ARCHITECTURAL EDUCATION IN THE ERA OF IT REVOLUTION. REFLECTIONS ON THE ASSUMPTIONS OF ARCHITECTURE FOR SOCIETY OF KNOWLEDGE STUDY PROGRAMME IN THE CONTEXT OF THE CURRENT STATUS OF THE DISCIPLINE

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The rapidity of social, economic and cultural change brings new challenges also to the sphere of architecture. The environment around practitioners of this sensitive and socially responsible profession is undergoing transformations which not only necessitate theoretical and practical response, but also call for redefining the educational approach. In the present world of challenge, the discourse on the shape of education often requires reflecting on the condition of architecture as a profession and a discipline.

Some of these challenges are addressed in the MSc programme titled Architecture for Society of Knowledge (ASK)[1] as part of Architecture and Urban Planning study curriculum, which is the first English-language study programme at the Warsaw's faculty of architecture. On the 1st of October 2010 the first 24 students in the programme listened to the opening lecture "Performative Architecture" given by Professor Branko Kolarevica. Until now (spring 2014), there have been four recruitments for the programme, a total of 77 students enrolled, of whom 25 have graduated and received the degree of "magister inżynier architekt" (MSc and engineer in architecture).

The programme

When arranging the study programme, the assumption was to take into account the conclusions following from observation of the modern architect's work environment. The idea was to answer the question: what are the competences and knowledge a young architecture graduate will need to be able to perform in his/her chosen profession in an efficient, informed and responsible manner? The following problem areas were deemed most important in shaping the programme:

1. The global knowledge-based socio-economic system and how it influences architecture;
2. Design as a network practice, dispersed in time and space;[2]
3. A highly complex set of circumstances which create new challenges, including the growing expectations necessitating the use of effective design tools;
4. The necessity to ensure interdisciplinary cooperation reaching beyond traditional engineering;
5. On-going critical evaluation of the design methods employed and of the technical skills in view of the complex social and cultural processes;
6. The influence of new digital tools supporting the design process on the profession's paradigm – from acquiring and managing knowledge through analysis and simulation to digital prototyping and fabrication;
7. New educational measures and how to use them in teaching architecture (acquiring knowledge,[3] distance education, MOOC,[4] support of the information environment);
8. The risks of failing to critically evaluate the available means, including new tools;

[1] The team of Professor Stefan Wrona began developing the concept in 2008, and in December 2009 the programme was approved by the Council of the Faculty of Architecture at the Warsaw University of Technology.

[2] Cf. A. Burke, T. Tierney, *Network Practices: New Strategies in Architecture and Design*, New York 2007.

[3] Cf. M. Peters, L. Tze-Chang, D. J. Ondercin, *The Pedagogy of the Open Society: Knowledge and the Governance of Higher Education*, Rotterdam 2012. It is also worth noting the different perspectives – both positive and negative, especially as regards encouraging creativity – presented in: R. Galar, J. Lubacz, *Paradoksalne konsekwencje rewolucji informacyjnej w edukacji*, [in:] J. Lubacz (ed.), *W drodze do społeczeństwa informacyjnego*, Warsaw 1999, p. 100–123. Interestingly, some statements still seem relevant, even though the text was published before the social networking era.

[4] MOOC – Massive On-line Open Courses, online courses (most of the time free of charge) providing interactive content available at dedicated web platforms. The popularity of this type of distance education has been on the rise since late 2011. The courses are offered on platforms such as Coursera, edX, or Udacity by e.g. Stanford University, Massachusetts Institute of Technology, Harvard University, Princeton University to mention just a few.

9. Placing the search for new techniques in the context of architecture's continuity and heritage.

The Architecture for Society of Knowledge (ASK) programme has been created around three interrelated themes: advanced theory and history of architecture and urban planning, design (large scale interdisciplinary design studio and experimental projects touching upon the issues of architectural creation in computer-assisted environments) and material aspects of arranging space (with particular focus on computer tools, prototyping and fabrication).

The programme reflects the contemporary challenges faced by practicing architects. Throughout nearly four years of running the programme we have also found that social aspects of design in architecture and urban planning play an important role – also in relations with students. These aspects include the changing perception of the role of architects and urban planners on the one hand, reflected in the somewhat degraded social position of these professions, and on the other hand – paradoxically – the growing expectations as a result of sheer complexity involved in performing them.

Another issue is the increasing pressure for intensifying citizen participation in the design process, sometimes unfortunately understood as co-designing with future users of the designed space. The role of the architect is also interpreted differently, as a designer of the process, not of the object, in the so-called open source design – designing an algorithm whose parameters can be changed by prospective recipients at their discretion to create a unique object. [5]

Lastly, the use of new techniques, particularly information techniques supporting data capture and processing and enabling simulation of processes, provides a solid base for the concept and ensures its effective evaluation without excessive social expenditure.

The social environment of Architecture as a discipline

The issues of social change and computer revolution act as a focusing lens for information flow and exchange of knowledge. Our post-industrial communities, built on the recognized value of resources, material and immaterial, are facing yet another change. Information, which used to be a valuable asset, has now become overabundant, ubiquitous, but often lacking in quality. We are witnesses to free production of content on a mass scale; consumers are being replaced by prosumers: professional producers and consumers at the same time. One can safely conclude that in fact, the information society which has just been born before our very eyes[6] must go on to become a society of knowledge, able to discern between valuable and worthless information and use it accordingly. These are issues of double importance for architecture as a discipline embedded in multilayered social relations and as a creative activity rooted in and based on knowledge. Availability of information and processing it into knowledge, evaluating it and being able to use it are also fundamental to the process of education, which makes these problems valid in the realms of didactics and architectural education.

When addressing contemporary education in general, and architectural education in particular, one cannot pass over the issue of generation gap. The master-disciple model of education, traditionally associated with architecture, [7] has earned a new dimension in the context of computer-assisted practice. This applies both to the use of computer tools and to aspects of information flow and generally understood social communication. The capability to use computer tools, combined with the possibility of sharing one's own content with the general public, provide new opportunities for creating authorities and shaping opinions – also in architecture. Against this background, it is astonishing how relevant still

[5] This approach is especially common in product design, though the same adaptation of an object to the needs of the consumer can be seen in architecture. An example of this can be the interactive system for the generation of design solutions for mass housing based on user preferences in a mathematical model called shape grammar, inspired by the houses designed by Alvaro Siza at Malagueira, Portugal – cf. J. Duarte, *Customizing mass housing: a discursive grammar for Siza's Malagueira houses*, Cambridge (MA) 2001, Ph.D. thesis under the supervision of W. Mitchell [on-line], (viewed on 15.04.2014, available at: http://hdl.handle.net/1721.1/8189).

[6] For a more detailed discussion of postindustrial information community see e.g.: A. Siciński, *Społeczeństwo informacyjne – próba nazwania naszych czasów*, [in:] J. Lubacz, op. cit., p. 11–28.

[7] These issues in the context of advanced tools of architectural education are discussed in more detail in: H. Achten, K. Koszewski, B. Martens, *What happened after the "Hype" on Virtual Design Studios?: Some Considerations for a Roundtable Discussion*, [in:] *Respecting fragile places*, Ljubljana 2011, p. 23–32.

are the ideas of Margaret Mead,[8] who at the turn of 1960s and 1970s distinguished between different cultural paradigms depending on intergenerational relations and the direction of learning. The scholar's three cultural phases, identified partially based on her experience with primitive societies compared with contemporary cultural processes[9] can now be re-interpreted anew. Her conclusions on the difficulty of accepting the reversed direction of learning are still valid, more than forty years later. Her ideas can have some bearing on both the way architects work and the way they are taught. If one were to reduce this issue to skillful use of new technologies (though it is by no means the only aspect of this problem), a major difference in master-disciple relations could readily be perceived. The master's advantage lies not in his skill in using a tool but in knowing where it is best applied. In using new tools the "master" is no longer expected to be – and often is not – more proficient than the "disciple". In consequence, the direction of learning will be reversed. The approach to teaching design is also undergoing change, the focus shifting from craftsmanship and skill to critical evaluation. "The young could learn from their elders that they should go beyond them—achieve more and do different things. But this beyond was always within the informed imagination of their elders (…)."[10] Perhaps the younger generation, in its everlasting pursuit of new ways of shaping the environment, indeed reaches far beyond the present approaches and ideas, which themselves have been a leap forward compared to the modern movement in architecture of the early 20th century.

The tools

When reflecting upon architectural education in the era of IT revolution it is impossible not to mention the role of computer tools. They are an important component in the Architecture for Society of Knowledge programme and allow contemporary architects to move with ease within the complex and multiform context of modern design. Literature on the subject contains references to the chaos theory and complexity theories.[11] It must be noted that when a process is very complex, the tools, besides facilitating or enabling some operations, can also put them in the appropriate order.

An important though often disregarded issue is critical evaluation of new design methods. It seems that it is the absence of this evaluation that gave rise to the belief that the tools determine the design process. The evaluation process embeds the creative approach in the rationalist concept, as opposed to the phenomenological approach. Assuming that tools are necessary as means to achieve a goal, and are not in themselves the goal,[12] which, as it has already been said, requires some degree of critical evaluation, then the designer can make an informed choice of the concept, according to his/her own belief. Seeking to describe the apparent dehumanization of architecture as caused by the very use of tools, as a departure from design, from the reception and experience of architecture, as suggested by Heidegger's *Umwelt*, seems completely mistaken, since it results from neglecting critical evaluation of the tools available to the architect and make the tools an axis for creative thinking.

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[8] M. Mead, *Culture and commitment: a study of the generation gap*, 1970. When discussing these ideas one needs to bear in mind that they are deeply rooted in the mindset of the 1960s, a time of some momentous events and discoveries – the landing on the Moon, the awe and terror of the atomic era, the Cold War, the countercultural movements of the late 1960s – all this created a climate of breakthrough, if not of an imminent disaster, which the author did not fail to notice.

[9] Postfigurative (invaluable forebears – the elder teach the younger generations); cofigurative (appreciated peers – both children and adults learn from their peers) and prefigurative (puzzling children – the direction of learning is reversed: adults learn from children).

[10] M. Mead, op. cit., s. 125.

[11] Literature on the subject of the multiformity of the modern design process in the context of these theories is indeed abundant, including among others: comments on *Datascapes* – a methodology developed by MVRDV in: B. Lootsma, *Reality bytes*, [in:] "Daidalos" 69/70, 1998, p. 8–21; also S. Johnson, *Emergence: The connected lives of ants, brains, cities and software*, London 2002, p. 38–39; remarks on the chaos theory in: C. Balmond, J. Smith, *Informal*, London 2002; M. Weinstock, *Morphogenesis and the mathematics of emergence*, [in:] M. Hensel, A. Menges, M. Weinstock, *Emergence: Morphogenetic design strategies*, Chichester 2004, p. 10–17; on an urban scale, the issue is discussed e.g. in: M. Batty, *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*, Cambridge, Mass, 2005.

[12] Abandoning the tool-centeredness of new design techniques and emphasizing the information-based nature of the activity was already proposed in 1996: cf. J. Kłos, D. Miller, S. Wrona, *Rola informacji w projektowaniu architektonicznym*, Warsaw 1996.

Equally important in the design process is the concept of integrated design, which allows for a comprehensive approach to the proposed solutions and an evaluation of the design process at ever earlier stages, at the same time extending the possibilities of experimentation in architecture. The latter is especially important in the view of the possibility to evaluate design concepts without the considerable expense of variant solutions.

Methods and importance of design

When discussing architectural education against the backdrop of the contemporary status of the profession, one cannot fail to take into account the issues of design methodology and related activities. Definition of the mechanisms involved in the creative process based on knowledge, as is the case with architecture, is still difficult. Even though half a century has passed from the height of interest in design methodology giving rise to a number of models of the process, there is still wisdom in the words: "The designer indeed has no common, precise, and consistent language with which to communicate about his activities and question them through logical discourse."[13] Given the somewhat popular belief that designing is an act of individual will dependent solely on intuition, and that decisions in design are made without any kind of deeper reflection, the necessity to provide a theoretical framework for the design process is an important educational goal. All the more so since proficiency in using the tools is not the only determinant of the result, although it is often so perceived.

Furthermore, since the terminology remains inconsistent,[14] it is also important to come up with a precise definition of the essence of the design process. The praxeology-based definition proposed by Wojciech Gasparski is still valid: "Design is a procedure intended conceptually to prepare a relevant change (rational, desirable, effective, acceptable and aesthetic at the same time)."[15] It assumes the occurrence of change, of future action based on previous design, and therefore it not only emphasizes the practical reflections, but also defines the precise shape of the anticipated change. Meeting the requirements for such changes is a challenge that can only be taken up by those in possession of adequate knowledge and skill. Knowing what constitutes the essence of architects' work is key to understanding the role they do and should play. A look at the contemporary world of architecture might tempt us to update the above definition: design is a knowledge-based creative process aimed at preparing relevant change; the process involves solving non-standard problems in an ever-changing environment.

Such a definition points to some important aspects of design didactics, among them the future-orientedness of the work and the capacity to be flexible in responding to the changing circumstances. The creative aspect is visible through the emphasis on non-standard design solutions. It is worth stressing that creativity as a product of education cannot be overestimated in the dynamically changing reality of today, when originality and individuality is required not only from architects.

Architecture, art and culture

As a discipline, architecture is defined by its relation to other disciplines, especially science and art.[16] It is hard to imagine contemporary academic discourse without reference to these issues. Design is an important, future-oriented aspect of human activity and it is increasingly perceived as a somewhat autonomous entity. Though it is still believed, as Jean-Nicolas-Louis Durand put it in early 19th century, that "architecture is both a science and an art",[17]

[13] R. Foqué, *Building Knowledge in Architecture*, Brussels 2010.

[14] While in the academic discourse the word "design" is fairly well-defined, in the prevailing vernacular of the everflowing information stream the term is often understood as an expression of certain intentions and desires, not necessarily followed by actual implementation. A contributing factor here is the adoption by the Polish language of the English word "project" in the meaning of a task or an undertaking.

[15] W. Gasparski, *Projektowanie – koncepcyjne przygotowanie działań*, Warsaw 1978.

[16] One must be aware here of the historic relations between architecture and arts; this broad subject reaches beyond the scope of this article and has been discussed in a number of publications, cf. A. Miłobędzki, *Badania nad historią architektury*, [in:] P. Skubiszewski (ed.) *Wstęp do historii sztuki. Przedmiot, metodologia, zawód*, Warsaw 1973; or more recently: G. Świtek, *Gry sztuki z architekturą: nowoczesne powinowactwa i współczesne integracje*, Toruń 2013.

[17] The entire quote reads: "Architecture is at one and the same time a science and an art. As a science, it demands knowledge; as an art it requires talent. Talent is accuracy and facility in the application of knowledge; and such accuracy and facility can only be acquired through sustained practice and repeated application." This reasoning of Durand's, first published in 1802, caused architecture to stray away from other arts in the 19th century. J. Durand, *Précis des leçons d'architecture données à l'École royale polytechnique. Second Volume*, Paris 1824, p. 1.

there have been voices advocating its emancipation.[18] Epistemologically speaking, design can be treated as an alternative cognitive method of exploring the world of possible beings – not as a purely speculative thought, but application of knowledge and experience to potential situations in response to proposed changes. Science generally deals with existing phenomena; art focuses on expression and relationships with broadly understood reality; while design can give rise to new cognitive elements. In this context, additional significance can be assigned to the experimental method supported by contemporary techniques, which at least partially tells us about the perception and acceptance of the designed elements, objects and structures before they actually come into being. This makes it reasonable to make such tools available to architects, also to teachers of design. It must be said here that experimenting in architecture does not depend solely on the availability of new techniques. Surely, traditional measures such as architectural drawing, most notably sketching, as well as architectural models, are in fact a sort of experiments to see how different elements of a design will function together.

Having placed architecture in between art and science, one should consider its role in art, and culture in general. The growing interest in architecture and urban planning we are now witnessing from artists, art theorists and critics, as well as historians, anthropologists and even geographers stems from the so-called spatial turn which was first observed in social science and was then transferred to the domains of architecture, art and related fields. The same can be said in the context of changed study perspectives in the history of art, constituting a focus on spatial aspects, which used to belong to architecture historians. One of the results is bringing architecture closer to sculpture,[19] to a point that sometimes the boundary between the two becomes blurred.

This mutual interest is not without influence on the way architects work, on the status of the profession and on education in this respect. The interests of architects, their inspirations and creativity have broadened significantly,[20] which does not make teaching any easier. This is evident from the professional carriers of architecture graduates over the last decade, showing a great variety of interests and activities often in between different disciplines.[21] From this point of view an interdisciplinary approach in architectural education has become not only advisable, but quite necessary, not only in engineer education (cooperation with specialists in other areas, such as robotics), but also in terms of the need to ensure a rich intellectual potential to discover new inspirations for one's design work.

The discussion on the status of architecture in relation to arts is still fervent and probably will not lead to any unambiguous conclusions in the nearest future. As a side note one may remark that one of the postulates of modern art (installations and environments) is contestation of the institutional *status quo*.[22] In architecture and related fields, such as public space management, this approach is hardly acceptable in view of the idea of expert studies. It would require radical re-defining of the status and role of architecture, which in consequence would undermine the very basic assumptions of the discipline.

Being aware of the context in which an architect works and of the possible links with art must be paired with a critical analysis of the relations between architecture and contemporary culture, which is particularly important in shaping creativity. The key here is to present the role of archi-

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[18] Cf. e.g.: D. Leatherbarrow, *Architecture is its own discipline*, [in:] A. Piotrowski, J. W. Robinson, *The Discipline of Architecture*, Minneapolis 2001, p. 83–102; also P. Schumacher, *The Autopoiesis of Architecture*. Hoboken, N. J. 2011, where the author describes architecture as a kind of autonomous discipline set apart from other "related" disciplines. Apart from this taxonomic interpretation, Schumacher continues to build his argumentation on ontologous grounds, thereby giving architecture a status of an independent and self-defined system. Richard Foqué (R. Foqué, *Building Knowledge...*, op. cit.) advocates an epistemological approach, putting emphasis on design being rooted in knowledge.

[19] Especially in its latest forms, beginning from 1950s, such as site-specific art, installations, land-art, environments. When talking about large scale sculpting projects which exist outside the white cube of galleries and function as parts of public space (Alexander Calder, Richard Serra and other) or installations built on existing buildings (Gordon Matta-Clark or Christo i Jeanne-Claude), the notion of "architectural sculpture" is often brought to mind (cf. G. Świtek, *Gry sztuki...*, op. cit., p. 21). One can also find many examples of "sculptural aechitecture".

[20] Cf. A. Vidler, *Architecture's expanded field*, [in:] K. Sykes, *Constructing a New Agenda. Architectural Theory 1993–2009*, New York 2010, p. 320–331.

[21] Cf. press article about young Polish architects: *Generacja – próba diagnozy. Siedem głosów o młodych architektach*, [in:] "Architektura i Biznes", 2011, issue 6, p. 36–39.

[22] This is especially true about public art, cf. R. Deutsche *Public art and its uses*, [in:] H. Senie, S. Webster, *Critical Issues in Public Art: Content, Context, and Controversy*, Washington 2005.

tecture against the background of new cultural models that encourage contestation as the essence of new culture. Zygmunt Bauman's concept of "liquid modernity", where culture is understood as an imposed limitation and an instrument to generate uniformity, is being given a new face, where focus is put on strong individualization and rejection of community, as well as on relativity, exchangeability and blending of concepts, expectation of change and a desire for change.[23] In this environment, the status of architecture as a creative discipline based on knowledge becomes vague. This has an impact especially in architectural education, since young generations of students are natural carriers of cultural change. Assuming that the key aspect of contemporary culture is fashion,[24] fuelled from within, based on affirmation of constant change, from "having" to "throwing away", defining the role of architecture in contemporary world becomes a difficult task. On the one hand it requires constructive consideration of the influence of new cultural phenomena on the field of design, and on the other it demands defining the underlying values and principles of the discipline which must be kept intact as integral components of the profession. New design concepts, uncritically embraced and implemented without much consideration, such as parametric design, can also be thought of as examples of the pursuit of fashion. They are without doubt an indirect result of the above-mentioned cultural change, of yielding to this change or of trying to oppose it. Being aware of the workings of these mechanisms seems crucial in architectural education.

Design as a knowledge-based process

In architectural design, where a number of precision tools come into play, being aware of the complexity of the process is key. Contrary to popular belief, tools do not have to determine a rational approach to creative work in architecture. If used well, they can support this multifaceted process, and in technical concept development they are virtually indispensable. In the Architecture for Society of Knowledge programme, knowledge management and close observation of the nature of the design process are important elements of education. They are also issues addressed by many renowned scholars,[25] though not yet explicitly described. The creative, multi-aspect nature of the research refuses to be pinpointed. Yet it is possible to record it. An awareness of the phases in the process, with their cyclical nature, helps to consciously arrange the subsequent tasks. This is why during the ASK diploma seminar students are asked to write down their actions and compare their notes with one of the known models of the design process (Fig. 1, 2, 3, 5).

The most popular model and a relatively simple one is Richard Foqué's model of three moments: the structuring moment (establishing epistemological relations with the *status quo*), the creative moment (reaching beyond rationality to explore new, original ideas) and the communicative moment (representation of an idea on three levels: syntactic, semantic and pragmatic; this phase is also called the execution phase in Archer's model).[26]

In students' records it is also important to pay attention to abandoned ideas, dead ends of the creative process, and to the cyclical nature of actions, where individual stages are not ordered into a clear sequence. This way, the full creative path emerges and can be understood and evaluated. Below are three student charts representing the design process which were presented together with the diploma projects at graduation (Fig. 4).

Summary

Thinking about education in architecture and urban planning, one needs to take into consideration the status of the discipline itself. The approach represented by the Architecture for Society of Knowledge study programme, focusing on new techniques and methods of design, encourages reflection of a general nature. Some basic issues regarding the profession and the related didactics are:

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[23] Z. Bauman, *Kultura w płynnej nowoczesności*, Warsaw 2011, p. 17–31.

[24] Z. Bauman, op. cit., p. 36–39.

[25] Among the exhaustive literature on the subject: Ch. Alexander, *Notes on the Synthesis of Form*, Cambridge 1964; B. Archer, *Systematic Method for Designers*, London 1965; Ch. Jones, *Design methods: seeds of human futures*, New York 1970; T. Maver, *Appraisal in the design process*, [in:] G. Moore (ed.), *Emerging Methods in Environmental Design and Planning,* Cambridge 1970, p. 195–202; Royal Institute of British Architects, *RIBA Handbook of Architectural Practice and Management*, London 1971; Ch. Jones, *Designing Designing*, London 1991; N. Cross, *Designerly Ways of Knowing*, London 2006.

[26] Cf. R. Foqué, op. cit., p. 54.

1) Perceiving design as a knowledge-based activity, with due consideration paid to the creative aspects involved;
2) Emancipation of design and its epistemological status;
3) The essence of basic design methodologies versus the status of the discipline;
4) The catalysing role of tools in structuring the design process, keeping its independence intact;
5) Redefining design methodology in view of the need for an interdisciplinary approach and experimentation;
6) The role of design and architecture in the society of knowledge.

Each of these issues is an open one, involving irreconcilable problems, habits and stereotypes. Undoubtedly, constant analysis of the multitude of relations and common grounds with architecture is key in creating and improving study programmes enabling young people to perform as architects. It is important to have a broad understanding of the discipline in the general environment of all creative endeavours. In a society driven by change, knowledge, awareness and in-depth analysis of the processes shaping the contemporary world cannot be overestimated.

Translated by Z. Owczarek

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