New Pattern for Architectural Computing Education

Positivist vs. Constructivist Approaches

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The paper discusses the possibilities of replacing the prevailing, positivistic approach in the field of architectural computing education with the constructivist one. The mentioned approaches represent radically different philosophies of what knowledge is and how it is produced. In the field of professional education they also differently define the competencies of the professional. Nowadays, in architecture, where the design digital platforms producers force the philosophy of 'standards', the need for rethinking our general approach to architectural computing becomes an urgent issue.

Keywords: architectural computing, education, positivist, creativity, constructivist approach

POSITIVIST VS CONSTRUCTIVIST. The call for a better tomorrow, especially dedicated to computing in architecture, seems to call out the search for answers to the questions of rather general and wide scope within the domain. At the same time, the issue contained in the conference theme is very positivistic in nature. This seems obviously right and probably should not be questioned. However, the theme contains and reinforces themes for discussion, or even assumptions within which the western culture is trapped (The first - and perhaps most fundamental - flaw of positivism is its claim to certainty). These assumptions tend to concern whole societies, and by that they also deeply concern the reality of architecture, methodologies of the architects’ work, tools and media that they use. Computer based design platforms, on the performative and even ideological levels, are actually the reality of architectural design. Trying now to simplify the issue, we may assume that the further development of digital media and tools (mainly led by the corporate bodies) will make the reality of architecture and architectural design better. In architectural education therefore, the constant rush to teach solutions that are proposed (imposed) by the new standards, developers, seriously narrows the space for the alternative approaches.

The question has to be asked - what does a “better tomorrow” mean in the field of architectural computing? This is going to be the first question more widely evolved in the full paper. The potential answer will cover both the criteria and consequences.

The main idea that is expressed in this paper is the need for a shift in general approach to education in the field of architectural computing. On the meta level, the main problem is the shift from the prevailing positivist paradigm in architectural digital media education towards the constructivist approach (To-
Although constructivist approach concerns the theory of education and learning (Vanderstraeten, 2002), the concepts derived from this specific thinking on learning can be more widely applied in different fields. In short we propose the shift from the approach led by objectivism, certainty and external control (legal, corporate standards), towards the approach within which the learner becomes the information instructor (Wellington, 2001, 2015). Can we then 'translate' CAD, BIM, VR, AR into the field of interpretative possibilities?

The pattern of development in architectural design oriented digital technologies can be generally ranged between two values (states): tendency for integration and covering the complexity. The space between these two situations uncovers the change within the field during last 20-30 years - from CAD to BIM.

CAD used to be a sphere of some digital support of architectural design. Architectural design was somehow external to the sphere of digital tools The tools were developed there to support the architect in making his/her part of the building process documentation.

BIM expresses the ambition (probably of the software houses corpors) to introduce common digital platform(s) that would cover all required components of the whole design process. What these solutions really bring is the wider understanding of the complexity of design processes in the real world. But does this have to mean also technological complexity? Does this really make the reality of architectural design better? And - how it influences architectural computing education?

In architectural education, both CAD and BIM platforms are media that in most cases are imposed - by software producers and technological lobbies, together with their teaching - learning methodologies. These methodologies came as a consequence of the nature of the tools (software) that have to be taught this but not the other way. So instruction-learning processes are led by the software manuals.

In most cases they come from the outside of the design world. In this sense BIM did not bring any new meaningful possibilities for architectural design (in fact brought only one - making possible to make design process a virtual place, but this possibility was conceptually developed far before the term BIM appeared) (Verbeke, Stellingwerff, 2001).

**CHANGE OF FOCUS.**

So what is proposed in this paper is a change of focus in architectural computing education. The focus has to move from the procedural, domain oriented pattern (profession practice with its seemingly legal requirements and imposed tools, where development of tools develops methodologies, the user has to adopt these - positivistic approach) towards the person oriented approach (design situation is defined through media interpreted by the conscious and reflective design process participant - constructivist approach) (Glanville, 1995). The new education paradigm in architectural computing that should be focused on the constant development of the person - architect, not just tools or methods, will enable more paths for development of better designers. Better: more conscious, intellectually flexible, self-actualising professionals (Maslow, 1971).

As architectural practices are nowadays deeply influenced by digital technologies, the reflection is needed whether this influence goes in the right direction. Computing technologies offer new possibilities, but these possibilities cannot be rationally evaluated from the point of view of both - development of the field of architecture as such and development of architectural thinking (which in fact means development of the architect as a person). There is a need to see the sphere of architectural computing as a sphere of possibilities, not only technological and methodological obligations. This should be an adaptive sphere, which can be used, adapted for different purposes and in various, not standardised ways. Therefore instead of inventing new needs that must follow technologies, we have to learn to use technologies for making new design environments.
Therefore the question of defining proper and open ways of architectural computing education is an ongoing question, especially now, when we face such a strong preference for BIM education, that has to follow the development of the tools that prevail on the market.

The only proper solution for defining ways for architectural computing education is to define what, or rather WHO should be its final ‘product’? I believe that the issue is NOT to produce just the competent architect, but the person, who “can be equally called self-evolving person, the responsible-for-himself and his-own-evolution person, the fully illuminated or awakened or perspicuous man, the fully human person, the self-actualising person” (Maslow, 1971).

Having this in mind, we can distinguish two general approaches to architectural education:

1. Education is a training of the future professional - a strictly positivistic educational approach. The student has to acquire the objective knowledge and skills, that are required by the profession. Computing education here is a linear cause-effect acquisition of skills with digital tools that are required by the market.

2. Education as a laboratory for professional innovation - a constructivistic approach, within which individual interpretation and experiment become fundamental strategies in the learning process. In this pattern, the professional education becomes a laboratory for a personal development. Individual talents, interpretation skills are involved to act creatively in the process of learning. The sphere of computing hence, becomes the sphere of exploration - in the course of developing new possibilities and new aspects of design. The classes should be replaced with conceptual labs, with a free access to digital tools as experiment devices.

Using Glanville’s distinction (Glanville, 1995) of the general approaches to architectural computing, we can say that the first model of education presented above uses computers as as tools, the second as a media. Probably a medium approach to computing, that is based on treating digital media as media for experimentation and discoveries, can be seen as general methodological direction for evolving new education paradigm in architecture: “this can help us get beyond the limitations of our own imaginings, for we are all somehow trapped in and by the limitations of our imaginations, no matter how wonderful” (Glanville, 1995).

We, as educators have to remember that there are no media without their user (receiver). It is him/her who has the ability to define his/her tools and approaches, by an active, creative attitude.

No matter how unrealistic the constructivist approach may seem nowadays, it can really bring an essential change for the better in architectural computing and in architecture as a whole. What would have to happen to make it possible?

In the author’s view, there are three potential generative situations for this kind of change:

- development of designers’ programming skills, which have to be based on the natural appropriation of programming from the level of basic education, programming needs to become a skill comparable to writing skill;
- development of a new kind of digital solutions for architectural design, that would enable far deeper possibility for user adjustment, the actual practice of making SDK available for users is not a sufficient possibility, until the designers get the programming skills; the next level SDKs have to become the design profession oriented;
- acknowledgement of the open and personalized approach to the digital design media; this is especially important in the education processes, where the place for the innovative solution should left open to the users; Figures 1 and 2 show several examples of how design thinking can be developed with a use od 3d modelling and rendering software, when used not for simulation, but creation
What and How?

Overall development requires figuring out and purposes.

Figure 1

Examples of the experimental spatial imagination training with 3D intuitive 3D digital modelling.

Bialystok, 1995 - 2018.
naming tasks that relate to the general condition of our culture, our present and future needs and problems to solve. Digitalization, virtualization seem to be unavoidable, but we need to ask - to what extent and under what conditions. Strategies for actual conflicts solving, patterns of social life, global cooperation and neighbourhood, social and individual progress - they

Figure 2
will never be solved unless we touch and give the right to reconsider the modern notion of humanity on every level of education. Architectural education has a special role to play. We all see that somehow we reached the paradox - with the digital technologies we are able to see the complexity of each and every component of the reality, BUT at the same time we reach the limit of grasping this complexity. The ‘ruling’ pattern of intellectual, scientific development, based on the rationalistic skepticism reaches its limits. This pattern is not wrong but is no longer sufficient in educating us to deal with the world. This skeptic system imposes the distance between the subject of thought and its activity, which locates the participant of the process outside, making him/her an observer. In this pattern, the position of participant is very hard to achieve - and in architecture, participation seems to be an essential issue to be sought in designing spaces. The position of the observer is the position of controlling. But how many more processes are we able to control? It is the paradox, but in order to really go further, the digital environments, that surround us, compel commitment and participation. With a great communication possibilities we need to become involved with and responsible for each other. Therefore the model for an open education, focused on interpretative skills is a must.

There is a need for an overall discussion on both - initial assumption for architectural education and the vision of its product. These issues cannot be left in thinking on education, especially in the context of computing. In fact we are somewhere between our perceptions and the real complex world. Almost everything speaks of crossing the borders - and the border that we have to cross in architecture is the belief, that our profession has only one face.

Therefore, I do not believe that present education systems, in which we participate, will even touch the issue of its own fundamental aims. Some of these aims lie in the question of the full development of the person, his own understanding of his own place in the world, his ability to creatively interprete his/her own professional development. Education is here to help us not just to educate as professionals, but we undertake the professional education to define our place in the world, in realities between architectural spaces that should delight us and digital worlds, that should enrich our experience.

Therefore the aim of education is not just knowledge, not development of the world ‘outside’, not some mythical future. Education is to be able to release the kind of creativity which concerns the person as a whole, where the specific profession is its component, a way of life. Maslow said that we do not need to teach and train engineers in a standard sense, but in a new sense, i.e. ‘creative engineers’. “Education can no longer be considered essentially or only a learning process; it is now a character training, a person - training process” (...) What I am really interested in is the new kind of education which we must develop, which moves toward fostering the new kind of human being that we need, the process person, the creative person, the improvising person, the self trusting, courageous person, the autonomous person” (Maslow, 1971). I am interested in this too.

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