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# Effect of Revit Software on Academic Performance in Building Drawings among Colleges of Education Students in North-West, Nigeria

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## Abstract

*This study investigated the effect of Revit software on students' academic performance in Building Drawing in Colleges of Education in North-West Nigeria. The study was guided by two specific objectives, two research questions and two null hypotheses. A quasi-experimental research design, specifically the pretest-posttest non-equivalent control group design, was adopted. The study was conducted in Colleges of Education in North-West Nigeria. Two colleges of Education were selected using a simple random sampling technique the sample consisted of one experimental group with intact class of 25 students and one control group with an intact class of 21 students. Data were collected using the researcher developed Building Drawing Performance test questions (BLDDRWPTQ), consisting of two questions designed to measure students' performance practical skills. The instruments were pilot-tested using test-retest method, yield correlation coefficient of 0.876 and 0.717 respectively. The data were analyzed using means, standard deviations and independent sample-t-test. The findings revealed a statistically significant difference in the posttest mean academic performance scores of students exposed to Revit software and those taught using the conventional teaching methods. The finding underscores the potential of Revit software to enhance students' academic performance*

***Keywords:*** Revit software, Building Drawing, performance, Building information modelling (BIM)

## Introduction

With the advancement of technology, digital tools such as Revit software have transformed the way building drawing is taught and learned. Revit is a Building Information Modelling (BIM) software that allows users to design, visualize, and simulate building structures in a three-dimensional environment. This interactive capability enhances students' understanding by providing realistic representations of building components. 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

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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. Academic performance in building drawing is influenced by several factors, including teaching methods, instructional materials, and students' level of interest. Conventional teaching methods are often teacher-centered and may not adequately support active learning. As a result, students may experience difficulties in understanding concepts, leading to poor performance and low retention.

## Statement of the Problem

With the advancement of technology, software such as Revit has been introduced as a modern tool for architectural design and building drawing. Revit offers features such as 3D modeling, visualization, and automation, which have the potential to enhance students' understanding and engagement. Despite these advantages, the integration of Revit software into teaching and learning in Colleges of Education, especially in North-West Nigeria, appears to be limited. Consequently, students continue to experience difficulties in grasping Building Drawing concepts effectively. Furthermore, there is a growing concern about students' declining Performance in building drawing course, which may be linked to the persistent use of conventional teaching methods.

## Objective of the Study

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

Specifically, the study seeks to:

1. Determine the difference between the pretest mean academic performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment.
2. Determine the difference between the posttest mean academic performance 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 Questions

The following research questions were formulated to guide the study:

1. What is the difference between the pretest mean academic performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment?
2. What is the difference between the posttest mean academic performance scores of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North – West Nigeria.

## Hypotheses

The following null hypotheses were formulated for the study and tested at 0.05 level of significance.

**$H_{O1}$**: There is no significant difference between the pretest mean academic performance scores of students in experimental group and those in conventional group prior to the treatment?

**$H_{O2}$:** There is no significant difference between the posttest mean academic performance score of students taught Building Drawing using Revit software and those taught using conventional teaching method in Colleges of Education in North-West Nigeria.

**Scope of the Study**

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This study focused on the effect of Revit software on students' academic performance in Building Drawing in Colleges of Education in North West Nigeria.

**Literature Review**

Students' performance is among the most important indicators used for evaluating instructional effectiveness within educational systems. In technical and vocational education, these variables are particularly significant because effective learning requires not only theoretical understanding but also practical competence, psychomotor development, visualization ability, creativity, and long-term application of acquired knowledge. Contemporary educational researchers emphasized that instructional technologies, teaching methods, learning environments, and students' engagement significantly influence learning outcomes within technical education (Dwivedi et al 2023, Petko 2025, ElSayary 2026, Gupta et al 2026). Performance refers to the measurable level of achievement attained by students after exposure to instructional activities. It is commonly evaluated through examinations, tests, assignments, practical tasks, projects, and other forms of academic assessment. Contemporary scholars argued that Performance reflects the extent to which students successfully acquire instructional content, practical competencies, and conceptual understanding within a given field of study (Bervell & Umar 2023, Oviawe et al 2021, Nikolopoulou et al 2021, Petko 2025). Within Building drawing education, students' Performance is closely associated with their ability to: interpret technical drawings, visualize structural relationships, produce accurate building designs, apply drafting principles and demonstrate practical modelling competence. Recent BIM education studies revealed that students exposed to technology-supported instructional systems such as Revit and BIM-based learning environments demonstrate significantly higher academic achievement than students taught using conventional drafting methods (Oyesode et al 2023, Agirbas 2020, Turk et al 2022, Bui et al 2023). Contemporary scholars further explained that digital instructional technologies improve students' understanding of abstract technical concepts through visualization, simulation, and practical interaction, thereby enhancing Performance. Students' Performance refers to learners' emotional engagement, enthusiasm, motivation, and willingness to participate actively in instructional activities. Recent educational technology studies revealed that interactive and learner-centered instructional systems significantly improve students' Performance in technical subjects because digital learning environments reduce instructional boredom and increase active participation (Nikolopoulou et al 2021, Bervell & Umar 2023, Turk et al 2022, Alenezi 2024). Within Building Drawing instruction, students frequently experience learning difficulties when instructional methods are excessively theoretical, abstract, or teacher-centered. Contemporary scholars argued that Revit-supported instructional systems improve students' Performance because learners are able to interact directly with realistic virtual building models, simulation environments, and collaborative design activities (Oyesode et al 2023, Sacks et al 2021, Bui et al 2023, Agirbas 2020). Despite the potential benefits associated with technology-supported instructional systems, several factors continue to affect students' performance within technical education programmes. Contemporary studies identified major influencing factors including: inadequate instructional facilities, poor ICT infrastructure, insufficient practical exposure, ineffective teaching methods, low technological competence, unstable electricity supply, and limited access to digital instructional resources (Akinradewo et al 2025, Bervell & Umar 2023, Oyesode et al 2023; Alenezi, 2024).

## Research Methodology

**Research Design**

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

**Area of the Study**

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The study was conducted in North-West Nigeria.

**Population of the Study**

The population of the study comprised all 187 NCE III Building Technology Education students enrolled in the eight Colleges of Education offering Building Technology Education in North-West Nigeria.

**Sample and Sampling Techniques**

The sample for the study consisted of 46 NCE III Building Technology Education students from two sampled Colleges of Education in North-West Nigeria. The two Colleges of Education were purposively selected and the study used intact classes.

**Table 1:** Sample Colleges of Education

| S/n | name of institution | state | location | funded by | no of students |
|---|---|---|---|---|---|
| 1. | Isa Kaita College of Education | Katsina | Dutsin Ma | State Government | 25 |
| 2. | Federal College of Education | Sokoto | Gidan madi | Federal Government | 21 |
| | **TOTAL** | | | | **46** |

**Source: Field Survey, (2025)**

**Instrument for Data Collection**

The Building Drawing Performance Test Questions (BLDDRWTQ) were developed by the researcher based on the NCCE 2020 minimum standards and the relevant course content of Building Technology Education.

**Validation of the Instrument**

The instruments used for the study 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**

Test – retest method was used to determine the reliability of the instrument.

**Method of Data Collection**

The data for the study was collected by the researchers with the help of research assistants that were selected and trained for the purpose of the study form the sampled Colleges of Education.

**Method of Data Analysis**

The data collected were analyzed using Mean and Standard deviation to answer research questions. Mean was used to determine the average academic performance scores of students in both groups, while standard deviation were used to show the spread of the scores from the mean.

## Presentation of Results

***Research Question One***

What is the difference between the pretest mean academic performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment?

A descriptive statistic was used to determine the difference in the pretest mean difference in academic performance scores of Building Drawing students in experimental group and those in conventional group prior to treatment. The results in table 1, Indicated that there was existence difference in mean academic performance of experimental group (M = 2.43, SD = 0.256) and conventional group (M = 2.33, SD = 0.718) at the pretest stage. This indicated that experimental group and conventional group are almost equal in their Building Drawing performance prior to treatment.

**Table 1:** Descriptive statistics of pretest mean performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment.

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| Variable | Group | N | Mean | Std. Dev | MD |
|---|---|---|---|---|---|
| Pretest | Experimental | 25 | 2.43 | .256 | |
| | Conventional | 21 | 2.33 | .718 | |
| | **Total** | **46** | | | 0.1 |

*Note: N=Number of students, Std. Dev= Standard deviation.MD, Mean deference*

***Research Question Two***

What is the difference between the posttest mean academic performance 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 statistic was performed to find out the difference between mean academic performance Building drawing in experimental group and those in conventional group in Colleges of Education in North-West Nigeria. The results in Table 2, revealed that there was a difference in the posttest mean academic performance of experimental group (M = 4.22, SD = 0.265) and conventional group (M = 2.28, SD = 0.272). This indicated that experimental group have better performance scores than the counterpart in the conventional group.

**Table 2:** Descriptive statistics of posttest mean performance 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 Mean | N | | Std. Dev | MD |
|---|---|---|---|---|---|
| Post-test | Experimental | 25 | 4.22 | .265 | |
| | Conventional | 21 | 2.28 | .272 | |
| | **Total** | **46** | | | 1.94 |

Note: N=Number of students, Std. Dev= Standard deviation, MD=Mean difference

**Hypotheses Testing**

An independent samples t-test was used to test the null hypotheses at 0.05 level of significant.

***Test of Null Hypothesis 1***

**$H_{O1}$** There is no significant difference between the pretest mean academic performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment?

The outcome of Independent sample t–test in Table 3, Indicated that there is no existence of a statistically significant difference between the pretest mean academic performance scores of Building Drawing students in the experimental group ( M = 2.43, SD = 0.256) and those in the conventional group ( M = 2.33, SD = 0.718), t(24.276) = 0.628, P = .536. The Null Hypothesis one is therefore, accepted. This finding indicated that experimental group and conventional group come from the same population because at the start of the experiment they are equal statistically in terms of their academic performance in Building Drawing prior to the treatment?

**Table 3:** Independent samples t-test of pretest mean academic performance scores of Building Drawing students in experimental group and those in conventional group prior to the treatment?

| | | | Levene's Test for Equality of Variances | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Groups | N | F | Sig. | t-value | Mean | Std. Dev | p-value | Decision |
| Pre-test | Experimental | 25 | 36.452 | .000 | .628 | 2.43 | .256 | .536 | Accepted |
| | Conventional | 21 | | | | 2.33 | .718 | | |

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***Test of hypothesis 2***

**$H_{O2}$** There is no significant difference between the posttest mean academic performance 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 Independence sample t-test presented in Table 4, Indicated that there was a statistically significant difference between the posttest mean academic performance scores of students in experimental group (M = 4.22, SD = 0.262) and those in the conventional group (m = 2.28, SD = 0.272), t(44) = 24.540,P < 0.01. Null Hypothesis two was therefore, not accepted. This finding indicated that Revit software had a significant effect on posttest academic performance on experimental group compared to conventional group.

**Table 4:** Independent samples t-test of posttest mean academic performance 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 |
| Post-test | Experimental | 25 | .118 | .733 | 24.540 | 4.22 | .265 | .000 | Rejected |
| | Conventional | 21 | | | | 2.28 | .272 | | |

## Summary of Findings

Based on the analysis of the data collected, the following findings were made:

1. The finding of Research Question One revealed that there was a difference between the pretest mean academic performance scores of students in the experimental group and those in the conventional group before the commencement of the instructional intervention. Students in the experimental group obtained a marginally higher pretest mean score than those in the conventional group, indicating that both groups had comparable levels of prior knowledge in Building Drawing. This finding is supported by the corresponding Hypothesis One, which revealed that there was no statistically significant difference between the pretest mean academic performance scores of students in the experimental and conventional groups. This implies that both groups were statistically equivalent at the beginning of the experiment.
2. The finding of Research Question Two revealed that students taught Building Drawing using the Revit instructional approach achieved substantially higher posttest academic performance scores than students taught using the conventional instructional method. This indicates that the Revit instructional approach significantly improved students' academic performance in Building Drawing. The finding is supported by the corresponding Hypothesis Two, which revealed that there was a statistically significant difference between the posttest mean academic performance 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 enhancing students' academic performance

## Conclusion

The study concluded that the use of Revit software as an instructional tool significantly improves students' academic performance in Building Drawing compared with the conventional teaching method. The integration of Revit software provides an interactive and practical learning environment

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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 programmes 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:

1. Colleges of Education should integrate Revit software into the teaching and learning of Building Drawing to enhance students' academic performance.
2. The Federal and State Governments should provide adequate Information and Communication Technology (ICT) facilities, including computer laboratories, multimedia projectors, stable electricity, and licensed Revit software, to support effective instructional delivery.

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