A Developmental Perspective for Architectural Design Education

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Part I: An Argument for Re-thinking Architectural Design Pedagogy

Schools of Architecture are accepting and graduating masses every year. In many cases, there is no test for eligible candidates. Therefore, the most challenging issues of architectural design education, particularly in the first year, are the diverse backgrounds, expectations, skills, and the level of motivations of the students. The Schools of Architecture, however, rarely cooperate with disciplines dealing with those issues and problems in education.

Architectural education has two poles regarding to their goals and expectations from the education and architecture. On one side, there is architect-tutor controlling and communicating the tacit and explicit knowledge of architecture and design. This knowledge is supposed to be based on a huge theoretical background, technical information and extensive experience. The tutor has absolute authority on design-training process by being an Architect. On the other side, there are students having diverse motivations expectations, goals for their education and future, and prejudices about profession.

The usual way of dealing with the students in the first year is to introduce them the visual language of perception and expression, “true spirit” of space and structures, great masters of architecture and their works, and sometimes, philosophical references for their intellectual improvement. This process is a kind of intellectual bombardment. That intellectual bombardment is mainly formed by means of a rough interaction between the architect-educators’ disciplinary knowledge, and attitudes / prejudgements towards education - teaching - learning. The prerequisites of education, learning outcomes and expected professional competencies are derived from the disciplinary-professional knowledge and experience accumulation. The methods and tools are developed and valorised through individual experiences, which are usually based on particular architectural design understanding. The least appraised components of that process are the conditions, necessities, motivation and readiness of the students. This might be caused by the belief that the merits of architecture and design can increase the quality of education, and can justify the methods by definition. Architect-educators usually confuse designing an interesting exercise – design problem with developing a pedagogical tool for design learning. The reason might be inadequate knowledge about education as a discipline - science.

There is a large research based literature on learning and development. The collected data and results clarify the nature of learning, learning about spatial relations in reality and in mental representations, the relations between cognitive and physical construction of space through design. Are these researches beneficial to architectural education?

It is a fact that, researchers and tutors in architectural education are following those achievements to develop better pedagogical tools. They are trying to be up-to-date in that field as well. The result is imported concepts and applications to develop new design exercises. But they are still missing an important part. There is a strong need for researches in/for architectural education to develope student-centered, theory and research-based pedagogical tools and methods. At this point, it is of importance to stress the difference between tracing the learning strategies or intelligence types of the students, and their developmental levels. Re-organisation of the materials according to different learning cycles or strategies of the students is not topic of this paper. This paper aims to initiate a debate about the tension between the cognitive development of individuals, bounded by the level of their society, and cognitive qualifications-prerequisites attributed to architectural design and its education, such as abstract-conceptual-multidimensional thinking, mental representation and so on. That tension is the key for establishing a correct and productive relation among design-architecture-education.

Neither disciplinary knowledge, nor the traditions of architectural education can explain the nature and components of that tension. Only a theory on the construction of knowledge and biologic-cognitive development can provide comprehensive explanations. The ground theory for development is Jean Piaget’s, Swiss-French biologist – natural scientist – developmental psychologist, Genetic Epistemology. Piaget is well known with his deliberate observations and notes on child development. His theory on cognitive development has an enormous influence on psychology and educational sciences.[1]

Jean Piaget researched the biological development, and the construction of knowledge. After numerous observations and experiments he concluded that the cognitive structures are developed in successive stages by means of genetically transferred unchanged operations.[2] Child development occurs in 4 sequential stages. Those stages are qualitatively transformed forms of cognitive structures. According to Piaget, these stages proceed with a universal and unchanging order. Post-Piagetian researches, however, showed that the ages and characteristics could vary according to the social and cultural circumstances.[3] They are hierarchically united in which all the structural characteristics of the previous stages are included by the next one. The ways of thinking varies in each stage qualitatively and they are organized to form a structure. The activities of the individual are the outcomes of that basic structure, rather than the results of learned responses to certain tasks.

The child cognition develops from one stage to the next one through two main processes: assimilation and accommodation, components of adaptation. Every single experience with the external reality disturbs the cognitive balance of the child. As a natural response, cognition needs to be balanced. The child assimilates the new situation directly into his/her existing cognitive structure first. It means that s/he tries to adapt the environment to his/her cognitive schemata. If it does not work, then s/he needs to accommodate his/her schemata to the environment. This is an open and interactive process that prepares the child for the next experience. A developing individual achieves a balance between the assimilation and accommodation in cognitive organization. This process is called as adaptation.

By means of adaptation process, the child constructs a certain reality; develops his/her perception of space; learns spatial relations, with their visual and mental representations. The child discovers the object permanence; learns reversing and representing the states of the objects mentally; explores different variables and constants at the same time; develops hypothesis, tests them and proposes alternating solutions for complicated abstract problems or situations. The abstract and combinatory thinking appear with adolescence. The process ends up with a fully developed cognition capable of running highly complex meta-cognitive operations on operations and actions.

Piaget converged physical discovery of space / spatial relations and the intellectual construction of space within development, which occurs through experience, social transference, adaptation and biological functions. He merged philosophy and science in Genetic Epistemology.

Philosophical and architectural issues of space have been under deliberate investigation since antiquity.[4] Piaget was one of the pioneers who endeavoured to explain ongoing interaction among body, external reality, spatial relations and mind. His statements on the levels of comprehension, representation (physically and mentally) and manipulation (design) of spatial relations promise a lot for architectural education. Because, all these cognitive skills correspond to the architectural design process, particularly in the first year design studio.

Part: II Developing Spatial Relationships[5]

One of the most important achievements is the emancipation and objectification of the external universe from the body and its movements. After the physical decentralisation of the body in the external reality, the child improves toward mental representation of his/her body among others. The final step is the understanding and representation of the others point of view, visually and intellectually. This could be called as a journey from “ego as the universe” to a “universe of egocentric perspectives”.

At the beginning, there is no external space or objects, but the extension of the body and the disposal of the acts. Things in sight are perceived as potential acts and resulting images without a sequence. It should be stressed that objects do not have independence and permanence in space and time yet. That is to say, space is a function of the subject.

Detachment of the object from the action begins with the search for vanished objects. This is a qualitative change in cognition. It is the initiation of the external reality. The centre of this subjective reality is the child’s ego. All spatial relations are constructed from the baby to the objects. Synchronically, dissociated reality is re-grouped in itself. The causality is the only schema of the all relations constructed by the child. It is transferred from the relations between the body and objects to the temporal spatial relations among the objects. This schema, however, is imposed and manipulated by the spatial egocentrism of the subject.

The early spatial relationships are the topological ones, such as proximity, separation, spatial succession, enclosure and continuity.

Those steps are followed by object permanence, development of a frame of reference that initiates the coordination of different viewpoints and consequently understanding of perspective, synchronic consideration of many factors as interdependent constants and variables. The reference system is crucial for the coordination of the surrounding events, otherwise the child's world could not go beyond a set of temporary relations constructed and collapsed permanently.

That reference system and coordination of different perspectives replace egocentric perspective. In time, children learn that other people have their own point of view. Piaget gives two exiting examples from his observations. Children sometimes uses only pronouns to tell their stories, like "he came to me to give it to do that". The child supposes that, by definition, other people know what s/he is talking about exactly as s/he thinks. In the other example, briefly, a model of three mountains in different colour and position is put on a table. The child sits one side. A wooden doll is placed to the other sides in each turn. The child's task is to find out how the doll sees the mountains from different sides. The result is fascinating. Until the age of, in average, 8-9, children fail to distinguish his/her viewpoint from the others. Every time they point out how they see. This mental egocentrism transforms into to the visual one in time.

The mental representation of the external reality helps children to consider and coordinate other viewpoints and states of different objects and people around. Without representation, perceptual world could have been incomplete and incomprehensible. The object permanence and reversibility, which are two pillars of external reality, could not be developed without metal representation. By this achievement, the children become capable of reconstructing other perspectives without seeing them, which comes with thinking content without an actual form. This could be accepted as the emergence of the adulthood. The individual begins to acquire the ability of proceeding mental operation on operations / actions hypothetically without a concrete form. The basic cognitive skills of the final stage can be summarized under five headlines: the capacity for reasoning on hypotheses; the use of propositional logic, that is, reasoning independent of factual content; the capacity of dissociating form from contents completely; the capacity of considering more than one factor at the same time (combinatory nature of the operations); the capacity of inserting real cases into a set of all possible cases in which reality is a special case of possibility.

Part III: Education vs. Architecture?

As a matter of fact, architectural design education requires all these cognitive transformations. Then, the reader might ask whether all students in the schools of architecture succeeded in their development. The answer must be yes, theoretically. Piaget, however, underlines the interaction between the individual and his/her environment.[6] Only proper experiences and social transference would allow the biological factors work to the utmost. In many cases, students begin their study before they reach the final stage.[7]

Despite the little space for psychological services and educational issues in architectural education, the literature on the "problems of the first year students" is huge. In many cases, those problems are discussed in relation with the lack of abstract thinking. The literature on architectural education has become an adventitious archive for different methods and "original" exercises for those new comers.

On the contrary, the lack of certain cognitive skills tells about the lines of proximal development. Schools of Architecture should explore the cognitive abilities, differences and similarities in cognitive structures of their students.

Such a research is compulsory for a creative destruction in architectural education. It is fact that studio – education is carried on through design exercises. These exercises are the professional or academic manifestations of the instructors, who construct a certain method with a strong and popular philosophical background and get the expected results in every "experience". Unfortunately, efforts to understand this design learning process cannot go beyond metaphorical explanations of communication between the instructor and the student.

Since that research will be based on error analysis approach, common problems (in terms of education and developmental psychology) for the same levels of education can be figured out. Then, the relation among the content (disciplinary knowledge and knowledge of design), method, and learning could be discussed. It might even initiate a debate on the prevailing academic-professional myths of architectural education, like Bauhaus and Basic Design.

Such a debate could remind that those mythological roots of architectural education were emerged from the interaction between artist-teachers and students sharing a common intellectual – philosophical – technical knowledge.[8] Different contexts and actors alter the results. In that case, there is a danger of running didactic studio exercises imitating the same 2 dimensional – visual compositions for completely different reasons.

Architect-educators should understand that the intellectual bridge and transference between the student and the architect have collapsed. There is a strong need for reformation. But it could not start from the secondary education system. Moreover, the intellectual – cognitive development of the individuals is not the main objective of the architectural education. There should be a new communication – interaction channel in the studio. This channel can be built on the achievements of cognitive development theory of Piaget, since it is capable of compounding space –constructed by the individual-, design –an intellectual/ metacognitive operation-, and education –learning-. Architectural education needs an educational reform. Otherwise, we can only talk about philosophical and professional indoctrination through imitated methods, which are didactic and mediocre oriented in their nature.

NOTES

[1] The works, experiments, observations and statements of Jean Piaget and Developmental Theory cited in this study have been collected from:

Jean Piaget, Bärbel Inhelder, *The Child's Conception of Space*, (trans.) F.J. Langdon & J.L. Lunzer, W.W. Norton & Company, 1967.

Jean Piaget, *Genetic Epistemology,* (trans.) Eleanor Duckworth, New York: Columbia University Press, 1970.

Jean Piaget, *The Construction of Reality in the Child*, (trans.) Margaret Cook, New York: Ballantine Books, 1971.

Howard E. Gruber, J. Jacques Voneche (Eds.), *Essential Piaget*, New York: Basic Books Inc.,1977.

Mary J. Gander, Harry W. Gardiner, Çocuk ve Ergen Gelisimi, (ed.) Bekir Onur, (trans.) Bekir Onur, Nermin Çelen, Ali Dönmez, Ankara: Imge, 2004, in Turkish.

Laurence Steinberg, *Ergenlik*, (trans.) Müge Artar et al., Ankara: Imge, 2007, in Turkish.

[2] Those stages are introduced to open up a basic channel from development to architectural education. Therefore, details, stage names, and substages are not given here. Please see the references above for further reading.

[3] For a comparative review of criticisms and counter-arguments please see Orlando Lourenço, Armando Machado, 'In Defense of Paiget's Theory: A Reply to 10 Common Criticism', *Psychological Review*, Vol. 103, No.1, 143-164. Available HTTP http://www.ches.ua.edu/.../hd501/materials/articles/lourenco,%20machado%20(1996)%20-%20defending%20piaget.pdf (accessed 16 Novamber 2007).

Another significant document is Piaget's Comments on Vygotsky's critical remarks. See Jean Piaget, Comments on Vygotsky's critical remarks concerning The Language and Thought of the Child, and Judgement and Reasoning in the Child. Available HTTP http://www.marxists.org/archive/vygotsky/index.htm (accessed 16 November 2007).

[4] See Cornelis, J. M. Van de Ven, *Concerning the Idea of Space: the Rise of a New Fundamental in German Architectural Theory and in the Modern Movements Until 1930*, Facsmile. Michigan, USA: University Microfilms, International Ann Arbour. 1977.

[5] Piaget associates cognitive transformation with three different types of space. Those space types, however, are open to discussion, and may lead us to the question of what space is. On the other hand, they are helpful to understand the development and expansion. Piaget says that children discover topological space first. The objects are distinguished or resembled through their proximity, separation, enclosure or openness, continuity and their spatial succession. And then, projective space and perspective emerge, in which different viewpoints are coordinated. The last step is the Euclidian space, in which all-possible displacements and relationships of the objects are predefined and subjected to the logic of the system. The projective space and Euclidian space develop almost simultaneously in order to construct comprehensive and coordinated reality for the child. But this study leaves them as the topic of another study.

[6] Lev Vygotsky's Social Cognition Theory and Urie Bronfenbrenner's Bioecological Models are worthy of reading on this subject, since they put the interaction with social and physical environment as the before biological constants and functions.

[7] See Steinberg, 2007 for researches on general education in USA. In architectural education, there are some researches concerning the learning strategies / style of the students to test a method or certain type of exercises. Psychological services and educational issues considering cognitive development, however, are not popular topics for the schools of architecture.

[8] Most of the Bauhaus students were highly motivated, less or more experienced in art or craft, mostly gifted artisans.