LEARNING BY DOING IN THE AGE OF DESIGN COMPUTATION

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Abstract. A design teaching approach of integrating the notions of design thinking and computing in the first year of architectural design education is introduced and discussed. The approach aims to enhance and bring up-to-date the educational practice of “learning by doing” in the first year foundations curriculum. In the studied example, the analytical phases of thinking in a simple design task are systematically and visually recorded. This documentation is incorporated to the design process as a means for the students to consciously reflect on their design thinking.

1. Introduction: Learning by Doing before Computing

Learning by doing, or experiential learning, is a phrase that is representative of the pedagogy articulated and advocated a century ago by the American philosopher and educator John Dewey (1916) as part of an agenda of implanting democracy in education. This pedagogy is based on the general idea that hands-on experiences leave deeper marks towards the development of the creative individual than those induced by uniform second-hand knowledge. Recognizing artistic activity as a mode of intelligence, John Dewey devotedly promoted the hands-on nature of artistic production as the primary means for elementary education (Eisner 1972).

The above point of view finds its parallel in the way William James (1908) couples learning with the ability, endorsed by the senses, to discover new part-relations as two indispensable parts of reasoning. Along this line, learning by doing within the extent of this paper specifically implies the using of the hands in coordination with the eye, and the other senses where necessary, to govern tools within a context of artistic production.

Learning by doing in the Modern framework is manifested most articulately in Dewey’s writings and his efforts at the Teachers College at Columbia University between the years 1905-1930 to establish active learning in education. Historically it is traced back to the pedagogies of early 19th century child educators Johann H. Pestalozzi and Friedrich Froebel who
separately started the kindergarten tradition in which children draw, make, build, play, and at the same time learn through sensory experiences of all kinds (Naylor 1985). Hands are at work in supplement to the eyes in acquiring not just abstract knowledge but also experienced (tested and personalized) knowledge. To make it all possible, “doing devices,” the tools, procedures, media or game objects incorporated by the educator as the means to do, are essential to this method (Schank 1995).

2. Learning Design by Making

Dewey’s legacy and learning by doing is today at the core of a widely practiced model of design education with the design studio at its center. It is yet open to improvement and thus has been a critical reference to multiple studies in artificial intelligence and education sciences, as well as those in the fields of design computing and design inquiry, notably by Gero (1999).

A design studio is ideally an atelier, open 24 hours, inhabited and kept by the students. It is an environment where students test out theories, ideas, materials, constructions, and similar productions as part of their design processes. Because it is a shared space, students are able to work together, and follow each other’s processes.

In pedagogical approaches from the lineage of the Bauhaus, experiential learning in the studio is rigorous especially in the first year of instruction when the subject matter is the first encounters with the means of doing. The foundations curriculum, which starts off the design education, encourages learning by making, where making implies literally the hands-on production. Directly involving the tools and materials, this approach aims to develop “that craft” which a designer must possess: creating while constantly testing out visual or spatial outcomes of ideas. The subject matter learnt is making itself in the very broad sense: how one makes, as part of designing rather than making a particular object in a particular way. This generalized experience implanted in the very first year of architecture education is adaptable to other contexts to come in the advanced years of education.

Today, tending towards the integration of digital tools, architectural design education is going through a transformation. Design students are now immersed in working with digital tools as much as and even more than in working with traditional design tools. The common ways in which they make their design models, the materials and the ways of production that the aspired architecture profession deals with are changing. Digital fabrication is becoming more and more the key to integrated design solutions.

From the point of the educator, the means to teaching design are altering in parallel with the tools. How the notion of making in the studio prevails in the age of technology remains to be investigated, along with how learning by digital fabrication is a continuation of the making learnt in the first year.