The effect of using specialized software and manual drawing on the improvement of modeling skills and creativity of students in the course of preliminary architectural design (3)

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A B S T R A C T

Research Problem:
Defining creativity in a single sentence is nearly impossible. While most researchers acknowledge the link between creativity and innovation, interpretations of their interplay vary. As a fundamental human phenomenon, creativity has existed since the dawn of humanity. In today's knowledge-driven, competitive, and dynamic world, creativity serves as a key driver of development across disciplines. The ability to solve problems creatively is a critical educational outcome. In design contexts, creativity manifests as novel solutions to specific projects. Creative activity often emerges in particular spaces and at distinct moments, highlighting its context-dependent nature.
In recent years, technology has continuously transformed teaching and learning, prompting educational systems to shift from standalone approaches to blended methodologies. Effective and comprehensive architectural education integrates valuable skills and knowledge, requiring curricula to adopt flexible teaching strategies. Undoubtedly, the architectural design studio serves as the cornerstone of architectural education, playing a pivotal role in its advancement. Blended learning is critical to achieving educational objectives successfully. Design studios employ various models such as conceptual, volumetric, and physical scale models as essential design tools. The foundational phase of an architect's journey begins with architectural training. Since creativity lies at the heart of successful architecture, fostering it during academic years profoundly enhances an architect's future career. One of the critical topics in education today is the use of specialized software related to academic disciplines. This issue holds particular significance in the field of architectural engineering due to its inherent nature. Despite this importance and the fact that all architectural documentation in real-world projects is produced using software the teaching of specialized software in universities, according to the curriculum, has not received adequate attention. Instead, the focus remains on manual design instruction. While the importance of manual design training cannot be denied, there is a need for greater emphasis on teaching design through specialized software. Given the significance of manual skills among novice architects, the timing of introducing software in architectural education and design processes has always been a contentious topic among faculty members. This research examines the use of specialized architectural software in introductory design education and its impact on students' modeling skills and creativity in *Architectural Design Fundamentals (3), comparing it with freehand design methods.

Research Question:

This study seeks to answer the following questions: 1. Which teaching method (using specialized software or freehand design) has a greater impact on enhancing students' modeling skills and creativity in *Architectural Design Fundamentals (3)? 2. Is there a significant correlation between students' scores in the two components of modeling and creativity across the two teaching methods (specialized software vs. freehand design)?

Research Method:

This applied research adopts a descriptive-analytical and causal-comparative approach. The statistical population consists of two groups of 30 students each from the *Architectural Design Fundamentals (3) course at Islamic Azad University, Urmia Branch, in the first semester of 2022. A multi-stage random sampling method was used for participant selection. The teaching methodology was structured as follows: Studio A (30 students): Students used specialized software (2D AutoCAD and Sketch Up) for design. Studio B (30 students): Students employed physical modeling and freehand sketching, with corrections tracked throughout the semester. Both studios worked on the same design project: a tomb for an artist, accompanied by ancillary spaces (gallery, library, café, administrative area, and restrooms). A key requirement was incorporating a 3-6 meter elevation difference in the site design, ensuring that most main spaces were embedded underground, with only the tomb structure visible at ground level. Access to lower levels was to be provided via designed staircases. The project duration was six weeks (10 hours per week) for both studios, with instruction overseen by the same professor. Upon completion, students filled out validated questionnaires assessing creativity and modeling skills. These questionnaires were reviewed and approved by five faculty members, with Cronbach's alpha values of 0.78 (creativity) and 0.81 (modeling). Final projects were evaluated by five professors, with average scores recorded for creativity and modeling components. Data analysis was conducted using SPSS to address the research questions.

The Most Important Results and Conclusion:

The study revealed that: The mean creativity scores were higher in the software-based teaching method compared to freehand design. Similarly, modeling performance was superior in the software-based approach. A significant positive correlation existed between creativity and modeling in both methods, indicating that an increase in one variable corresponded with an increase in the other. The findings suggest that using 2D and 3D architectural software in design education Architectural Design Fundamentals (3) enhances students' modeling skills and creativity due to higher drafting precision, editability, and flexibility in modifying designs. Advantages of design software include faster drafting, construction, and editing capabilities. Tools like AutoCAD (2D) and Sketch Up (modeling) provide designers with greater control over the design process, enabling precise examination of dimensions—an aspect often overlooked in freehand design, where beginners may neglect scale and spatial proportions. While specialized software is crucial in architectural design, freehand design remains indispensable. The two methods should be integrated as complementary approaches, as architects must also possess strong manual design skills

KEYWORDS

Architectural education, Architectural design, Architectural design software, Modeling skills, Creativity