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## Development of an approach for producing architectural form in architectural design education

Arzu Özen Yavuz<sup>a</sup>, Fatih Çağrı Akçay<sup>b</sup>

<sup>a</sup>Gazi University, Faculty of Architecture, Department of Architecture, Ankara, 06570, Türkiye

<sup>b</sup>Gazi University, Faculty of Architecture, Department of Architecture, Ankara, 06570, Türkiye

### Abstract

At the early stages of architectural education, it is observed that students have difficulty to produce forms. Students, during the design process, comfortably use basic geometrical elements one by one, however are not able to diversify them by transformation because of the fact that students are not capable enough to transform basic geometrical forms in accordance with arithmetical operations and geometrical transformation. In this study examining the architectural form creation; a three-month case study is conducted with first year students in Department of Architecture through which the software is used. Initially architectural projects of students designed in accordance with traditional methods and it is observed that students are not able to thoroughly transform the forms. At the second stage, students are expected to develop their projects through software transformations. Additionally, a questionnaire is also conducted with students in order to define the positive and negative aspects of forms created with this method.

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*Keywords:* Architectural Design, Architectural Design Education, Morphologic Analysis, Formal Conversion.

### 1. Introduction

An architect designs a space as a whole related to its environment and internal relationships and reaches result form. Therefore, each data defining design process affects architectural formation. Forms, which constitute architectural environment, are generally explained in literature through theories on nature and social sciences. However, in the present study, the act of formation was analyzed within designing process in terms of the formation activity of the designer. “Form, which is obtained at the end of design process, is created with the experience of the designer and decisions taken in line with the information clusters which define design problem.”. Stiny and Gips (1971), explained this formation process as follows: “While directing input information he/she transforms into forms in design process, an architect follows some composition rules which form with accumulation of experience which he/she puts in his/her mental library by filtering”. A designer has to think with form to make formation. In formation process, the designer firstly imagines information for design problem in an intuitional process and then to materialize his/her ideas for design, he/she visualizes the image he/she created using basic geometrical forms with

<sup>1</sup> Arzu ÖZEN YAVUZ. Tel.: +90-533-634 48 01  
E-mail address: [arzuozen@gazi.edu.tr](mailto:arzuozen@gazi.edu.tr)

two and three dimensional forms and finally produces the design product by transforming the style. However, since the students do not have sufficient experience and knowledge during the first years of design training, it was found that they experienced difficulty both in formation of architectural design and in realization of designs by transforming forms. For this reason, in the present study, we aimed to develop a computer-aided tool to help the students, who are at the basic training process in the field of architecture, to develop a design language they produced to address design problems and to help them to differentiate architectural composition while they make it objective. Accordingly, a case study was carried out with first grade architecture students for style production both through traditional methods and produced script. In conclusion, positive and negative aspects of producing style through successive use of traditional and digital methods were determined.

## 2. Rules of form transformation

The concept of form refers to formal order of an object which is created with the continuity of limits determining the general outlook of the object. On the other hand, in design, it was defined as the arrangement and transformation of the composition formed to materialize image of design idea with geometrical elements. Ching (1979) reported that principle elements which define form were geometrical forms and explained the rules which transform form with as central, linear, radial, gridal organizations and operational geometrical organization principles such as changing the dimensions of geometric whole, extracting parts from the whole, adding parts to the whole. Terzi (2009), on the other hand, reported that principle element which defined form was geometry and defined geometry as the abstract expression of the relationships in nature and life. He explained geometrical transformation of form with four different organizations. “Formal transformation of geometry is explained by Euclid geometry which explain Cartesian space, Non-Euclid global geometry, topological geometry which are explained with parametric functions and nurbs.”

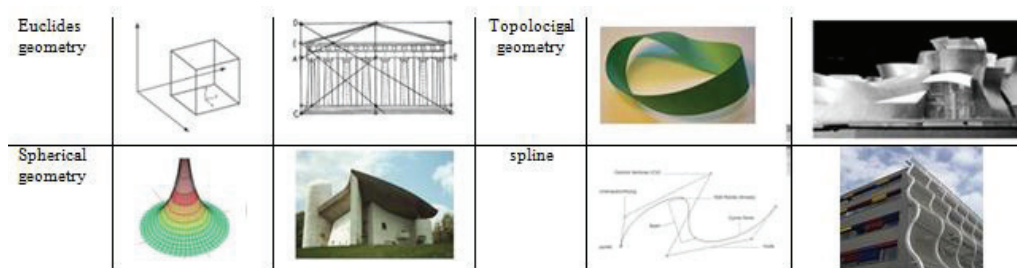


Figure 1. Geometric elements

Pottman, Asperl et al. (2007), defined geometry as the element which is present at every step of the process from the first decisions that form architectural design to the stage of construction and thus which forms the basis of architectural design process. According to these authors, although geometrical forms vary and although there is limited possibility of ensuring a formal diversity though traditional geometrical methods, differentiation of operations applied with today’s computer technologies resulted in a formal revolution. The principle properties which ensure this diversity are the operations that provide formal conversion. Pottman (2007) categorized these operations which determine the rules of formal transformation in three groups. The first one involves adding new geometrical forms to basic geometrical forms, excluding geometrical forms from basic geometrical forms or arithmetic operations which are used to take cross-section of two objects. The second one is geometrical transformations including most basic geometrical operations applied to forms which are transformation, scaling, reflection and lengthening. The third one is formal deformation which ensures the modification of form as a result of value changes in point, superficial or volumetric data which define a prime geometric form. The form, which is obtained as a result of formal deformation, was ensured by modifications such as inflection, enfolding, torsion and shrinking of prime geometrical form.

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