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USING THE "REVIT" GRAPHIC SOFTWARE IN TEACHING ARCHITECTURAL AND CONSTRUCTION DRAFTING

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Annotation

This article discusses the role of Revit graphic software in teaching architectural and construction drafting. The paper highlights the importance of digitalization in education and emphasizes Building Information Modeling (BIM) as a key component of modern architectural education. Revit, compared to other software like AutoCAD, ArchiCAD, SketchUp, and 3ds Max, stands out for its ability to create both 2D and 3D models simultaneously, enhancing students' visualization and analytical skills. The study also explores Revit's collaborative features, which allow students to work together in real time, improving teamwork and problem-solving abilities. Additionally, the multi-dimensional capabilities of BIM (4D, 5D, 6D, 7D, 8D) are examined, demonstrating their impact on construction planning, cost estimation, sustainability, and safety. The article concludes that integrating Revit into education modernizes the learning process and better prepares students for real-world architectural and construction challenges.

Keywords

Revit, Building Information Modeling (BIM), architectural drafting, construction drafting, 2D and 3D modeling, digital education, project-based learning, sustainability, parametric design, visualization, collaborative learning, modern architecture, urban development.

Nowadays, great importance is given to organizing all fields, including education, based on digital technologies. Consequently, there is also a necessity to computerize the teaching of architectural and construction drafting within the drafting discipline. Studying architectural and construction drafting provides the opportunity to work with architectural drawings. However, in today's world, no architect creates projects manually. Hand-drawn sketches are only used to determine client requirements, while all other architectural and construction drawings are created using computers.

Furthermore, several graphic software programs are available for drawing architectural and construction plans on a computer. These include AutoCAD, ArchiCAD, 3ds Max, SketchUp, and Revit. However, among these, Revit is the most suitable for architectural and construction drafting because it allows users to create both 2D and 3D drawings simultaneously, displaying both processes in real time.

The role of Revit software in teaching architectural and construction drafting is becoming increasingly significant today. Through its Building Information Modeling (BIM) system, this software enables the creation, management, and improvement of architectural projects in a modern and efficient manner. Revit serves as a powerful tool not only for preparing 2D drawings but also for three-dimensional modeling, allowing users to visualize and analyze project processes. This experience is one of the most crucial practical skills for students, as it helps them correctly understand complex architectural concepts and develop the ability to apply them in practice.

The integration of Revit in teaching not only enhances technical skills but also fosters collaboration and creative thinking among students. The collaborative work features in Revit provide a platform for students to share experiences, support each other during project planning, and engage in teamwork. Through this process, students gain a deeper understanding of engineering, construction, and project management elements, better preparing them for their future professional careers. The incorporation of Revit into the educational process also opens additional opportunities for innovation in architectural education, paving the way for the development of new methodologies.

Moreover, Revit software allows for specialized courses and seminars designed to enhance students' visualization abilities and analytical thinking skills. Through these courses, students are presented with real-life project examples, enabling them to explore every stage of engineering and design processes in depth. As a result, Revit becomes an essential resource in architectural drafting education, further strengthening students' professional preparation and contributing to their ability to achieve their career goals.

The methods of teaching with Revit enable students to effectively master modern technologies in the field of architectural and construction drafting. These methods focus on several key elements, including practical exercises, interactive lessons, and project-based learning systems.

Practical exercises introduce students to each function and tool of the software, allowing them to develop problem-solving skills tailored to their needs. For example, during the 3D modeling process, students enhance their abilities in

creating and editing objects. Additionally, they gain opportunities to learn not only from their own experiences but also from the experiences of their peers.

Interactive lessons play a crucial role in establishing open communication between teachers and students. Designed to help students deeply understand the complex features of the Revit system, these lessons can be presented through simple video demonstrations and virtual simulations.

Seminars, online workshops, and discussion forums provide an ideal environment for student interaction and knowledge exchange. Such teaching methods make the learning process more interactive and help students absorb the material more effectively.

Teaching architectural and construction drafting with Revit equips students with practical, analytical, and collaborative skills. The software's implementation in education not only modernizes the learning process but also ensures that students are well-prepared for real-world challenges in the field of architecture and construction.

The project-based learning system serves to prepare students to solve real-life problems through practical applications. This method allows students to learn how to overcome difficulties in the design process by creating copies that reflect their own visual values. In turn, this approach enables students to develop the necessary skills for planning and implementing large-scale and long-term projects. In this way, teaching methods in Revit encompass not only theoretical knowledge but also practical experience, preparing students to become successful architects or construction drafters.

The use of Revit software provides significant advantages in modern architectural and engineering practices, making its applications even more attractive. Firstly, Revit's parametric modeling capabilities help streamline and efficiently manage the design process. Due to the interconnectivity of each object, any changes made to one element are automatically updated in all related components. For example, if the building plan is modified, elements such as the façade, upper floors, and electrical systems are also automatically adjusted. This not only saves time but also minimizes errors while ensuring coordination among engineers and architects.

Another important advantage of Revit is its 3D visualization capability. Presenting a project in this format allows for a comprehensive representation of the complexity of the workflow and the dynamics of objects. Through these features, clients and stakeholders can preview project outcomes in advance and provide their feedback and suggestions. As a result, interactions during the project process

are enhanced, and necessary modifications can be quickly implemented to improve the quality of the building.

Additionally, Revit software helps improve the project process based on principles of sustainability and environmental responsibility. Conducting energy analysis facilitates the development of proposals to enhance the environmental sustainability of buildings and implement essential measures to reduce energy consumption. Therefore, Revit is not only aimed at fully or partially meeting the needs of architecture and construction but also contributes to the formation of modern, sustainable, and conditionally efficient construction processes. These advantages, in turn, ensure greater adaptability to client demands in the field of architecture and construction.

Overall, the integration of Revit software into architectural design and construction management processes represents an innovative approach to modern urban development. As examined in this study, the application methodology of Revit not only simplifies the design processes but also enhances collaboration among specialists from various fields. This digital tool creates a unified environment for architects, engineers, and construction professionals, helping to minimize misunderstandings and errors commonly encountered in traditional design methods.

Furthermore, the emphasis on Building Information Modeling (BIM) associated with Revit stands out as one of the key aspects. The ability of BIM technology to fully digitally represent the physical and functional characteristics of a project allows for improved planning, efficient resource utilization, and well-founded decision-making. These data-rich models can be applied at various stages of a project—from the initial concept through construction and operation. This ensures that the aspects requiring attention throughout the project's lifespan are considered from the earliest stages.

The analyses derived from applying such methodologies help advance innovative design solutions and contribute to the development of sustainable practices in line with modern ecological standards.

The concept of "BIM" technologies and "BIM" models is a bright star in the construction industry. Although this technology has existed for nearly a decade, in the past couple of years, many rumors and speculations have emerged around it. We understand what information modeling means, but what is BIM? BIM encompasses the process of forming and managing physical and functional project data. The result of this process is what is called BIM, which generates digital files depicting every aspect of a project and supports decision-making throughout the project's lifecycle. Some believed that BIM was nothing more than three-

dimensional models, but in reality, it is much more. BIM systems and similar technologies extend beyond 3D (width, height, and depth) to include 4D (time), 5D (cost), and even 6D (assembly).

Building Information Modeling (BIM) is the digital representation of an object's physical and functional characteristics. BIM is a shared information resource about an object that creates a reliable basis for decision-making throughout its lifecycle, from the earliest concept to its eventual demolition. BIM has different terms depending on its stages and uses, including 3D (model), 4D (time), 5D (cost), 6D (operation), 7D (sustainability), and even 8D (safety) dimensions. This multi-dimensional capability of BIM is defined as an "nD" model because nearly unlimited dimensions can be added to the construction model. Below, we clarify these terms. We have chosen to describe them starting from the 4D term, as 2D and 3D concepts are not new to us.

The 4D dimension links construction activities with time schedules and three-dimensional images, leading to real-time modeling of the construction process. "Time measurement" allows for assessing project assembly and planning capabilities. All project participants can easily and effectively visualize, analyze, and report problems related to the sequential, ongoing, and temporary aspects of the construction process. This leads to improved schedules, site layouts, and logistics plans, which help increase production efficiency.

Below, we briefly describe the 5D, 6D, 7D, and 8D levels of BIM technology. The 5D model adds the "cost" dimension to the BIM model, allowing for the immediate generation of material costs and material representations in the model. This increases the accuracy of cost estimation data and reduces potential discrepancies that may arise in CAD data. The 6D model allows for BIM object management. By incorporating complex descriptions of geometry, connections, and ownership capabilities, it creates an ideal database for managing building elements and engineering services.

The 7D model integrates sustainability components into BIM, enabling specialists and designers to achieve carbon targets for specific project elements, justify decisions, and test and compare choices. The 8D model incorporates safety aspects into the design and construction process. BIM and similar technologies provide opportunities for projects and solutions for project managers. As automation systems are increasingly used in the construction industry, BIM models must be adapted to include complex management components that integrate 4D time and 5D cost models and share this information with the project team as an integrated project implementation approach.

However, BIM is not just about new software and technology; it requires an alternative way of thinking and a different approach to procurement and project implementation. Moving away from isolated information pools and incompatible software technologies of traditional methods, participants must fully integrate into a common platform where they have access to the same information and can work together effectively.

In conclusion, research results indicate that the implementation of Revit software not only expands the capabilities of architects and designers but also significantly contributes to improving quality standards in construction projects. The effective use of this technology strengthens the principles of precision, flexibility, and efficiency in the architectural field. Future prospects require specialists to continuously develop their skills and focus on forming a highly skilled workforce capable of managing the complexities of modern design environments. As this methodological analysis has shown, the integration of technology and architecture plays a crucial role in building design and urban infrastructure development.

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