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## A critical look at the digital technologies in architectural education: when, where, and how?

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### Abstract

In the past decade, architectural education has seen an increasing amount of digital technologies being involved in the design studio curricula. Following the trends in the profession, these various technologies of computer aided drafting, enumerating, modeling, and analysis became not only key pedagogical nodes in the design studio, but also started to shape the overall curricular structure of architectural education as they also needed to be implemented as support courses in order to compensate the learning curves and the number of software available to architects. These digital technologies range from one end of simple drafting, conventional three dimensional modeling, and more sophisticated animation of buildings with a computer, to the other end of inventing new tectonic and spatial geometries using parametric computations. In this context, it will be unrealistic to argue against teaching and using digital technologies in architectural education. When one thinks how the profession has evolved in the past decade, it is necessary to embrace these tools in the architectural curriculum. However, a discussion that has not been clearly resolved is when, where, and how these digital tools are thought and used in the architectural education. My paper argues that the conventional tools of hand drawing, physical modeling, and hand making should be embraced in the foundational levels, and the digital tools should be introduced after developing a certain set of skills of one-to-one physical making where a sense of tectonic resolution, scale, and spatial experience is cultivated as a basis of architectural thinking with digital tools. In what follows, I will discuss this viewpoint through examples from architectural design studio education in the United States and in Turkey.

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### 1. Three schools, three practices

I will discuss the use of digital tools in the architectural education by focusing on three universities. Two of these universities are in the United States and one in Turkey and all three programs are accredited professional degree programs. I will first introduce the general structures of the schools, and discuss the approaches to the digital tools in

the context of overall curriculum and design teaching attitudes. I believe a proper understanding of the general design pedagogies of the schools is an important part of when, where, and how the digital tools are implemented in the architectural education as a normative curricular question.

### *1.1. Background*

School A is a 4+2 professional program in the United States. There are 8 undergraduate studios, 3 graduate studios, and a thesis semester. Digital tools start at the 3rd year of the undergraduate program, usually second term, and the rest of the program heavily uses digital technologies in the studios. Drawing and modeling programs are taught as a separate required one semester support course in the 2nd year, before the students start using these in the architectural design studios. However, the digital course uses projects from the 2nd year studios as base for its assignments.

School B is a 2 year professional graduate program in the United States, with also a 2 year core program that accepts students with other majors. There are 6 studios, and 2 semesters of thesis. Digital tools start in the 1st year of the graduate program, or the 3rd year of core program, usually the first term. So, there are only two design studios that use digital production and incorporation into thesis depends on the particular student. Digital tools are taught as elective courses, and there are no required courses. Depending on if and when the student chooses to take the digital elective, studio projects may be used as basis for the digital course assignments.

School C is a 4 year undergraduate program in Turkey. There is a masters program, however, due to professional licensing requirements in Turkey, the masters program does not count towards professional credit. There are total 8 studios that count towards professional credit. The digital tools are introduced in the 1st year and the rest of the program heavily relies on digital production and presentation in the studio. Drawing and modeling software are taught in required support courses in two semesters in the first year of the program along with the graphic component of the design studios.

## **2. Curricular structures and approaches to architectural design teaching**

Despite the difference in number of design studios, School A and B follow similar approaches in design teaching. The first foundational studios emphasize hands-on making in different media, from hand drawings and sketching to physical models. Both schools structure these foundational studios around a concept of making that takes the product as a one-to-one scale made object rather than representing an architectural construct on the world in another scale. Therefore, the early studios aim at establishing a sense of tectonic making and seeing space in one-to-one crafted constructs even before they can be called architecture in the general sense of the term indicating habitable structures. Designing habitable structures, or the notion of building, is introduced gradually towards the second year and third year of education. The first year's assignments focus on ideas of space making and tectonic construction in volumetric and expanded conditions, introducing concepts of internal scale, joint resolutions, hierarchy, repetition, movement, and iterative relations between elements, materials, and spatial and tectonic moments, without making these part of a broader notion of building. Thus, a fundamental sense of spatio-temporal experience is cultivated through hands-on, one-to-one making, laying the ground for the basic strategies of controlling and managing the complexity of architectural space. The transition from these tectonic and spatial constructs to designing habitable structures and buildings takes place with the introduction of design problems that address questions of experience, movement, sight, light, and sense of enclosure relative to human scale in the form of fragments rather than full programmed buildings. The advantage of introducing architectural typologies and fragments as design questions is that the students transition from spatial and tectonic constructs to constructs that house human body much efficiently and steadily, being able to think about architectural experience with only focusing on certain aspects of it rather than tackling the problem in the complexity of a building. The result of these transitional assignments follow the complexity of the one-to-one constructs, carrying the knowledge of space and tectonics acquired, and thus a rich sense of architectural experience. In this way, the architectural typologies, or fragments, like door, window, stair, etc. become problems of boundary, threshold, movement, visibility, scales of enclosure, etc., parameters of spatio-temporal experience, rather than given known elements. Thus, along with a highly developed sense of space,

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