SD = 0.330$), $t(44) = 11.115$, $P < .001$. Null Hypothesis one was therefore

rejected. This finding indicated that students taught Building Drawing using Revit software retained significantly more of the concepts and skills learned than students taught Building Drawing using conventional teaching method.

Table 2 Independent Samples T-Test of Mean Retention Scores of Students Taught Building Drawing Using Revit Software and those Taught Using Conventional Teaching Method in Colleges of Education in North-West, Nigeria.

Levene's Test for Equality of Variances									
Variable	Groups	N	F	Sig.	t-value	Mean	Std. Dev	p-value	Decision
Retention	Experimental	25	.769	.385	11.115	3.85	.316	.000	Rejected
	Conventional	21				2.79	.330		

➤ Finding of the Study

The finding of Research Question one revealed that students taught Building Drawing using the Revit instructional approach demonstrated higher retention of Building Drawing concepts than students taught using the conventional instructional method. The students in the Experimental group retained significantly more of the knowledge and skills acquired during instruction, indicating that the Revit instructional approach enhanced long-term learning and knowledge retention. This finding is supported by the corresponding Hypothesis one, which showed that there was a statistically significant difference between the mean retention scores of students in the Experimental and conventional groups in favour of the Experimental group. This implies that Revit-based instruction was more effective than the conventional teaching method in improving students' retention of Building Drawing concepts in Colleges of Education in North-West, Nigeria.

III. DISCUSSION OF THE FINDING

The finding of Research Question, together with the corresponding Hypothesis, revealed that students taught Building Drawing using the Revit instructional approach demonstrated significantly higher retention of Building Drawing concepts than those taught using the conventional instructional method. This finding suggests that the Revit instructional approach enhanced students' long-term retention by providing meaningful learning experiences through practical engagement, visualization, and repeated interaction with digital building models. The finding is consistent with Azhar (2011), who reported that Building Information Modelling facilitates deeper understanding and long-term retention of construction concepts because learners actively interact with realistic digital representations during instruction. Similarly, Sampaio (2018) found that BIM-based learning environments significantly improved students' retention and transfer of knowledge in construction and architectural education. In the Nigerian context, Mohammed and Ibrahim (2023) also reported that technology-enhanced instructional strategies significantly improved students' retention of technical concepts compared with conventional teaching methods. The implication of this finding is that Revit-based instruction promotes meaningful learning by enabling students to visualize, manipulate, and repeatedly apply Building Drawing concepts, thereby improving their ability to retain and recall knowledge over time.

IV. SUMMARY

The study investigated the Effect of Revit Software on Students' Retention in Building Drawing in Colleges of Education in North-West, Nigeria. The study was necessitated by the persistent low retention of Building Drawing concepts among students, which have largely been attributed to the continued reliance on conventional teaching methods that provide limited opportunities for visualization, interaction, and practical engagement. The study was guided by a specific objectives a research question with a corresponding null hypothesis, all of which focused on determining the effect of Revit software on students' retention in Building Drawing. To provide a sound theoretical and conceptual foundation, an extensive review of relevant literature was undertaken, covering concepts related to Building Drawing, Revit software, Building Information Modelling (BIM), students' retention.

V. CONCLUSION

The study concluded that the use of Revit software as an instructional tool significantly enhances students' retention in Building Drawing compared with the conventional teaching method. The integration of Revit software provides an interactive and practical learning environment that promotes better visualization, deeper understanding of building concepts, and improved problem-solving skills. Consequently, Revit software represents an effective instructional innovation capable of improving the quality of teaching and learning in Building Technology education in Colleges of Education. Its adoption will contribute to producing graduates with the digital competencies and professional skills required in the modern construction industry.

RECOMMENDATIONS

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

- Students should be encouraged to develop competence in the use of Revit software through regular practical exercises, assignments, and collaborative design projects.
- Lecturers should adopt learner-centered instructional approaches that integrate Revit software to promote active participation, creativity, and practical skill acquisition among students.

➤ *Contributions to Knowledge*

- The study demonstrates that students taught with Revit software retain Building Drawing concepts more effectively than those taught through conventional teaching methods, thereby contributing new evidence on the role of digital instructional technologies in enhancing knowledge retention.

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