

Interdisciplinary education of architects both globally and locally

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ABSTRACT: Architectural education depends on many factors, but is regulated by national guidelines that are consistent with international requirements. The architectural education programmes are monitored and evaluated by accreditation commissions operating within individual countries, but also recognised on a global scale. The knowledge and skills of the architect and the expression of architecture in urban structures take into account the processes and phenomena characteristic of globalisation, as well as local conditions that allow for shaping unique architectural and urban works. Rapid social, environmental, technological and economic changes force architects to have diverse roles and knowledge from different areas. The examples in this article of requirements and programmes of first- and second-degree studies, postgraduate studies and case studies of doctoral theses, show that this required knowledge is interdisciplinary.

INTRODUCTION

Discussing the problem of interdisciplinarity in architectural education requires consideration of several issues. The first concerns the importance and effects of *globalisation* and *locality* in the activities of the architect. The second relies on analysing the content and understanding of the word, *architecture*. The question is what content, in relation to the definition of architecture, should be included in the education of architects. Finally, interdisciplinary education requires a determination of what disciplines are in the scientific world and, indirectly, whether architecture is in fact a *discipline*.

GLOBAL AND LOCAL SCALE OF ARCHITECTURE AND EDUCATION

Globalisation with its pros and cons is a fact. Locality is important because it restores the human dimension to the globalising process. Architecture and the education of architects has two aspects: the global and local scale of problems and education.

Globalisation in the teaching of architects means taking into account the basic phenomena associated with this process, such as climate change, migration, unification of products, materials, construction systems, as well as the flow of information, knowledge, students and architects. Locality means taking account of original features of a place, the population, tradition and architectural heritage, as well as legal, environmental and social conditions characteristic of a place.

Globalisation in architecture is most visible in architectural detail, which results from the universality of the materials used. The problem of repeatability is apparent in office and residential buildings, which are the most common structures in the city.

The same materials, forms of buildings and elements of the urban structure occur in all countries of the world. However, architects and urban planners understand that the local features of a place give an unprecedented opportunity to create a unique architecture with features of the locality, to achieve the best spatial and aesthetic effect, consistent with the expectations of the local community (see Figures 1, 2 and 3).

Examples of such efforts can be found, among others, in the works of Zaha Hadid in Innsbruck (Figure 4), Steven Holl in Langelois (Figure 5) and Peter Zumthor in Vals (Figure 6).

Also, a number of residential developments, such as the Amsterdam seafront (Figure 7) or the Torpedohallen residential building in Copenhagen (Figure 8) reflect from local tradition and conditions, which makes them uniquely recognisable.



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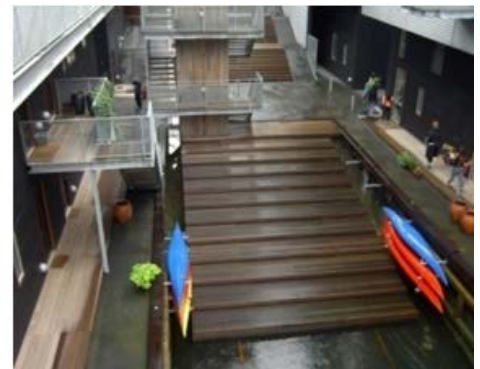
Figures 1, 2 and 3: Fragments of the façade of buildings from Germany, the Czech Republic and Denmark (Photographs by the Author).



Figures 4, 5 and 6: Examples of new developments (Photographs by the Author).



7)



8)

Figures 7 and 8: Examples of new residential developments (Photographs by the Author).

ARCHITECTURE AND THE ARCHITECT

There are different definitions of architecture in literature and practice. The Merriam & Webster Dictionary says that *...architecture is the art or science of designing* [1]. The Encyclopedia Britannica states that: *architecture - the art and technique of designing and building, as distinguished from the skills associated with construction* [2].

The definition in the Faculty of Architecture at Cracow University of Technology (FA-CUT) is the closest to the author's view, and much wider. It states that *architecture is the art and science of designing and creating buildings, as well as shaping the urban space for people's needs and environmental profit*.

The scope of education for architects at the FA-CUT directly depends on this definition. With such a broad meaning of the word, *architecture*, and the requirements for the architects' education, it is instructive to refer to ancient legacy and, for comparison, cite the terms used by Vitruvius in his work, *The Ten Books on Architecture*, Chapter I, Education of the Architect:

The architect should be equipped with knowledge of many branches of study and varied kinds of learning. This knowledge is the child of practice and theory. Practice is the continuous and regular exercise of employment where manual work is done with any necessary material according to the design of a drawing.

Theory, on the other hand, is the ability to demonstrate and explain the productions of dexterity on the principles of proportion [3].

and then, it goes on to say that:

An architect ought to be an educated man - he must have a knowledge of drawing, geometry is of much assistance in architecture, optics, arithmetic, wide knowledge of history, philosophy, music, the architect should also have a knowledge of the study of medicine on account of the questions of, air, healthiness and unhealthiness of sites, and the use of different waters [3].

The education of architects in Poland is regulated by a Minister of Science and Higher Education Regulation dated 29 September 2011, on the Standards of Education for Majors: Veterinary Studies and Architecture [4]. The standards included in the document define the wide range of knowledge necessary for the architect, which must be comprised in the teaching programme, and is visible in the curriculum of the FA-CUT. The implementation of ministerial requirements is necessary for obtaining national accreditation for the faculty of *architecture* granted by Polska Komisja Akredytacyjna (PKA) - the Polish Accreditation Commission.

Another Polish accreditation is granted by Komisja Akredytacyjna Uczelni Technicznych (KAUT) - the Accreditation Commission of Universities of Technology. The KAUT awards a EUR-ACE® certificate to accredited courses. The accreditation system was developed by the European Network for Accrediting Engineering Education (ENAE). This network brings together many European organisations involved in training engineers, such as the Engineering Council (EC) in the United Kingdom, Commission des Titres d'Ingénieur (CTI) in France, Fédération Européenne d'Associations Nationales d'Ingénieurs (FEANI), Société Européenne pour la Formation des Ingénieurs (SEFI), and Internationalen Gesellschaft für Ingenieurpädagogik (IGIP). This accreditation has a European scale. The global scale is represented by the Accreditation Commission of RIBA (Royal Institute of British Architects) [5][6]. On their Web site, it is explained:

The RIBA is a global membership body providing support, events and activities in the places local to you. The RIBA International is a global professional membership body driving excellence in architecture, with more than 42,000 members worldwide. We offer support for members based or wanting to work overseas, with four global regions - Americas, Europe, Middle East and Africa, and Asia and Australasia - and 11 established International Chapters serving local communities of architects across the world and hosting regular events and activities [5].

Validation criteria prepared by RIBA include various requirements for students and graduates of architectural studies:

- Ability to create architectural designs that satisfy both aesthetic and technical requirements.
- Adequate knowledge of the histories and theories of architecture and the related arts, technologies and human sciences.
- Knowledge of fine arts as an influence on the quality of architectural design.
- Adequate knowledge of urban design, planning and the skills involved in the planning process.
- An understanding of the relationship between people and buildings, and between buildings and their environment, as well as the need to relate buildings and the spaces between them to human needs and scale.
- An understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors.
- An understanding of the methods of investigation and preparation of the brief for a design project.
- An understanding of the structural design, constructional and engineering problems associated with building design.
- Adequate knowledge of physical problems and technologies, and the function of buildings so as to provide them with internal conditions of comfort and protection against the climate, in the framework of sustainable development.
- The necessary design skills to meet building users' requirements within the constraints imposed by cost factors and building regulations.
- Adequate knowledge of the industries, organisations, regulations and procedures involved in translating design concepts into buildings and integrating plans into the overall planning [5].

ARCHITECTURE AS A DISCIPLINE

The following excerpts from the classification of disciplines applied: a) before 1 October 2018, in Poland; b) in the OECD; and c) in Poland after 1 October 2018.

Regarding a) Polish old - a three-stage division with 102 disciplines. Architecture and urban planning was a discipline in the field of technical sciences: Field - Engineering and Technology; Discipline - Architecture and urban studies.

<p>Regarding b) according to the OECD</p> <p>Field of Science and Technology</p> <ol style="list-style-type: none"> 1. Natural sciences 2. Engineering and technology <ol style="list-style-type: none"> 2.1 Discipline - Civil engineering <ol style="list-style-type: none"> 2.1.a. Civil engineering 2.1.b. Architecture engineering 3. Medical and Health sciences 4. Agricultural sciences 5. Social sciences <ol style="list-style-type: none"> 5.7. Discipline - Social and economic geography <ol style="list-style-type: none"> 5.7.c. Urban studies (Planning and development) 6. Humanities <ol style="list-style-type: none"> 6.4 Discipline - Arts <ol style="list-style-type: none"> 6.4.b. Architectural design 	<p>Regarding c) Polish new two-stage division</p> <p>Field of Science and Technology</p> <ol style="list-style-type: none"> 1. Humanities 2. Engineering and Technology Disciplines: <ul style="list-style-type: none"> - Architecture and urban studies 3. Medical and Health Sciences 4. Agricultural Sciences 5. Social Sciences Disciplines: <ul style="list-style-type: none"> - Social and economic geography and spatial management 6. Pure and Natural Sciences 7. Theological Sciences 8. Art
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Hence, architecture and urban planning is still a discipline in the field of engineering and technical sciences. This is important for assessments made in Polish universities. During the four-year assessment, the level of teaching in one university is compared to the same discipline at another higher education institution. The discipline category will depend on the results of the assessment, and consequently, the funds that the university will receive for academic development and teaching.

For the university's development strategy and the architect's profession, it is important that architecture and urban planning are separate disciplines. However, according to the Minister of Science and Higher Education and the accreditation commissions for the first- and second-degree studies, future architects are expected to possess broad knowledge enriched with issues from other areas of science, such as Engineering and Technology, Humanities, Health Sciences, Social Sciences and Art.

CASE STUDIES

Interdisciplinary teaching is also evident in the highest education forms - doctoral and postgraduate studies - examples of which are given below:

Case study 1:

Intimacy in multifamily residential complexes

Author: Stanisław Krzaklewski, PhD Eng. architect

Supervisor: Prof. Grażyna Schneider-Skalska

Discipline: Architecture and Urbanism

In co-operation with sociology - focus research questionnaires and meeting with potential users

Links to: architecture; sociology; sociology of the city; social ecology; housing design; spatial economy.

It was necessary to define the attributes for intimacy using the literature, sociological research and urban studies. Additional attributes of intimacy were the result of sociological research.

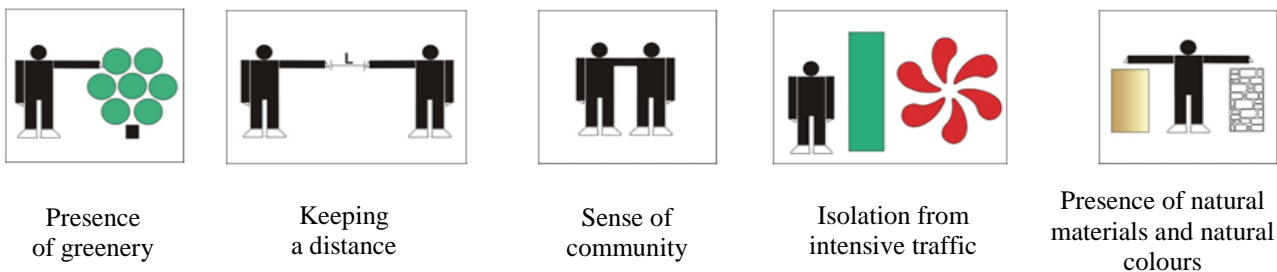


Figure 9: Author - Stanisław Krzaklewski.

Case Study 2:

The influence of urban planning and architectural shaping of a residential urban interior on its acoustic comfort

Author: Beata Walicka-Góral, PhD Eng. Architect

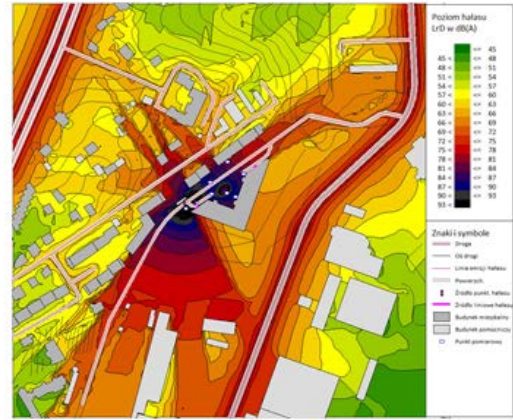
Supervisor: Prof. Grażyna Schneider-Skalska; Co-supervisor: Krystian Woźniak, PhD (civil engineering (transport))

Disciplines: Architecture and Urbanism

In co-operation with sociology - questionnaires for inhabitants and civil engineering (transport) - research on the level of noise.



10)



11)

Figures 10 and 11: Measurements of noise in the urban interior and image of intensity and range of noise (Author: Beata Walicka-Góral).

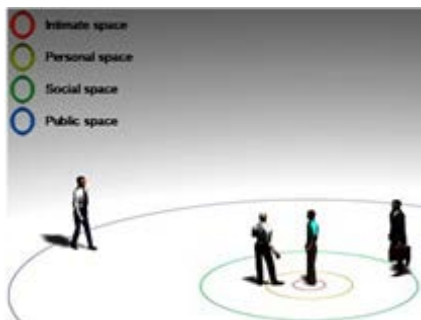
Case Study 3:

Human scale in housing units

Author: Wojciech Sumlet, Eng. Architect

Supervisor: Prof. G. Schneider-Skalska; Co-supervisor: Zofia Łącała PhD (psychologist)

Disciplines: Architecture and Urbanism + Psychology - research methods prepared with an expert on the methodology of research.



12)



13)



14)

Figures 12, 13 and 14: Interior perception by users (Author: Wojciech Sumlet).

The same interdisciplinary relationships occur with postgraduate studies. For example, there are postgraduate studies on sustainable architecture at the Faculty of Architecture at Cracow University of Technology, conducted by Prof. Waław Celadyn. The programme includes such issues as the legal aspects of the subject, energy, materials, water, users' comfort, climate, integrated design of the sustainable built environment, energy and ecological assessment of buildings, management and education [7].

Another example is the programme for postgraduate studies conducted by the Chair of Housing Environment, under the direction of Prof. Grażyna Schneider-Skalska and Dr Elżbieta Kusińska. The studies were conducted on the basis of an agreement between Cracow University of Technology and the city of Kraków. The aim of the programme was broad and included increasing the knowledge, skills and social competencies of participants in the process of shaping and developing sustainable housing areas that offer residents the opportunity to live in a high-quality, healthy environment.

The educational outcomes included:

For students:

- increase in competitiveness in the labour market by acquiring the latest theoretical knowledge and practical skills of planning, shaping and managing residential areas in urbanised areas, including social, spatial, economic, aesthetic and environmental issues;
- use of complex concepts based on professionally constructed diagnoses;
- acquisition of competencies in co-operation in an interdisciplinary team for the transformation and development of sustainable housing areas;

For public administration, design, development and other organisations:

- preparing staff to participate in the processes of shaping and managing the urbanised environment;

For university:

- development of interdisciplinary teaching methods that integrate scientific communities.

The students of postgraduate studies worked on a local scale, preparing alternative concepts for a specific place in Krakow, the Ruczaj area, applying the principles of sustainable design as principles recommended on a global scale.



15)



16)



17)

Figures 15, 16 and 17: Discussions on the city's strategy, environmental aspects and social studies, respectively (Photographs by the Chair of Housing Environment).

CONCLUSIONS

The opinions, definitions, programmes, documents and cases presented in this article lead to the conclusion that the interdisciplinary teaching of architects on a global and local scale is necessary. This covers structures, people and the environment. The education contains elements of knowledge from architecture, urbanism, law, sociology, psychology, civil engineering, geodesy, environmental engineering, and economics, as well as skills, such as architectural and urban design, presentation, co-ordination, mediation and the ability to use manual and computer tools. Teaching and all activities are carried out in accordance with the well-known dictat: *think globally act locally*.

Interdisciplinarity and multiscale in teaching are implied by the new challenges faced by the architects and urban planners, as set out in The New Charter of Athens 2003 [8]. This document specifies a new interpretation of the role of the architect as *creator, administrator, leader, manager, advisor, mediator, and educator*, encountering new tasks resulting from social, political, economic and technological changes, as well as changes in the environment and urban structure.

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