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A STUDY ON UTILIZATION OF TECNIQUES OF INTERACTIVE ANIMATION IN THE ARCHITECTURAL BASIC DESIGN EDUCATION

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Abstract

In architectural design education applications such as drawing and modeling traditional design and expression tools still continue at the present time. Computer technology is used as an auxiliary tool. This mixed (hybrid) education system is seen as a transition process to computer technologies. By the using of computer technologies in architectural design education, whether students can perform their studies through modeling programs using two-dimensional drawing or three-dimensional models. They can use photorealistic visual tools and simulation environments using counter-interactive animation techniques and they can experience their work using virtual reality software. In this thesis study, it was aimed to give a different perspective to architectural design education by investigating the effect of design principles on the teaching of basic concepts and perception of the place to students who have started design education by using counter interactive animation techniques.

1. INTRODUCTION

Architectural design education is a process in which students understand and perceive the environment they are in the ability to reproduce and organize it with their own elements. The basic design education in architecture is "a visionary system of thinking which is placed in its continuity in the continuity of design education, which will gain the educational acceleration" [1]. The systematic aims and objectives of the basic design education based on the basic Bauhaus school are "to provide a guidance to be learned from the preliminaries of the students, to prepare the infrastructure for the selection of the space within the tool and the activity and to give the theoretical knowledge about the case for an objective perspective ..." [2].
In this period students are required to perceive the design problem given to create their own design language for solution and to create formal compositions by transforming design problems with creativity and skills. In order to define this composition, the students are required to have two-dimensional design in the first stages of basic design education; in the later processes, they try to create a meaningful whole by bringing the basic geometric shapes in 3D in the direction of basic design elements and principles. Particularly, volumetric organizations defined by three-dimensional elements are both difficult to perceive and express. For this reason, the methods and tools used by students to express their designs are of great importance both in perceiving the formal and volumetric relations and in designing the relationship between the elements that define the composition.
Computer aided design tools are also used in architectural basic design education as well as applications such as drawing and modeling traditional design and expression tools [3]. With the use of computer technologies in architectural design education, students can make their studies through two-dimensional drawing, three-dimensional models, and use computer aided photorealistic visual tools and simulation environments. [4]. In this way, students can produce their designs more quickly, as well as have the opportunity to see both their three-dimensional model and their different appearances and cross-sections accordingly. However, both traditional and computer-aided design expression tools are able to perceive the volumes they create on an external scale, making them particularly difficult to design volumetric compositions. The use of interactive technologies, especially integrated with smartphone technologies,

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has enabled the perception of spatial and volumetric experiences. However, there are no studies on the use of these technologies in basic design education.

2. EXPRESSION TECHNIQUES USED IN ARCHITECTURAL DESIGN

The design process is externalized by the "thinker of the design product" and is examined as an inclusive environment in this process [5]. Items, perspectives and models at every scale can be used as communication tools. The externalization and realization of design thinking allows us to perceive the design process as an environment. Obtained within the design process, especially the emergence of form, is expressed by Oxman [6], as means of understanding and representing the visual world. While traditional design environments are physical qualities like paper, models, new environments are composed of multi-media in digital structure where the image, animation and animation are put together [7].

Traditional expression techniques used in architectural design process are two dimensional plan, section and views, three dimensional perspectives and three dimensional models. A drawing is a description of a building or any architectural element using lines, tones, and colors [8]. "Perspective is the way in which a circle and an object are specified in a picture plane as seen by the human eye" [9]. The material of the strcture is hand drawings approximating the real space senses reflecting the dimensions. The model is constructed in a way that the architectural product to be designed and built is reduced to a certain size.

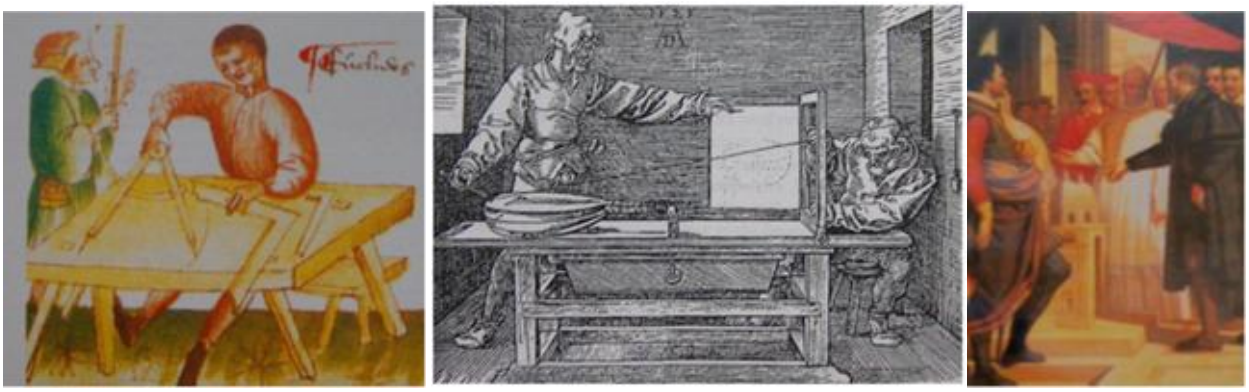

Figure 1. Architects drawing in the Renaissance.

The use of computers in architecture is spreading at an increasing pace since the 1960s, as in all other disciplines. The biggest factor that influences this development is undoubtedly the rapid development in computer software and hardware technology. [10]. Visualizations and time-series, including motion, are expressed in research that not only allows the designer to see the effects of light, color, texture, reflection and contrast, but also allows better judgments about space and form [11]. Real life simulations allow to learn from mistakes before they are built. [12]. One of these methods is the application of virtual glasses which is one of counter interactive animation techniques. Virtual Reality (VR) is a computer-generated virtual world that addresses one or more emotions of a person and is created in real time by the actions of users [13]. The virtual reality eyewear is a vision system designed as a helmet. The user uses this system by plugging in. The screen on the system is placed in front of you. There is a lens between the eye and the screen. With the help of this lens, the view angle can be enlarged and a closer image to the real image can be obtained instead of looking at a flat screen. It offers spatial experience due to real head movement. Virtual glasses are being used more effectively, especially with smartphones.

Figure 2. Virtual reality glass

Figure 3. Google Cardboard

5. CASE STUDY

Within the scope of this study, architects who have difficulty in designing the volumetric composition determine the changes that can be experienced in the design process by using virtual reality based software that the architectural basic design students can experience volume. For this reason, the study was used to compare real and imaginary three-dimensional fiction and expression techniques used in the experiment. It has been tried not to determine the relationship between these different methods and the elements that define volumetric fiction and whether it helps the experiencing students.

In this context, a six week case study was conducted with the first-year students who took basic design education in Gazi University Architecture Department. The students are divided into two groups. "border, transition, circulation" using the interactive techniques defined by virtual eyeglasses that allow 3D virtual experimentation, integrated with computer aided design tools and smartphones, from the students in the first group using drawing and model, which are traditional expression techniques, it is desirable to organize a volumetric composition in which the concepts can be conveyed to the concrete. Thus, the students' perception of the relationship between the bulk organizers was aimed.

Students who are using the traditional method are required to organize their volumetric compositions by using linear and planar elements of the size of 30x30 cm (15x15, 10x10, 5x5 -2.5x2.5 - 1.25x.125 cm.) Students firstly divide the cube with horizontal and vertical linear elements, then used the planar elements to define the boundaries and the concepts of transition and circulation were sought in the continuity of the empty surfaces and empty spaces of the cube.

Figure 3. Model study

Students who use virtual glasses application first modeled their designs in computer-aided design program. In order to provide motion-based experience later on, the model was recorded using Apowersoft, a navigation program using the Cortana imaging program. The iPlayer SBS program was used to make the video recorded in Mp4 format suitable for use with the Virtual Eyewear. So the video becomes viewable with the Virtual Eyepiece. Google VR Cardboard was used during the Virtual Goggles work. In this method, the pupils take a holistic view of the cubes, they first cut their cubes and then designed the concept of transition and circulation in the cube by wiping some surfaces depending on the experience of movement. Because the virtual motion can be connected and experience the Cube on an individual scale, the continuity in circulation is provided based on the relationship between the inner and the outer continuity relationship. Finally, the linear elements, which are the structural elements that can sustain the relationship, are arranged to define the planar elements and spaces.

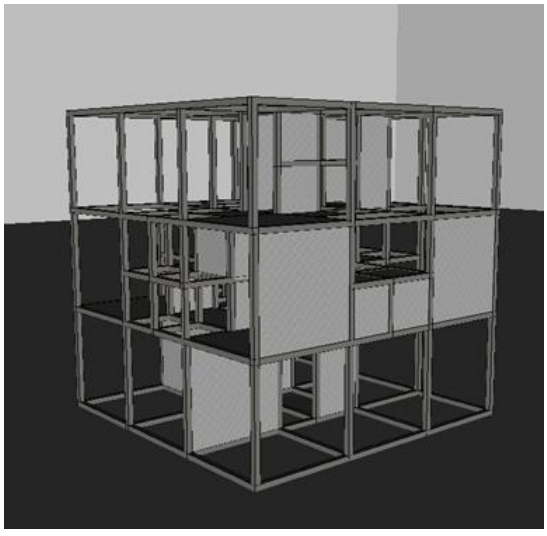

Figure 4. Model study

Figure 5. Designs in computer-aided design program.

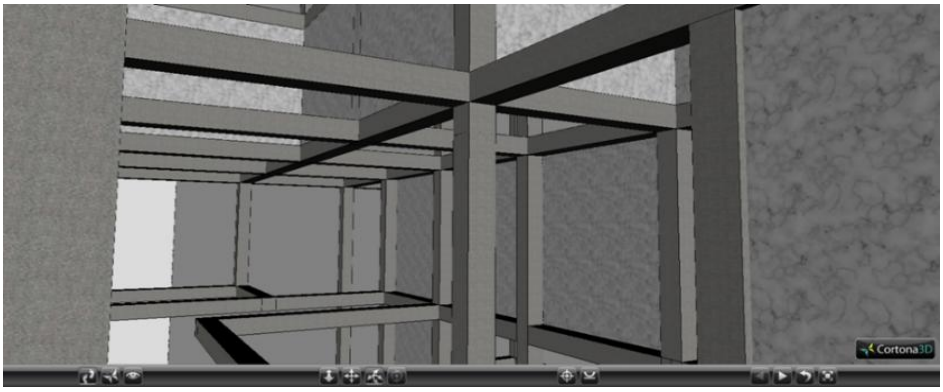

Figure 6. Cortana imaging program for VRML

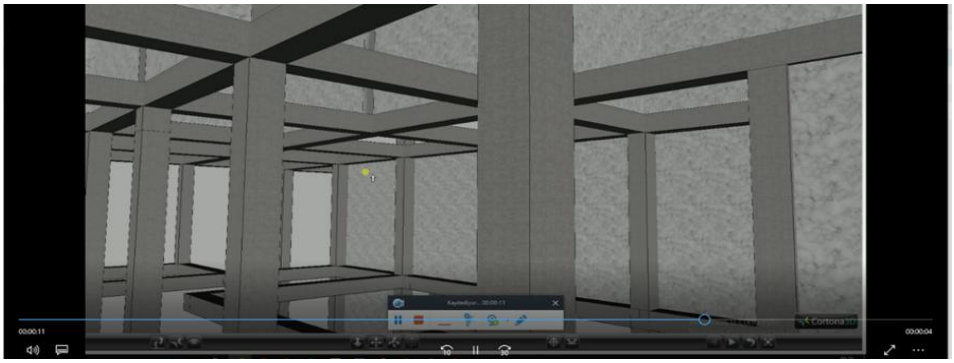

Figure 7. Apowersoft

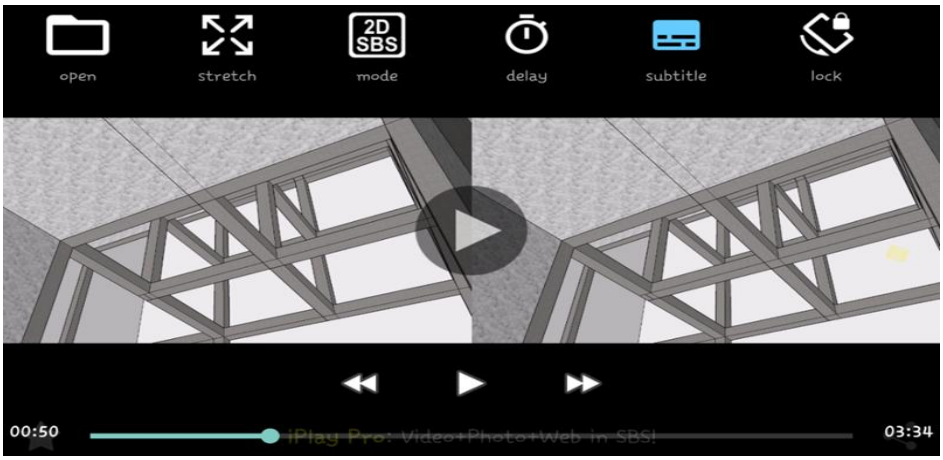

Figure 8. The iPlayer SBS program

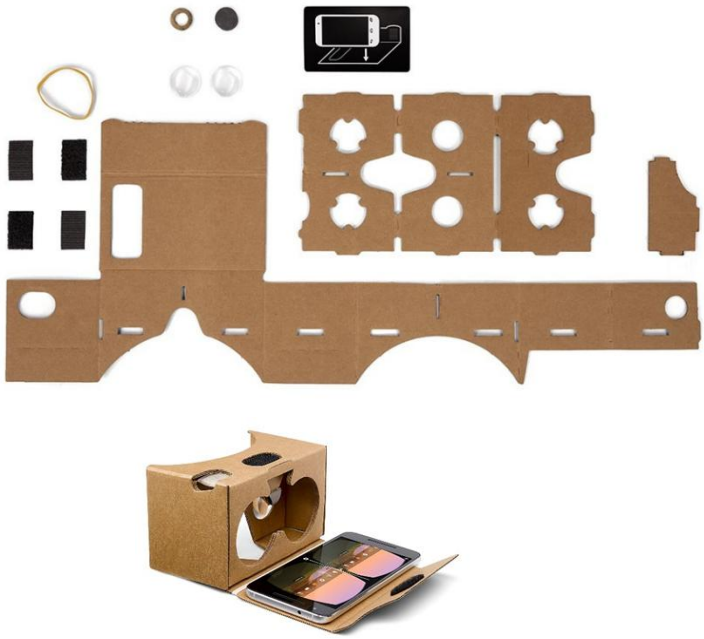

Figure 9. The Virtual Goggle work study using Google VR Cardboard

In order to compare the work done by the students, both methods have been evaluated in terms of defining the concepts of boundary-transit-circulation which defines volumetric organization. In this direction, the concept of boundary is defined by the horizontal and vertical elements, the transition by emptying these elements, and the circulation by the relation between the volumes providing continuity and both methods are evaluated with these parameters.

Since students who define cubes using traditional expression techniques generally design their cubes by looking at them from the outside, they first define the structure, divide the volume and then define the boundary element. For this reason they started from the outermost surface to define the boundary, first they defined the cube with a boundary element. However, they were inadequate in defining the relationship between the smaller volumes in the interior. Empty surfaces are defined instead of empty space; so even if surfaces are defined, continuity between sub-volumes and between them is not established. Circulation is often perceived as the continuity of linear elements rather than being perceived as volumetric. Students who want to make a design that can provide circulation within the cube using the traditional method; confused about understanding the surface of the space, the transitions between the surfaces.

In the sample which is done by using interactive glasses and depending on the interaction experience; the cube is first divided by the specified metrics, and the sub-volumes are defined by the unloading process. Then, with the experience connected with the action, the connection between the volumes was again provided by volumetric discharges. Finally, in order to be able to get out of the cube, circulation and transition are defined by volumetric emptying from inside to outside. All volumes were covered with surfaces, and the continuity of the transparent parts provided by computer-aided design tools was sought. With the experiential opportunity that occurs depending on the action from the inside of the volume, the students can better define the volumetric relations.

5. CONCLUSION

The aim of this paper is to teach design principles and basic concepts to students who are new to design education by using VRML and Virtual Reality Eye from counter interactive animation techniques, as well as to increase their impressions and early interactions with computer aided design technologies. In this respect, when comparing the techniques related to the traditional and virtual glasses experience, model expression, which is a traditional expression method, has an important place in terms of developing the expression method. The use of traditional methods as a means of thinking and expression during the

conceptual design phase we are designing enables us to achieve successful results in design. The interactive animation techniques provide an advantage over the experience of the design, the point at which the three-dimensional design method is inadequate. Through interactive techniques of counter interaction, photorealistic simulation can be achieved so that the design can be experienced on an individual basis. The volume, which we perceive from the traditional outer surface of the maket, is becoming observable from the desired point thanks to the computer-aided three-dimensional model. The most important advantage of counter-interactive animation techniques is that the user can enter into the volume and experience the entire space. The model making technique is a slow process. Material selection, dimensioning of materials requires time and effort. Both the design of volume and the perception of surfaces are among the factors that push the designer in this process. Computer-aided three-dimensional model accelerates the process of evaluating and producing the design. Changes to the design or to produce more alternatives are realized in a shorter time than traditional methods. When interacting animation techniques are used, it is also seen that there is a significant acceleration in the process of detecting the elements, the surfaces.

As a result, computer aided design technologies are one of the prime components of architectural design education. The greatest advantage of the use of interacting interactive technology in education is the shortening of learning time. Research shows that interactive animation techniques significantly reduce the learning period of space, transition, and circulation concepts. The new-era architectural students learn the basic components of design with an educational technique as much as fun; it is thought that it will be easier to adapt to the later training stages. For this reason, in addition to the use of traditional expression techniques in architectural design education courses seen by first-year students, the integration of counter-interactive animation techniques in the light of technological developments in VRML and Virtual Goggles is seen as a proposal for the future of architecture education.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors

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