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IMPACT OF REVIT ARCHITECTURE SOFTWARE ON ACCURACY, EFFICIENCY, AND WORKING DRAWING QUALITY – COMBINED SURVEY FOR STUDENTS, PROFESSIONALS & FACULTY.

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Abstract : The use of Building Information Modeling (BIM) has significantly changed the Architecture, Engineering, and Construction (AEC) sector. (Eastman, 2011) A potent BIM technology that combines modeling, visualization, and documentation into one platform is Autodesk Revit. (Autodesk, 2024) In contrast to conventional Computer-Aided Design (CAD) software like AutoCAD, this study examines how Revit Architecture software affects the precision, effectiveness, and calibre of architectural working drawings. (IJERT, 2024)

Working drawings were chosen as the topic because they are the foundation of construction execution, and even small mistakes can result in rework, lost time, and expensive consequences. (ASCE, 2019) To assess software usage, learning problems, and performance outcomes, a mixed survey methodology comprising academic professors, working professionals, and architectural students was used.

Keyword: *AutoCAD, Revit Architecture, Building Information modeling, Working Drawings, Accuracy, Efficiency.*

I. INTRODUCTION

Architectural working drawings are the most critical documents in the building process, as they translate design concepts into executable construction information. AutoCAD has historically been used extensively to prepare these drawings, but it necessitates a great deal of manual coordination between plans, sections, elevations, and schedules, which makes the process laborious and error-prone. (Autodesk, Revit vs AutoCAD / BIM vs CAD, 2024)

The working drawing topic was chosen for this study because it is crucial to construction accuracy and immediately shows the technical proficiency of professionals and students. (ASCE, 2019) Drawing mismatches, revision errors, poor perspective coordination, and trouble visualising intricate architectural components are common issues in traditional drafting. (Autodesk, 2024)

II. LITERATURE REVIEW

The transition from traditional 2D CAD tools like AutoCAD to Building Information Modeling (BIM) platforms like Autodesk Revit has significantly changed the architectural design and documentation process. Originally created as a general-purpose drafting tool, AutoCAD provides flexibility and accuracy in 2D drafting, but it mostly depends on manual coordination between plans, sections, elevations, and schedules. (Autodesk, 2024) When creating functioning designs, this manual coordination frequently results in discrepancies, revision mistakes, and coordination problems. (Autodesk, 2024)

In contrast, BIM-based software such as Revit is developed on parametric and data-driven modeling principles, where drawings and schedules are automatically generated from a single coordinated model. Research shows that BIM greatly improves interdisciplinary coordination, reduces repetitious drafting effort, and increases documentation accuracy. BIM process decreases unnecessary changes and enhances information consistency across the project lifecycle. Eastman et al. (Eastman, 2011)

The efficiency advantages of BIM adoption in professional practice have been emphasized by a number of researchers. According to Abubakar et al. (2014), Revit's parametric change propagation greatly, lowers coordination disputes and drawing mismatches, especially in complicated and large-scale projects. Similar to this, Park et al. (2019) discovered that because views, schedules, and quantities were automatically generated from a centralised BIM model, BIM users finished documentation duties far more quickly than AutoCAD users.

Architectural education has been found to benefit from the incorporation of CAD and BIM tools in the academic setting. According to Kocaturk and Kiviniemi (2013), integrating BIM-based modeling with conventional drafting techniques in practical drawing courses as it improves students' comprehension of spatial linkages and construction systems. A smooth transition from 2D drafting to information-rich 3D modeling is made possible by this hybrid approach. (Kocaturk, 2013)

Comparative analyses of BIM-based software also show that programs like Revit provide sophisticated modeling, visualization, and automation features, which enhance design communication and documentation quality. These studies do, however, also recognize difficulties including software complexity and a high learning curve for novices. (Barison, 2011)

Despite BIM's shown benefits, a number of obstacles have been found that prevent it from being widely used in academics. Inadequate infrastructure, a lack of institutional support and a shortage of qualified professors were identified by Khosrowshahi and Arayici (2012) as the main barriers to BIM integration. (Khosrowshahi, 2012)

III. RESEARCH OBJECTIVES

The main objective of this study is to evaluate the impact of Autodesk Revit on the accuracy, efficiency, and quality of working drawings in architectural education and professional practice.

The specific objectives are:

1. To identify the most commonly used software tools for preparing working drawings among architecture students, faculty, and professional architects.
2. To compare AutoCAD and Revit in terms of:
   - Drawing accuracy
   - Time efficiency
   - Ease of modification and revision
   - Error reduction
   - Visualization quality

To analyze user preferences and confidence levels in using AutoCAD and Revit.

To understand the challenges faced by students and faculty while learning and using Revit.

To examine the need for early integration of BIM and Revit training in architectural curricula.

To provide recommendations for improving software training methods in architectural education.

IV. RESEARCH METHODOLOGY

4.1 Research Design

The impact of Autodesk Revit on working drawing accuracy, efficiency and quality in architectural education and professional practice is examined in this study using a quantitative survey-based research approach.

Data from architecture students, professional architects, and architecture faculty members were gathered and analysed using a descriptive study design

4.2 Data Collection Method

Primary data was collected using two structured Google Forms:

Form 1: Subject-Wise Software Usage Survey

Form 2: Comparative Study of AutoCAD and Revit

Multiple-choice and short-answer questions about software preference, accuracy, efficiency, visualization, ease of change, learning difficulty, and training recommendations were included in both forms.

4.3 Sample Selection

The survey respondents included:

- Architecture students
- Practicing architects
- Architecture faculty members

Convenience sampling was used to choose participants, and the survey URLs were sent through academic contacts, professional networks, and campus groups.

4.4 Sample Size

Both forms received more than 200 answers in total, yielding a solid data set for study.

4.5 Data Analysis

Frequency distribution and percentage analysis were used to examine the gathered replies. A comparative analysis of responses related to AutoCAD and Revit was carried out to identify trends and patterns. To find trends and patterns, the results were displayed as tables and charts.

4.6 Tools Used

- Variables of Microsoft Word for documentation
- Google Forms for survey distribution
- Microsoft Excel for data collection
- Tools for graphical representation in charts

V. RESULTS, ANALYSIS AND INTERPRETATION (REVISED & CORRECTED)

5.1 Survey Design and Respondent Groups

Several Google Forms were created for the current study and distributed to various respondent groups, such as practicing professionals and architecture students.

Members of academic faculty

Separate Google Forms were used in order to gather different viewpoints on the use of AutoCAD and Revit for working drawings from academic and professional domains.

This method guarantees that the research results reflect a thorough, multi-level assessment of software performance and usability rather than being restricted to a single user group.

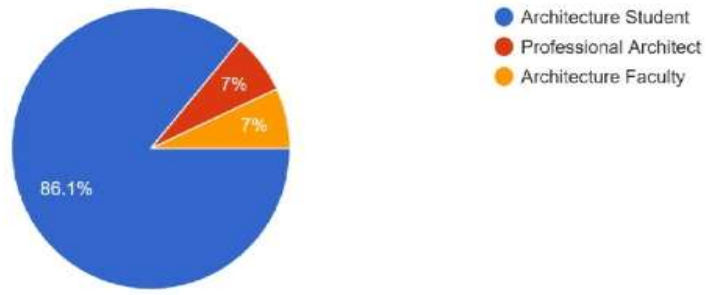

Figure 1: Survey Design and Respondent Groups
(**Source**: Google Form–1, Question No. 2)
Students, professionals, and faculty members make up the respondents, as seen in Fig. 1, guaranteeing a multi-level perspective in the research.

5.2 Analysis and Interpretation of Student Responses

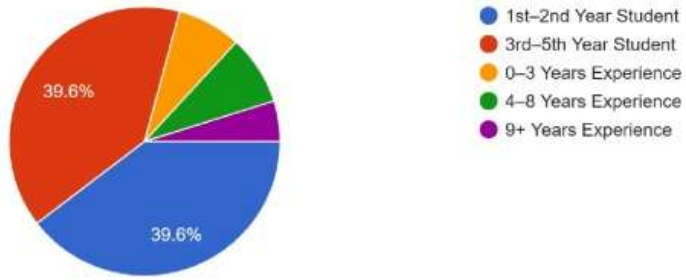

Figure 2: Distribution of Respondents by Academic Level
(Source: Google Form–1, Question No. 4**)**
The majority of student respondents are in the middle and senior academic years, where working drawings are an essential component of the curriculum, as shown in Fig. 2.

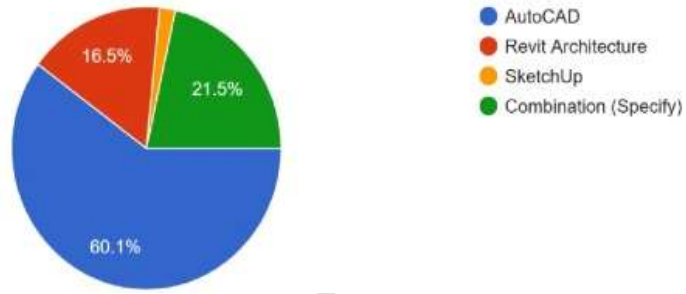

Figure 3: Software Preference for Working Drawings (Students)
(Source: Google Form–1, Question No. 5**)**

- The data represents well-informed judgements rather than presumptions at the introductory level;
- Student responses are based on direct academic exposure to working drawings

The academic dependability of the student responses is established by this number.
Because of its ease of use and early exposure, AutoCAD is preferred by more students, as shown in Fig. 3.
Analysis: Students favor AutoCAD more than Revit, according to the chart.

Interpretation and Evidence:

- Early exposure and simplicity of learning have an impact on AutoCAD preference;
- Less structured instruction, not a lack of skill, is indicated by lower Revit utilisation. This chart demonstrates that familiarity, not performance, drives software preference in academia.

5.3 Analysis and Interpretation of Professional Responses

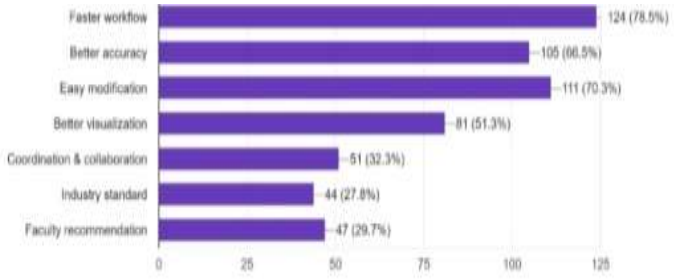

Figure 4: Perceived Accuracy and Coordination of Working Drawings
(Source: Derived from Google Form–1 responses**)**

Analysis: In terms of working drawing accuracy, consistency, and synchronisation, practicing experts gave Revit a higher rating than AutoCAD.

Interpretation and Evidence:

Coordinated drawings and error avoidance are top priorities for professionals.

Drawing mismatches are reduced by Revit's parametric, model-based workflow. When compared to AutoCAD, Revit is thought to offer greater accuracy and coordination of working drawings (Fig. 4).

This chart proves that Revit is more suitable for professional practice.

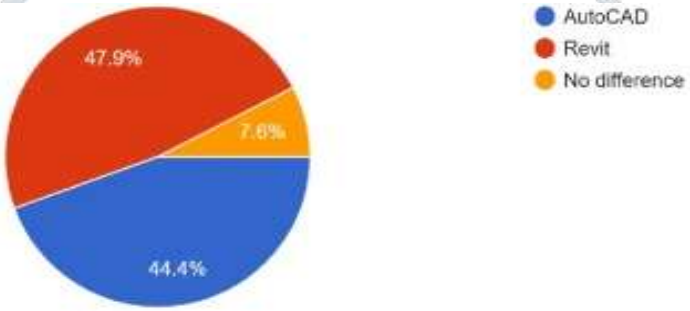

Figure 5: Time Efficiency in Working Drawings
(Source: Google Form–2, Question No. 6**)**

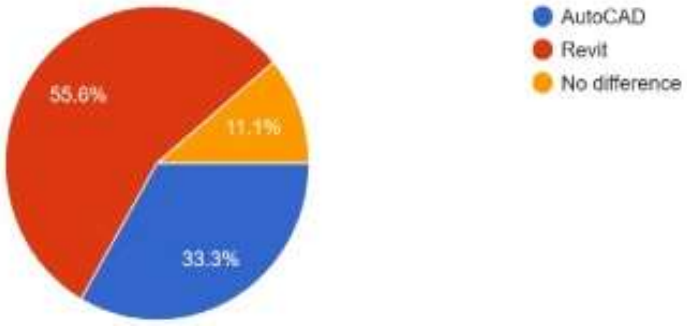

Figure 6: Error Reduction in Working Drawings
(Source: Google Form–2, Question No. 9**)**

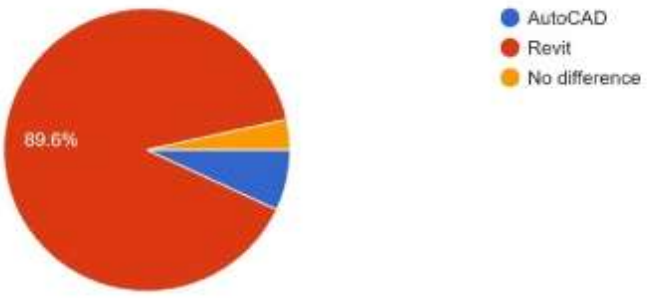

Figure 7: Visualization
(Source: Google Form–2, Question No. 8**)**

Figure(5,6,7): Combined Interpretation of Figures 5, 6, and 7: Time Efficiency, Error Reduction, and Visualization in Working Drawings
(Source: Google Form–2, Question on time efficiency during revisions**)**

Together, Figures 5, 6, and 7 show that Revit has benefits in terms of time efficiency, error reduction, and visualization, which makes it more appropriate for producing professional working drawings.

Analysis: According to the figure, Revit is thought to be more time-efficient and successful at lowering errors during revisions.

Interpretation and Evidence:
• Revit's automatic updates save time when making adjustments.
• In AutoCAD, manual updates raise the risk of mistakes.

This graph demonstrates Revit's dominance in professional practice in terms of efficiency and error control.
All of the aforementioned figures lend credence to the quantitative conclusions drawn from the survey-based analysis.

5.4 Qualitative Analysis of Open-Ended Responses (Google Form–2, Question 11)

Analysis: Thematic analysis was used to examine the open-ended responses.
The following are the main topics that were found: The necessity of organized and useful software training Software training is integrated with design studios; students' preferences are influenced by early AutoCAD experience; and Revit is acknowledged as an industry-focused tool.

Interpretation/Proof:
Due to its early launch, AutoCAD dominates academia;
• Revit is well regarded in professional practice for correctness and coordination;
• There is a glaring disconnect between academic instruction and industrial requirements.
The necessity of curriculum-integrated BIM training is amply supported by this qualitative data.

5.5 Combined Interpretation of All Survey Results

The following conclusions are reached when all quantitative and qualitative data are examined collectively: Professionals and instructors favor Revit because of its precision, efficiency, and coordination; students prefer AutoCAD because it is simple to learn and introduced early.

This demonstrates that while Revit is necessary for producing professional working drawings, AutoCAD is appropriate for learning basic drafting.

5.6 Research Validation

The combined findings of the two surveys show that:
Revit Architecture gets better Working drawings' accuracy in Coordination of schedules, divisions, and plans Reduction of errors connected to drawings

Time efficiency during revisions ,The successful use of Revit is hampered by academics' lack of organised BIM training.
In order to close the gap between academia and professional practice, the study confirms the necessity of incorporating BIM-based software training into architectural education.

VI DISCUSSION

The results of this survey unequivocally show that professionals, academics, and architectural students are increasingly choosing Autodesk Revit for creating working drawings. Even though AutoCAD is still frequently used, particularly by novices, Revit's superior accuracy, coordination, and visualization capabilities are becoming more widely acknowledged. According to the majority of responders, Revit's parametric modeling platform, which immediately reflects changes in one view across all linked drawings, improves drawing accuracy. The manual coordination errors that frequently occur in AutoCAD-based workflows are greatly reduced by this functionality.
Due to their lack of formal training, faculty members showed minimal confidence despite their high enthusiasm in using Revit. The necessity for organized BIM education programs for teachers is highlighted by this discrepancy between interest and competence level.
Overall, the conversation demonstrates that, with the right training and academic support mechanisms in place, incorporating Revit into architectural courses may greatly raise the calibre of working drawings.

VII. CONCLUSION

Through a joint survey of academic staff, practicing professionals, and architecture students, this study examined the effects of Autodesk Revit Architecture software on the precision, effectiveness, and calibre of architectural working drawings. The study ensured a thorough and multi-level assessment of software performance across academic and professional fields by using distinct Google Forms for various responder groups.

Due to early exposure and simplicity of learning, AutoCAD was found to be the most popular choice among students, according to the analysis of their responses. However, students in the middle and senior academic years showed well-informed opinions based on direct interaction with working drawings, indicating that familiarity rather than performance was the driving force behind this preference. One of the main causes of Revit's poor uptake in academic contexts was found to be less structured exposure.

Professional comments, on the other hand, made it abundantly evident that they much preferred Revit for working drawings' accuracy, uniformity, and coordination. The results showed that drawing mismatches are much reduced and plan, section, and schedule coordination is enhanced by Revit's parametric, model-based workflow. Because of its automatic change propagation and less dependency on manual drafting, professionals also thought Revit was more time-efficient during revisions and upgrades.

These results were further supported by faculty replies, which acknowledged AutoCAD's value for beginning drafting while praising Revit's efficacy in teaching coordination, visualization, and interdisciplinary understanding. A significant need for organized, curriculum-integrated BIM training, a progressive switch from AutoCAD to Revit, and industry-focused teaching methods was highlighted by the qualitative analysis of open- ended comments.

The combined analysis of all survey data shows that while Revit is essential for more complex and professional-level working drawings, AutoCAD is still appropriate for basic drafting abilities. The study confirms that Revit Architecture greatly enhances mistake reduction, time efficiency, interdisciplinary coordination, and drawing correctness. Inadequate academic exposure to BIM is also identified as a significant obstacle to successful adoption.

As a result, the study unequivocally backs the inclusion of organized BIM-based instruction in architecture education. To improve the overall quality of architectural working drawings and to close the gap between academics and professional practice, Revit must be incorporated into the curriculum early and methodically.

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