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Comparison of traditional and digital visualization technologies in architectural design education

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Abstract

Today, like in all other science fields, information technologies are intensively used in architectural design education. However, in that education, conventional tools are still used. Digital technologies are used as supplementary tools. Current hybrid education system is considered as a transition period to digital technologies today. In this article, conventional and digital technology based systems which are used in architectural design and visualizing education are analyzed and compared. It is aimed to compare weak and strong sides of both technologies. The case study was held by Gazi University students in the period of four semesters. In conclusion, it was found that the transition from traditional to digital technologies in architectural design education is compulsory; however this transition will take some time.

*Keywords:*Architectural design, architectural education, education methods, design tools and technologies, visual design, computer aided design, information technologies

1. Introduction

In traditional architectural design process, two-three dimensional drawings and models which gradually become more concrete are used. With the use of computers in design process, although traditional expression tools are not left, digital technologies are used as additional tools in visualization of design. For this reason, a hybrid training process with a combination of traditional and digital technologies is experienced.

In this paper, "traditional" and "digital" techniques used in visualization of architecture design were compared within the scope of "Production Time", "Spatial Need-Hardware", "Precession-Quality", "Photorealistic Results" "Ease of Revision", and "Ability to Produce New Alternatives ","" Ease of Archiving, Compatibility for Distance Education "and" Satisfaction of Lecturers and Students.

We carried out a field study with the students enrolled in Gazi University Faculty of Architecture which lasted for four successive academic years. During the field study, traditional and digital visualization techniques were used and the same student group was monitored. At the end of four-semester study, a measurement and questionnaire study was conducted and an evaluation table was formed. Products produced in traditional and digital media were compared in measurement and questionnaire study.

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2. Visualization techniques in architectural design

Architectural training and applications are based on visualization of design. Expression techniques used in architectural design can be categorized in two main groups as traditional and digital techniques;

1) Traditional expression techniques: Architectural design training process refers to the visualization of ideas formed in the mind using concrete tools like paper, pen or model.

1.1.) Two-dimensional drawings on paper: Drawing refers to the description of a building or any architectural element using lines and color . Two-dimensional technical drawings which contain plan, cross-section and profiles is one of these expression techniques (Figure 1).

1.2) Three-dimensional drawings on paper; Perspectives:"Perspective is the method of describing the environment and an object in a picture plane as seen by human eye" The material of the structure is hand drawings, which are approximated to real spatial perception reflecting dimensions (Figure 1).

1.3) Three-dimensional Presentations; Models: Model is the minimized version of an architectural product, which is designed or is going to be constructed according to certain scales (Figure 1).

2) Digital expression techniques: Today, architectural designs created in digital media are used due to easy and long-term storage, photo-reality, speed, precession and design alternatives. Unlike traditional methods, hardware such as software, computers, printers and scanners are required in these techniques. Architectural software used in digital media are pixel, vector and object based software.

2.1. Vector based software in digital media: Vector based software are the ones which produce drawings in the form of mesh with line element and wireframe (Figure 2).

2.1.1. Two-dimensional drawings. Orthographic drawings (plan, section, façade)

2.1.2. Three-dimensional models: modeling, animation and photorealistic images

2.2. Object based software in digital media: Object based drawing, modeling, animation and photorealistic images: In this software, basic geometric forms are present in the software in the form of object libraries and architectural form is produced by being selected by the designer. In this software, animations where photorealistic animations can be produced (Figure 2).
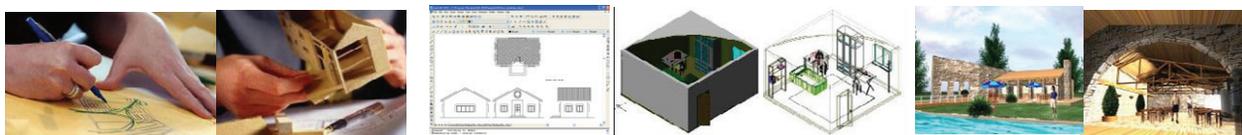

Figure 1. Traditional visualization techniquesFigure 2. Digital visualization techniques

3. Case study

The aim of this paper was to analyze traditional and digital expression techniques used in the process of visualization of architectural design from various aspects and to compare the superior and weak aspects of these techniques. A field study was conducted with a group of students selected from Gazi University Faculty of Architecture. The field study lasted for four successive semesters. Within the scope of this study, an evaluation study was perfumed with 72 students starting from first grade to third grade, for four successive semesters. In this process, design visuals were evaluated in terms of "Production Time", "Spatial Need-Hardware", "Sensitivity-Quality", "Photorealistic Results" "Ease of Revision", and "Ability to Produce New Alternatives", "Ease or Archiving"," Compatibility for Distance Education "and" Satisfaction of Lecturers and Students.

The first stage of the study was conducted in second semester of 2007-2008 academic year. Within the scope of technical drawing course, the students were provided plan, cross-section and profiles of a ready project and were requested to make two-dimensional drawings, perspective drawings and models (Figure 3). In 2008-2009 academic year, this group of students made vector based drawings of the same project in "Computer Aided Design I" course (Figure 4).In the second semester of 2008-2009 academic year, in "Computer Assisted Design II" course, the students made three-dimensional modeling of this project in vector based software (Figure 5).In computer course conducted following the first semester of 2009-2010 academic year, which was the final semester, the same group of