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Interdisciplinary studies for PhD students in the Faculty of Architecture at Cracow University of Technology: part 1 - first year study

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ABSTRACT: The main aim of this article was to examine the PhD curriculum (first year study) and highlight the modern way of approaching advanced academic studies. What is most important these days is an interdisciplinary approach to the studies of young scholars. Modern architects are confronted by a range of challenges due to modern materials and ideas. The authors focused on presenting a range of methodological and learning approaches applied in PhD studies in the Faculty of Architecture at Cracow University of Technology (FA-CUT). In this article, the authors have analysed the approaches used during first year PhD studies at FA-CUT. The interdisciplinary approaches are described in the first part of the article. In the second part, examples are presented of key interdisciplinary lectures delivered by professors from FA-CUT and various specialists. In the third part of this article is presented a range of monographs and other specialist books that are used during the interdisciplinary study of PhD students at FA-CUT.

Keywords: PhD studies, education, curriculum, interdisciplinary studies

INTRODUCTION

Interdisciplinarity: a Contemporary Pursuit

Interdisciplinarity is the new wave in the contemporary world. People live and work in an interdisciplinary world. Thinking becomes interdisciplinary. The link between interdisciplinarity and creative thinking is well described by Professor Sir Ken Robinson, who says:

> *Creativity depends on interactions between feeling and thinking, and across different disciplinary boundaries and fields of ideas* [1].

The interdisciplinary way of teaching and learning should start in a primary school and continue throughout all levels of education. In higher education in Poland - as in many European countries - there are three levels: Bachelor, Master and PhD. There is a growing need for higher education to be interdisciplinary. This also applies to the education of architects. Work becomes more and more interdisciplinary. Therefore, education has to become interdisciplinary to prepare for such work [2].

Architects work with high-tech materials, bright ideas and with constantly improving technology. In order to create up-to-date work, the architect needs interdisciplinary knowledge. This is also true for academics and PhD students [2].

Interdisciplinarity as an approach to advanced academic studies has become more pervasive over the past several years [3][4]. Particularly in architectural studies, this is considered important and is highly valued. In the context of multidisciplinary studies undertaken by aspiring scholars in architecture, an examination of a PhD programme is presented in this article, including the challenges posed by modern materials and technological tools.

The examined PhD curriculum is offered by the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland [5]. The authors examined the curriculum from the perspective of the methodological approaches at the Faculty and how the resulting outcomes may impact on the future employability of PhD graduates.

RESEARCH METHODOLOGY

Gaining Insight from Collaboration

The unique insight into interdisciplinary studies in the education of PhD students was provided through the collaboration of the authors of the article: one an experienced academic supervisor and the other a PhD student. They have complementary perspectives on how, in the first semester programme at FA-CUT, the students are introduced to the methodology and new approaches to interdisciplinary education. The great advantage was to examine the perspective of both teacher and student.

In order to investigate the interdisciplinary aspects in the academic curriculum, the programme of selected lectures, workshops and published monographs was analysed. The focus was on the suitability of the interdisciplinary education by making a scientific assessment of the first year of study.

The second part of the assessment - the analysis of further years of studies (second to fourth years) will be completed in the near future. The authors will present results in future papers. It will be equally important to review the second, third and fourth semester PhD studies, with the aim of improving them. This study will provide the background material for future work on the analysis of the PhD studies curriculum.

The interdisciplinary approaches used during the PhD studies in FA-CUT are described in the first part of this article. In the second part of this article, the examples are given of key interdisciplinary lectures presented by professors from FA-CUT and other specialists who are working at the University. In the third part of this article a range of monographs and books is presented that are used during the interdisciplinary courses of PhD studies conducted at the University.

THE PROGRAMME OF DOCTORAL STUDIES

> *Learning results from what the student does and thinks and only from what the student does and thinks. The teacher can advance learning only by influencing what the student does to learn* [3].

Emphasis on Learning

The main aim of the research reported in this article was to examine the PhD programme curriculum for the first year of study and to assess the modern way of approaching advanced academic studies. Nowadays what is most important is an interdisciplinary attitude towards the studies of young scholars. The interdisciplinary approach to academic studies was revealed through an analysis of the lectures, seminars and workshops conducted during the first year of studies. Changing the emphasis from what the teacher does to what the student does and from teaching to learning shifts the emphasis in the classroom to create space for discussion and academic development [3]. This allows for true interdisciplinarity.

> *What are the learning goals? How is the student body changing? How should teachers adapt the learning to meet the new challenges? How can interdisciplinarity help to achieve the stated goals?* [3].

The first semester of studies requires the acquisition of five ECTS (European credit transfer and accumulation system) credits and the subjects require nominally 69 hours of student work. The majority of a student's time is focused on the lectures with only a few hours on the final project. First-year classes are mostly compulsory and lay the foundations for further learning. These are not only theoretical lectures, they include practical classes too, in various forms including workshops and seminars. The first year ends with a seminar, where students present the outlines of their future doctoral dissertations.

The first semester is a unified course for all students, while the individual approach of the young scientists is clearly visible in the second. The second semester of studies requires 10 ECTS credits (twice as many as in the first semester). The proportion of academic classes to individual work also changes. The semester consists of 189 hours. The University offers an open study programme. It is students who control their career path and decide how and what they want to study. The doctoral programme at Cracow University of Technology can be modified to the individual needs and requirements of students, guided by their interests and the skills they want to acquire.

The programme is updated every year to keep up with changing trends in higher education and teaching methodology. Also, the development of technology requires a change in the approach to teaching and an update of the tools used. These changes include the emergence of e-learning platforms and specialist on-line databases that have become indispensable tools for conducting research.

A significant part of the workshops at the University are conducted in computer laboratories with access to the Internet and necessary software. The University encourages students to BYOD (bring your own device) for use during workshops and consultation. Cracow University of Technology supports research that is high-tech, using new methodologies and up-to-date software programs.

> *The target of a pedagogue is to teach well and efficiently at the same time. A good pedagogue tries to give maximum knowledge in a given time interval. It is a mistake to think that it is possible to teach everything, mainly if one regards the university surroundings. Understanding this seemingly definite fact is not natural for many teachers and sometimes modern methods are applied to life only with difficulty. Efficiency in teaching is presented through different views from the pedagogues' and students' sides* [6].

Methodology for Conducting Lectures

The first semester is extremely important for the education of a PhD student. The main subject is *Wybrane Zagadnienia Teorii Architektury i Urbanistyki, Wiedzy o Kulturze* (Selected issues of the theory of architecture and urban planning, knowledge of culture) delivered as a series of lectures. Each lecture is conducted by a different professor at Cracow University of Technology, each with their own charisma, experience and knowledge of different fields. This allows students to learn how diverse the approach to architecture and teaching can be.

Also, the theme of the lectures is highly diverse: from pure theory to practical implementation of the knowledge, from architecture itself, through construction, conservation of monuments, urban planning, to landscape architecture and environmental protection. Professors work in various scientific units, often presenting the scope of their research and, at the same time, they expose the PhD students to their areas of research.

This information is especially important, as the students are obligated by the end of the first semester to choose a tutor and the unit in which they want to pursue their academic work. *The tutor can help, lead, keep track and determine the right direction* [7]. The final assignment of the course is to write an essay describing the methodology and topic of one of the presented lectures.

The topics of selected lectures presented below illustrate the interdisciplinary approach of the academic research including shaping the city and landscape, healthy urban living spaces, residential buildings, various technical matters and materials.

Interdisciplinary Lectures

The first in a series of interdisciplinary lectures on shaping the city under the title *Metafizyka Miasta* (Metaphysics of the city), by Professor Rafał Blazy, focused primarily on presenting to the students the philosophy of the creation and existence of cities. The lecture described the network of connections and dependencies of individual elements composing the city as a coherent whole. In the conclusion, he referred to research presented in his publication entitled *Wartości Humanistyczne jako Kod Genetyczny Miasta* (Humanistic values as a genetic code of the city) [8].

Another lecture is the presentation of the issues of sustainable design in urban and housing space by Professor Grażyna Schneider-Skalska [9][10]. It shows how to shape sustainable housing to meet social needs and which is economically viable, beautiful and accessible to human beings. She underlines that sustainable design treated as part of sustainable development is becoming a challenge for contemporary and future generations of architects [10].

The lecture by Professor Teresa Kusionowicz entitled *Kształtowanie Zdrowego Środowiska Mieszkalnego* (Shaping a healthy residential environment), was a continuation in discussing the issues of sustainable design within the complexity of one building. The author touched on the issues closely related to her scientific research presented in the publication *Problemy Projektowania Budynków Mieszkalnych a Zdrowie Człowieka* (Problems of designing residential buildings and human health) [11]. During her lecture she discussed the issues related not only to the construction, but also to the chemical, physical and biological issues, as well as problems faced during construction and subsequent usage of the building. The author mentioned several factors and phenomena, which may adversely affect the quality of the environment in an apartment or a house. The range of these factors is wide, from the architectural form and materials of construction, to the interior microclimate, which is influenced by factors such as temperature, humidity, radiation, harmful substances and air movement.

During the second part of the lecture, Professor Kusionowicz introduced students to the publication of Professor Elżbieta Niezabitowska's book entitled: *Metody i Techniki Badawcze w Architekturze* (Methods and techniques of research in architecture) [12]. This book has become a *Polish Bible* for academics in the field of architecture. Professor Niezabitowska in her book presents various research methods and techniques that academics can use to carry out research, to present it and publish it.

Another lecture worth mentioning was by the co-author of this article, Professor Sabina Kuc, where she discussed another approach to shaping the human environment and, in particular, the landscape. Professor Kuc in her lecture touched on issues closely related to her scientific research presented in the publication, *Techno-kreacja a Architektura Krajobrazu. Wybrane Zagadnienia* (Techno-creation and landscape architecture. Selected issues). This is another useful textbook [13], in which she discusses issues related to landscape creation using modern techniques, materials and technologies.

Selected Issues of Scientific Research

Professor Niezabitowska's publication, discussed above, is also used in a first semester PhD studies course entitled *Wybrane Zagadnienia Prowadzenia Badań Naukowych* (Selected issues of conducting scientific research). This course consists of practical classes implemented in six-hour blocks. The classes were conducted in the form of seminars and discussions, and their main purpose was to present the tools for writing a doctoral thesis and gathering information for analysis. These classes were conducted by employees of Cracow University of Technology not related to the Faculty of Architecture and also lecturers from Jagiellonian University, Kraków, Poland. Most of these classes take place in the Library of Cracow University of Technology, where a qualified employee familiarised students with the research tools for creating bibliographies, such as Mendeley.

During the course, students learn how to use the resources of global databases, such as Scopus or Web of Science. The classes are practical and conducted mostly in a computer laboratory. They were the first of the classes to implement the BYOD model. This allows the students to choose the workstations and the tools to work with. There is both the possibility of using their own equipment or equipment offered by the University. During this course, a team of PhD students set up their own group in the Mendeley application. Members posted bibliographies, exchanged views or passed notes on selected publications. This subject in the first year was also intended to provide PhD students with knowledge about copyright and protection against bad practices during scientific research.

For PhD students to learn more about conducting scientific research, during one block of classes they access the national archive and search, in the traditional way, archival documents in situ. During this course the computerised archiving system was also discussed. The last block of classes concerns theoretical issues of academic presentation and pedagogy. As CUT is a technical university, the main focus is on preparing the students for conducting lectures, seminars and workshops. In this block, specially trained employees of Jagiellonian University help students to obtain this knowledge.

In addition to the obligatory classes in the first semester, PhD students had the opportunity to participate in a number of training sessions, meetings and workshops organised by the Faculty of Architecture and other university units at CUT. The University has a very rich offering and range of activities. They are conducted by the Library of CUT and Centrum Transferu Technologii (Centre of Technology Transfer). There is training provided on other global databases and courses, such as the advanced use of the Mendeley program. There are also workshops in which advice is dispensed on writing grant applications.

SECOND SEMESTER CLASSES

Selected Elements of Methodology and Didactics

In the second semester there is more emphasis on the students' own work and on research. The semester begins with a course that includes lectures and seminars that focus on the elements of methodology and didactics. This course includes students' own work, presentations and workshops. The students have the task to prepare their own project plan for their research. This should contain information on the location, building parameters, functions and topic of the research. The students are obligated to lay out the project schedule and decide what will be the criteria for its final grading. This allows young scientists to assume the role of an academic lecturer, a role opposite to the one to which they are accustomed. During the second part of the course, students are also introduced to modern teaching technologies and their importance in contemporary education, not only in higher education. The final assessment of this course is a short presentation on methodological and didactic issues related to the use of modern technologies.

Publications Applied to Lectures

Examples of interdisciplinary publications:

a) Schneider-Skalska, G., *Zrównoważone Środowisko Mieszkaniowe: Społeczne - Oszczędne - Piękne*. Kraków: Wydawnictwo Politechniki Krakowskiej (2012);
b) Niezabitowska, E., *Metody i Techniki Badawcze w Architekturze*. Gliwice: Wydawnictwo Politechniki Śląskiej (2014);
c) Kusionowicz, T., *Problemy Projektowania Budynków Mieszkalnych a Zdrowie Człowieka*. Kraków: Wydawnictwo Politechniki Krakowskiej (2008);
d) Kuc, S., *Techno-kreacja a Architektura Krajobrazu*. Kraków: Wydawnictwo Politechniki Krakowskiej (2011).
e) Blazy, R., *Wartości Humanistyczne jako Kod Genetyczny Miasta*. Kraków: Wydawnictwo Politechniki Krakowskiej (2015).

Design Workshops

Another course in the second semester are design workshops where PhD students are allowed an independent choice of the issues on which to work. The University offers workshops on issues within architecture, urban planning and conservation of monuments. Each workshop is carried out by another institute, with a variety of formats, material and approach. During the urban workshops selected by the co-author, the doctoral students were tasked with analysing a selected area of the city of Krakow in terms of compliance with the *MPZP - Miejscowy Plan Zagospodarowania*

Przestrzennego (Local spatial development plan) and the chances for development and the impact of this zone on the entire city.

The first part of the task involved conducting an in-depth analysis of the selected area along with field research and a search for information about the area including that from archives. If there was a local spatial development plan for the area, it was necessary to take into account its findings, but also to address its limitations. Part of the final assessment of the course is an essay with a written analysis of the area and the presentation of selected, similar material from other European cities.

CONCLUSIONS

The aim in this article was to present the curriculum applying to the first year study PhD programme in the Faculty of Architecture at Cracow University of Technology, and to show the modern way of approaching advanced academic studies. The focus these days on what is most important in such education is an interdisciplinary attitude towards the studies of young scholars.

In conclusion, it should be stated that an architectural PhD programme needs interdisciplinary knowledge. Showing the interdisciplinary complexity of shaping space is the most important task of the first year PhD programme. An essential element of the programme is a series of lectures, seminars and workshops. Co-operation on the course involving lectures, seminars and workshops helps not only to strengthen the interdisciplinary nature of the teaching, but also the interdisciplinarity of learning outcomes.

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BIOGRAPHIES

Sabina Kuc is an architect and a Professor at Cracow University of Technology, Kraków, Poland. She received her PhD degree in architecture in 1997 and the DSc degree in landscape architecture in 2012 from the Faculty of Architecture of Cracow University of Technology. She joined Cracow University of Technology as an assistant in 1986, became an Assistant Professor in 1987, an Associate Professor in 2012, and a Professor of Cracow University of Technology in 2015. She was a Visiting Professor at Eurasian National University (Astana, Kazakhstan, in 2013 and 2014) and Belarusian National Technical University (Minsk, Belarus, in 2014). Her current research interests include techno-creation, construction and building technologies in landscape architecture, and landscape water objects. Professor Kuc has been a member of the Global Science and Technology Forum (GSTF) since 2016 and a Fellow of the World Institute for Engineering and Technology Education (WIETE) since 2018. She has been a member of the Regional Chamber of Architects, a Chamber of Architects of the Republic of Poland (Izba Architeków Rzeczpospolitej Polskiej) since 2002, and a member of the Society of Polish Architects (Stowarzyszenie Architektów Polskich - SARP) at the Kraków Branch since 1987.

She received the Best Research Paper Diploma at the 2nd Annual International Conference on Architecture and Civil Engineering (ACE-2014), Singapore (with L. Ruban, PhD, Ukraine) and the Best Research Paper Diploma at the 4th Annual International Conference on Architecture and Civil Engineering (ACE-2016) in Singapore. She has been a member of scientific committees of such conferences as IASS MIT Boston, ACE Singapore, WIETE Australia, NBTAD, INBUILD and Instalacje Basenowe Poland. Sabina Kuc became Vice-President of WIETE International Academic Advisory Committee, Melbourne, Australia in 2018.

Aleksandra Tadewicz was born in April 1991. She has always known that she wanted to be an architect. So, in the years 2010 to 2015 she studied in the Faculty of Architecture at Cracow University of Technology. At the first stage of studies, she was fascinated with conservation of monuments. She graduated with the award of a Bachelor of Engineering degree in 2014, on the dissertation topic, *Adaptation of the orangery ruins to the multifunctional, cultural center*. In the second stage of her studies she changed her interests. She started to appreciate urban planning, and has understood how important the work of urban planners is. She finished her studies with a Master of Engineering degree in 2015, on the dissertation topic, *Evolution of the industrial zone in Tarnów*. During the last year of her studies she completed the course required to become an academic teacher. At the same time, she started working as an architect in private practice. After completing her studies she worked as an architect. She commenced her PhD studies in the Faculty of Architecture at Cracow University of Technology in 2017.