

Architectural education and residential buildings

Michal Czafík, Branislav Puškár, Edita Vráblová & Andrea Bacová

Slovak University of Technology in Bratislava
Bratislava, Slovakia

ABSTRACT: Architectural education must respond to the needs of society. Today, most focus on housing issues, but residential buildings education is also important. The Internet and digital technologies are changing teaching in the Faculty of Architecture at Slovak University of Technology in Bratislava (FA-STU), Slovakia. A paradigm shift in pedagogy implies a shift in students' thinking. Freehand drawing is often seen by students as a burden but teachers consider it a useful skill. Despite its rapid development, technology is not the only or perhaps most effective means of creating architectural art. The student-teacher symbiosis depends on reciprocal influence and motivation. The pedagogical process at the FA-STU combines different methods by year and degree of study in the field of architecture of residential buildings. The authors present the current methodology of teaching theoretical and practical subjects with a focus on education in the field of housing and residential buildings, for the complete study programme.

Keywords: Architectural schooling, accommodation, technique

INTRODUCTION

The education of architecture students regarding housing, while being specific, is dichotomous. Firstly, it reflects individualism and, at the same time, manifests contemporary architectural shaping. Secondly, the critical thinking and opinions of architects reflect the cultural, social and economic needs of society. Hence, architectural objects reflect individual or group imperatives and, from a didactic perspective, the ability to transfer knowledge by education into practice.

Housing satisfies basic existential needs and each period of history brings challenges in the field of housing that affects the teaching of architecture. The student transitions to practical design after a Bachelor's degree of four years in education or an engineering degree of two years. After graduating, there is a choice of professional architectural path to pursue. However, the choice probably will involve the design of residential buildings.

A residential building should be well designed, functional and durable. It should be designed according to standards and typology. It is often described by a potpourri of features, e.g. individual, beauty, urban, family, efficient, ecological, sustainable, intelligent. It ought to satisfy all, from designers to users, as well as representing respect for the environment and the time in which it was created.

In the design process, students must deal with many inputs, such as the lifecycle of the building, energy savings during the operation of the building, extraction of raw materials and their conversion to building materials, construction itself and subsequent building operation. In general, in the very first stage of the project students and architects must determine the preliminary time of the building's operation, because this aspect is crucial for the proposed measurements [1].

METHODOLOGY IN EDUCATION: RESIDENTIAL BUILDINGS

In pedagogy, the relationship between the teacher and student is important and interdependent. The student's trust in the teacher is deepened by communication. The more intensive the communication, the more their mutual trust increases, which enhances their professional relationship. The teaching of a subject is dictated by the relevant curriculum, which determines the aim of the subject, its content and schedule. The technique and method of teaching by a teacher is often individualistic.

There are differences between teachers in expression, in the proffering of concepts, in setting, supervising and assessing assignments and projects, as well as in the general interaction with students.

The instructor's role is to find the appropriate tools and methods not only to motivate students' learning and engage them in the learning process, but also to help them achieve the desired skills [2].

Education methodology in residential buildings in the Faculty of Architecture at Slovak University of Technology in Bratislava (FA-STU) is divided into Bachelor's and engineering. Both differ in the pedagogical process, but mirror each other in the composition of theoretical and practical subjects. They also differ in architecture and design.

While the first primarily is focused on typology, the second focuses on theoretical subjects. Figure 1 shows the educational methodology, typology and theory of residential buildings.

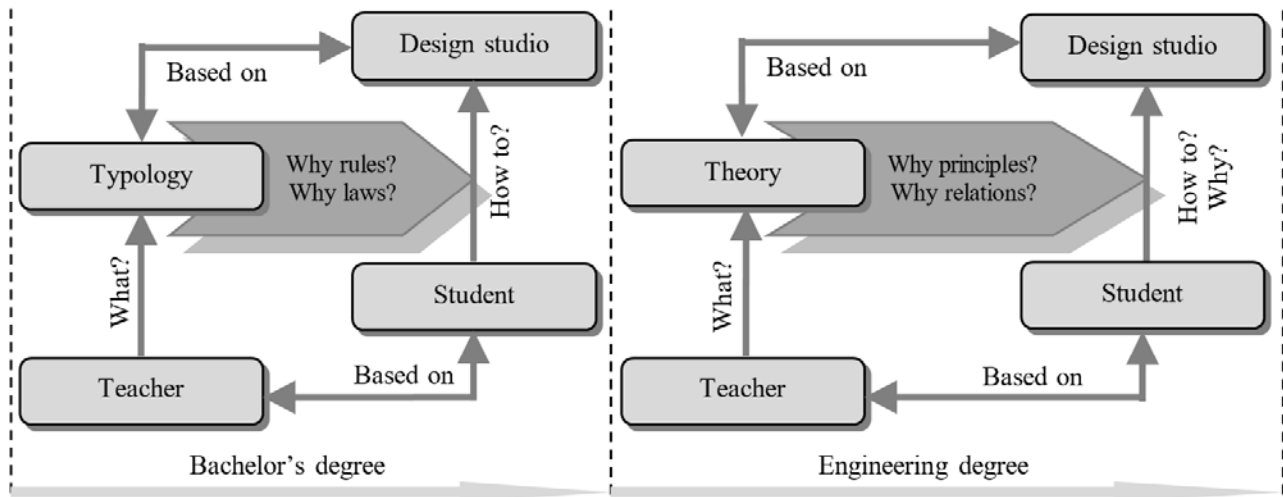


Figure 1: Education methodology, typology and theory of residential buildings (Source: Authors).

An objective of education is to give students answers to questions related to the level of study. The aim is to educate students so that they can transfer their basic typological knowledge to studio work, i.e. they can apply it to a specific typology of residential buildings. The teaching methodology focuses on the level of knowledge and its application:

1. The teacher answers the basic questions with lectures in theoretical subjects: what are residential buildings and what are their rules? The student learns the basics of furnishing items, rooms, applicable laws, standards, enriched by the typology of housing.
2. The student tries to apply the typology for simple objects to simple assignments of studio work, with emphasis placed on strict adherence to typological principles.
3. Design studio teaches the student how to proceed from the architectural concept to the details. The primary goal is to teach the student to apply the basic typology of residential buildings to their solution. The creativity and individual ability of the student do not play a primary role. This is especially true in the first and second years.

The task of the further level of study in the field of residential buildings primarily is to expand students' thinking with theoretical knowledge from various areas of housing, and thus inspire them to acquire specialised areas of expertise.

The aim is to educate students, so that they can apply typology in their designs, reflecting the individualisation of lifestyle with the satisfaction of needs. This addresses both outdoor and indoor living environments. The teaching methodology at this level of study focuses on the relationship between typology, people, lifestyle and the environment:

1. The teacher is the bearer of theoretical ideas that inspire deeper contemplation by students of housing, in looking for answers to basic questions: what is the design principle, what are the metrics for satisfying human needs?
2. The student then tries to find answers in studio work to shape the design. The basic question is *why?* The student is taught to argue not only against the teacher, but also the investor.
3. The teacher tries to lead the student to broad-spectrum thinking about the problem in the field of housing. The aim is to create a conceptual design, accepting the principles and limitations of the environment and user requirements. The users are often different social groups of people with different housing needs. Emphasis is placed on the complexity of the relationship between the environment and housing services. The design no longer consists only of layout, but also practical functionality and applicability.

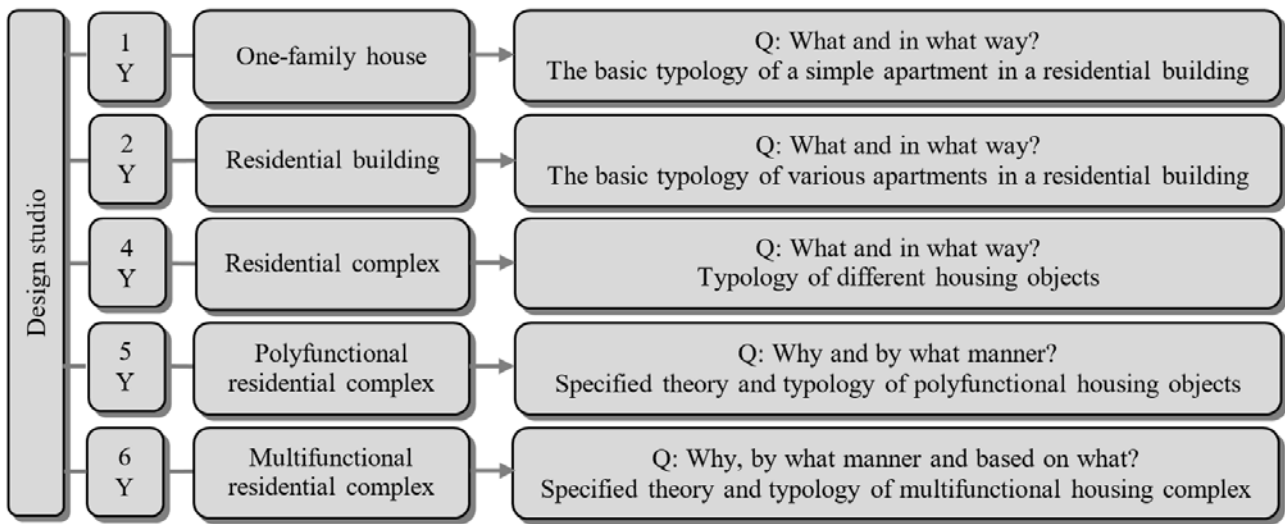


Figure 2: Model of education in studio work (Y - year, Q - question) (Source: Authors).

BACHELOR'S DEGREE

The first degree covers typology and the dimensioning of buildings, which can be used in simple studio work assignments. Students encounter Residential Buildings in the first year, focusing on the basic typology of family and apartment residential buildings. Lectures provide an insight into the practical design of residential buildings and their typology, i.e. living environment, shape, size and function, while respecting planning, urban, architectural, structural and aesthetic rules.

Typology exercises are carried out at weekly intervals, each exercise ends with an individual task according to a typological theme (e.g. day zone of the apartment, night zone of the apartment, and so on). The student receives feedback orally or in writing.

In connection with architecture, [typology] is mainly a study of types and their classification, sorting into categories and groups based on differences and conformities. The biggest benefit of using typology in practice is to collect data about the functioning of buildings and their architectonic creation [3].



Figure 3: Exercises focused on typology and their application to the design of a family house (Student: I. Čapičíková. Tutor: M. Czafík) (Source: Authors).

In parallel with Residential Buildings, the focus in Fundamentals of Architectural Design II is on the creation of a family house. The student is given an assignment for an object intended for a family of four. Studio work involves drawing, without computer support; freehand drawing is the perfect way to transfer ideas to paper (see Figure 3).

In the modern era, design work requires the use of computers and graphic programs. Many students thus feel that the instruction in drawing, modelling and other artistic fields, is not well-founded. However, it is quite the opposite, as may be evidenced from the experience of schools of architecture from the Czech Republic and abroad. It is necessary that students are led by imagination and spatial perception before they start entering their projects into computers [4].

In recent years an assignment was given to students for a house on an indefinite plot without a specific location. The hypothesis was: *an indefinite plot of land for the construction of a family house is simpler for the design of a family house* for first-year studio work. The hypothesis was not confirmed, in a sample of 260 students.

The design on an indefinite plot of land proved to be problematic. The student could not identify with an indeterminate locality and the indeterminate locality prevented contextual thinking. On the other hand, the typology for buildings was applied correctly. It was recommended that teachers always enter a specific location for an architectural study of a family house.

The second year in the field of residential buildings focuses on the design of an apartment building in Design Studio I. The student is required to apply typology to four types of apartment building: sectional, point, corridor and gallery. The solution depends on the number of above-ground and underground floors and composition of dwellings according to size. The result is a physical model of an apartment building.

During the second and third year the student encounters other subjects: Public Buildings I, Public Buildings II, Industrial and Engineering Buildings, Monuments Restoration, Urban Typology I, Urban Typology II. In the fourth year of the Bachelor's degree, the teaching is divided into modules that have a thematic specification. One of them is Design Studio VII - Residential Buildings.

Design Studio - Module M1 concerns building practice in urban or rural environments. Its essence is the design of housing in demanding environments. The first introductory and shorter phase of the course is a basic conceptual urban design in which the student demonstrates the potential usability of an area with the functions of housing, amenities, work, recreation and transport. The second phase focuses on a selected type of building. Each student will develop an architectural study for an object (or group of objects) for the housing of different social groups.

In parallel with the Design Studio, the Studio I seminar focuses on deepening the methodological, theoretical, typological and practical knowledge of current forms of housing. The focus and format of the seminar is chosen at the beginning of the semester. The requirements of both the Bachelor's degree and the Engineering degree are shown in Table 1 below.

Table 1: Bachelor's and Engineering degree subjects (Source: Authors, adjusted by the FA-STU).

Degree	Summer (SS) or winter semester (WS)	Subject	Obligatory subject	Compulsory subject of choice	Optional subject of choice	Theoretical subject	Studio	Seminar	Sessions/week (lecture-seminar)	Sessions/semester	Sessions/year	Sessions by degree level	Total sessions
1	WS										104	325	975
	SS	Residential Buildings	•						2-2	52			
		Fundamentals of Architectural Design II	•					0-4	52				
2	WS	Design Studio	•						0-5	65	65		
	SS												
3	WS												
	SS												
4	WS	Design Studio VII - Module M1		•					0-8	104	156		
	WS	Studio Seminar (Module M1)		•					0-2	26			
	WS	Selected Chapters I (Module M1)		•					2-0	26			
	SS												
1	WS	Revitalisation of the Housing Environment			•				1-1	26	234		
		Studio Project II A1		•					0-10	130			
	SS	Studio Seminar II		•					0-2	26			
		Housing Trends			•				1-1	26			
		Social Forms of Housing			•				1-1	26			
2	WS	Studio Project III A1		•					0-10	130	416		
		Studio Seminar III		•					0-2	26			
	SS	Diploma Project		•					0-16	208			
		Diploma Seminar		•					0-4	52			

ENGINEERING DEGREE

The Engineering degree is focused on architecture. Focus A1 buildings for housing is a theoretical and practical specialisation that has the widest application in practice. It is assumed that the student in engineering studies already has a comprehensive command of the typology of residential buildings and the course extends this to the theory of housing.

Theory of the architecture of residential buildings expands technical thinking, raises questions, provokes controversy and stimulates discussion. The theory enriches architectural design with an understanding of the principles of complex design. The theory generalises the practical experience of teachers and expands students' knowledge.

Important theoretical subjects in which the practical experience of teachers is presented include three optional subjects: Revitalisation of the Housing Environment, Housing Trends and the Social Forms of Housing. The subjects expand on the knowledge of specific issues, but they are also focused on the development of critical thinking.

Studio works are focused on designing complex typological species with various combinations of housing functions. In the fifth year, the focus of the Design Studio is the multifunctional residential complex, which represents a more complex set of buildings with various functions. The study is completed in the sixth year by defending a diploma thesis.

In the Diploma Thesis, the student demonstrates the ability to comprehensively develop an urban design of a selected part of the city and then design a multifunctional residential complex. Students address the questions, *why? in what way?* and *based on what?* The student demonstrates the individual ability to originally solve problems from the urban complex, through the architecture to the technical details.

FOCUS OF THE EDUCATIONAL PROCESS

Transparency, flexibility, adaptability, quality, openness, creativity, innovation, mobility, experimentation, diversity, compatibility, comparability, parametricism, employability appear to be already established values which demand new strategies, new actions and new approaches to the structure of school curricula in order to respect the contemporary definitions of quality in architectural education [5].

In both stages of studying, the methodology of teaching residential buildings aims to bring to the students real skills for practice. Based on this, the selection of assignments focuses on co-operation with local governments, whose participation in the educational process brings an independent view and reflects the present needs of society.

Co-operation with the economic environment and local administration should provide students with the necessary reference to reality. Co-operation among the university - local administration - local community - business is the element that contributes to inculcating in students the language of sustainability and the culture of sustainability [6].

The number of hours devoted to teachings related to the issue of residential buildings during the six years of study is 975. Of this, 375 hours (33.33%) are in the first stage of study and 650 hours (66.66%) in the second stage. Considering subjects and their composition, the summary distribution is as follows: typological subjects in toto form 52 hours (5.34%); practical subjects - design studio 689 hours (70.66%); theoretical subjects 104 hours (10.66%) and seminars 130 hours (13.34%).

Although studio works in comparison with the first and second degree make up the same number of taught hours, the difference is in theoretical and typological subjects. At the engineering level, the pedagogical process is more focused on studio work. Figure 4 shows the distribution of subjects in the individual stages and in summary.

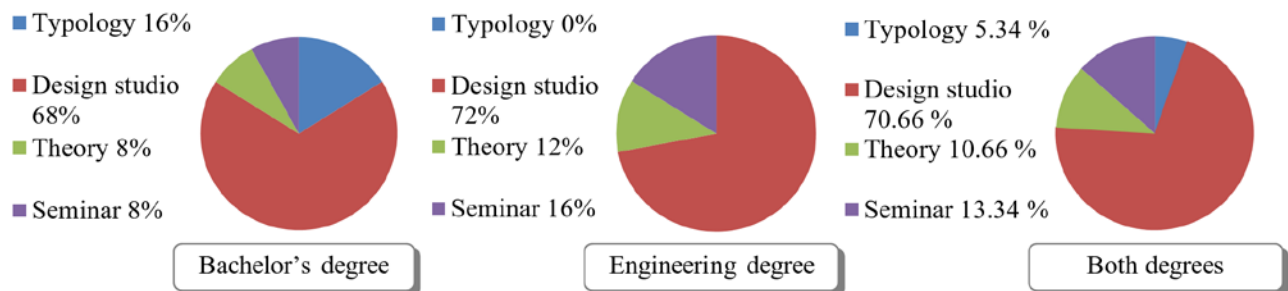


Figure 3: Percentage of subjects during study (Source: Authors).

CONCLUSIONS

The typology of Residential Buildings enables students to apply ergonomic and dimensional principles, spatial relationships of objects and operating principles to a complex architectural design. The aim is also to achieve a harmonious whole, designed for daily human needs in a residential building. The educational process and its current setting demonstrate the ability to master the typology not only on a theoretical basis but, above all, as a practical tool for design. If further connected with the theoretical basis in the future, the result of the educational process will be a professionally and argumentatively equipped student - architect.

REFERENCES

1. Oberfrancová, L., Legény, J. and Špaček, R., Critical thinking in teaching sustainable architecture. *World Trans. on Engng. and Technol. Educ.*, 17, 2, 127-133 (2019).
2. Pusca, K. and Northwood, D., Curiosity, creativity and engineering education. *Global J. of Engng. Educ.*, 20, 3, 152-158 (2018).

3. Ilkovičová, E. and Ilkovič, J., Buildings typology education in the Faculty of Architecture at Slovak University of Technology in Bratislava, Slovakia. *World Trans. on Engng. and Technol. Educ.*, 16, 4, 374-379 (2018).
4. Peřinková, M., Evaluation of the technical and architectural education within the programme, *Architecture and Civil Engineering* at the Faculty of Civil Engineering in Ostrava. *World Trans. on Engng. and Technol. Educ.*, 16, 3, 307-311 (2018).
5. Spiridonidis, C. and Voyatzaki, M., *Learning for the Future. New Priorities of Schools of Architecture in the Era of Uncertainty*. Thesaloniki: Charis Ltd, 12-16 (2000).
6. Schneider-Skalska, G., Sustainability and environmental protection in housing design education. *World Trans. on Engng. and Technol. Educ.*, 16, 2, 101-107 (2018).

BIOGRAPHIES



Michal Czafík graduated from the Faculty of Architecture at Slovak University of Technology in Bratislava (2011) and concluded his PhD studies through the research dissertation in 2014. At present, he is a senior lecturer at the Institute of Architecture of Residential Buildings. He deals mainly with research and the issue of social housing, focusing on homeless people housing. He conducts lectures and teaches theoretical and practical courses. His scientific achievements include scientific publications included in journals and conference proceedings, participation in international grant projects, as well as a number of completed architectural projects. In 2015, the Ministry of Transport, Construction and Regional Development in Slovakia appointed him a member of the jury for the assessment of affordable housing in Slovakia.



Branislav Puškár graduated from the Faculty of Architecture at Slovak University of Technology in Bratislava, in the Department of Architecture and Urbanism (2005). He concluded his PhD studies through the research dissertation at the Faculty of Architecture in Bratislava (2008). He was the Vice-Dean for Development in the Faculty of Architecture of STU in Bratislava between 2013 and 2018. He deals mainly with research and the issue of social housing, focusing on intelligent buildings. His present engagement includes publishing scientific papers and participation in international grant projects, as well as a number of completed architectural projects. He conducts a range of activities in architectural research and presents the outcomes at domestic and foreign scientific meetings and fora. He was habilitated in the Faculty of Architecture at Brno University of Technology, Czech Republic in 2018.



Edita Vráblová graduated from the Faculty of Architecture at Slovak University of Technology in Bratislava and concurrently accomplished a one-year scholarship at Vienna University of Technology in 2002. Since then, she has practised at, and works in, the Institute of the Residential Buildings of the Faculty of Architecture in Bratislava. At present, she is an Associate Professor and devotes herself to the domain of residential buildings and progressive trends in temporary accommodation. She conducts numerous activities in architectural research and presents their outcomes at domestic and foreign scientific conference and fora. She has published many professional studies and reviews in contemporary architecture. Her research is devoted mainly to the design of residential buildings and those generated by her architectural practice.



Andrea Bacová graduated from the Faculty of Architecture at Slovak University of Technology in Bratislava in 1985. From 1985 and to 1993, she worked at the Department of Chief Architect in Bratislava as head of the studio for the City Districts Development. In architectural practice she primarily has focused on housing projects, urban plans and studies. Since 2003, she has been working as a teacher in the Faculty of Architecture at Slovak University of Technology in Bratislava, where at present she leads the Institute of Architecture of Residential Buildings and is devoted to systematic research of housing architecture. She has published more than 350 articles, scientific studies, and reviews, as well as several books and scientific monographs. Since 2010, she has been the editor-in-chief of the magazine, ARCH, which is focused on architecture and culture. The ARCH Award is one of the prestigious Slovak architectural awards.