

Binding architectural practice with education

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ABSTRACT: Architectural education emerged a long time after humans began to construct their dwellings. The process of its formation began by passing down skills from generation to generation. Later, it was systematised in workshops. Even during antiquity, but especially in the Renaissance period, the education was further enriched with theoretical and practical rules of architecture. The current way of life implies specific changes in methodology of teaching the new generation of architects. The construction process is also changing with the use of new technologies and practices, such as 3D printing of entire building elements or the use of drones. Capitalising virtual reality, increasing emphasis on the introduction of practical skills, and the presence of practicing teachers are now part of the academic scene. Is institutional educational still necessary? Would it be possible to gain the requisite knowledge and skills solely through experience in the architectural office, as it was the case in the past? Will the architect's position remain justifiable and tenable in the future? Can this role be taken over by the technologically advanced and ever more reliable automation, which could efficiently satisfy the most specific requirements and design details demanded by the investor? Compared to the automated process, what added value does the architect offer?

Keywords: Architectural education, architectural practice, architects as teachers

INTRODUCTION

Every epoch brings specific challenges, offers space for necessary change, but also encourages the self-reflection, which is essential for any progress. This article argues about the interconnection of architectural practice and education from history to the present. How is the position of the architect as a pedagogue or pedagogue as an architect perceived today? Are there any fixed limits between the academic and professional fields? Where and how one gains the knowledge about architecture? Is the notion of an *architectural container* of knowledge - introduced by Koolhaas within building, which keeps everything in place - really necessary? [1] Or, is it possible, figuratively, to return to the renaissance workshops - nowadays, practicing studios? In upcoming paragraphs, the authors will attempt to indicate the possible future direction in this discipline, which has been considered to be the *queen of all arts* for ages.

Bucky (as Buckminster Fuller was nicknamed) said: ...*The specialist in comprehensive design is an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist* [2]. Architecture is undoubtedly a complex discipline that can be taught only through a long-term study, because, as Vitruvius has noted, only such a process can lead to the ...*summum templum architecturae*, to the architecture itself. It must be understood and perceived, and a good architect should have some innate gift.

When Nietzsche talked about the need to revitalise the *vita contemplativa* (active dialectic/dialogue), quasi specific pedagogy of vision, he also formulated three tasks that require the presence of a *tutor*. First, it is important *to see* things in the right way, then it is necessary to learn *to think* and, finally, to learn *to speak and write* [3]. In the case of architecture, *to build* must be added. According to his words, the aim should be *grand culture* as a whole - a beautiful and man-serving architecture. It is all about patience, peace, contemplation and waiting, not about immediate mechanical responses to a given impulse. It is about controlling oneself in general. The way of seeing things is greatly influenced by what one believes in. It is an act of choice, the relationship between man and things - structures, architecture. It is definitely a complex and sophisticated process. In the context of perception, one might also mention the inspiring Merleau-Ponty's opus *Phenomenology of Perception* [4].

Architecture accompanies the human being from birth. People are probably born inside architecture, every day they are surrounded by buildings, they perceive materials, odours, colours. In the human world, however, vision and visual appeal prevails. The view is followed by words. The child sees and recognises things before it can speak. Perception,

thinking, feelings are also often induced by architecture. According to Zumthor, designing is a research handling with childhood memories, visits of places or cities. *Practicing architecture is asking one-self questions, finding one's own answers with the help of the teacher, whittling down, finding solutions. Over and over again. The strength of a good design lies in ourselves and in our ability to perceive the world with emotion and reason* [5]. The tutor can help, lead, keep track and determine the right direction.

BACK TO THE HISTORY

In order to argue about architectural education, first, a certain degree of architectural taxonomy, definitions, descriptions and determined laws in an adequate language had to be developed. When talking about architecture (initially the building process), all the construction skills at the beginning have not been taught primarily through words or theories, but mainly through the practical acquisition of sequences of operations. They were improved and refined by means of passing them from generation to generation. The basis of the theoretical perception of architecture was certainly laid by the Vitruvian triad (*firmitas, utilitas, venustas*) and his book *De Architectura Libri Decem*. Historically, the study of architecture was preceded by *encyclios disciplina* (circle of education) viz. *septem artes liberales* (seven liberal arts such as grammar, rhetoric, dialectics, arithmetic, geometry, astronomy and music), which means by the knowledge of the basic disciplines necessary for a professional and personal development.

In the Middle Ages, the first manifestations of architecture were written in the form of descriptions, speculations or encyclopaedias. In addition to basic practical advice, full of recipes for colours, glues and methods for making the best charcoal, Cennini notes in his *Craftsman's Handbook* (1390) that art requires a combination of *arte* (technical skill) and *fantasy* (imagination). Everyone who has entered the artistic profession should have begun to confess *enthusiasm, reverence, obedience and constancy* and should have submitted himself to the direction of a master for instruction as early as possible. He advised not leaving the master until it became necessary [6].



Figure 1: The so-called *masterbücher* and various *canons* and *treatises* represented the main sources of knowledge at their time. The book usually contained everything the builder had to handle with, while constructing the final design (right to left: *De Architectura Libri Decem*, *Canon of the Five Orders of Architecture* by Giacomo Barozzi Da Vignola, and *Notes Architekta* [Architect's Notebook]). Over time, much more knowledge has been acquired in the field of building. Today, highly specialised architectural books and manifestations are being published [7].

Later, thanks to Alberti (birth of a central projection) or Leonardo da Vinci (who is considered e.g. by Bulent Attalay to be the father of modern science), art has gradually become equal to philosophy, literature, history or natural sciences. The Renaissance brought an artisan's (*faber's*) transformation to an artist in perfection - to their modern conception. All the *fine arts*, such as painting, sculpture or architecture, were taught at that time by transferring the knowledge from master to pupil. In particular, it was the domain of men and skills were generally passed on from father to son in the fathers' shops. The pupil became a master of the discipline over time and was able to extend the sphere of knowledge. The span for the training of an artist varied according to guilds (two years - Venice, three years - Padova, Cennini recommended 13 years), but also to localities (Florence, Venice, Tuscany, Netherlands in the 17th Century); and the studies usually began before reaching the 10th year of life. Boys who were apprenticed at a workshop (called *garzoni*) typically became part of their masters' extended household, lodging and sharing meals with the family. Parents often paid the master for their sons' keep, but masters, in turn, were obliged to pay wages to their apprentices, increasing the wages as skills grew [8].

An important milestone of the relatively brief history of architectural education was the establishment of the *Académie Royale d'Architecture* in 1671 in Louvre - an impetus of Jean-Baptiste Colbert. It became the leading institution influencing the theory of architecture and education not only in France, but also in Europe and later overseas. It was the first institution providing systematic studies of architecture and the forerunner of faculties of architecture at technical universities all over the world.

FOUR HISTORICAL MODELS OF ARCHITECTURAL SKILLS ACQUISITION

When attempting a certain degree of generalisation, one can conclude that basically four models of acquisition of architectural skills existed and still exist. The first is *learning by watching*. This can be considered the most basic and the simplest way to comprehend creating things or building dwellings. It can be described as the *proto-learning* process.

The second is *learning by imitating* or even *working by imitating*. In this case, pupils usually continued the master's work and the boundaries between oeuvres were practically impossible to distinguish. This principle was used throughout the history by many architects. As a shining example, one could state e.g. that Christopher Wren's St. Paul's Cathedral on Ludgate Hill, completed in 1710 - was inspired by Brunelleschi and his glorious buildings in Florence. Nowadays, the model of imitating is mostly common in building of vernacular architecture using traditional techniques and processing primary materials, such as wood, earth or stone. The first outcomes of summer architectural workshops based on such methods can be seen in campus for the future alternative School of Bunesti, Romania.



Figure 2: Student workshops in Bunesti are focused on use of local materials and traditional building techniques, enabling to build simple objects with new meanings [9].

Tightly linked with the previous model is the *learning by doing* method. Characterised by successes and failures during construction, it can mostly be used in the context of small scale objects. Such a process can be motivating and very interesting for students. In this way one can arrive at a deeper understanding and correct solution for the mistake. In the field of architecture, this model is well-known today as *research by design*, or among designers as the wide-spread process of *prototyping*. Using the definition from the European Association for Architectural Education's Research Charter, research by design is *...any kind of inquiry in which design is a substantial part of the research process (...). In research by design, the architectural design process forms a pathway through which new insights, knowledge, practices or products come into being. It generates critical inquiry through design work. Therefore, research results are obtained by, and consistent with experience in practice* [10].

Finally, the most common model of *learning by education* can be mentioned. The educator has to learn continuously, which in this case is the *conditio sine qua non*. All the above stated models of architectural skills acquisition were/are always intersecting each other without any fixed boundary between them.

CURRENT DISCUSSIONS IN ARCHITECTURAL EDUCATION

Variations in teaching arise in relation to changes in society, its needs and the emergence of new building processes or the development of information technologies (*information society, net-generation*). However, the fundamental pier of today's architectural education is mostly the practicing architect - the tutor teaching a single student or a very small group of students in a studio. Weiner states that the old studio models of modern and postmodern era *...the monastic condition is* (due to distractions) *simply no longer possible (...)* and which *...would either question the model or cause new models to emerge* [11]. What educational models exist in architecture and what are their advantages and disadvantages? New models will always be partial and incomplete, but it is worthwhile to create them. How can a school make the best use of its existing available spaces and facilities? If one would propose elimination of the studio, what are then the other options for teaching architecture? As a result of that, would students lose the sense of discussion and authentic working environment in such case? Finally, how can students be motivated to be involved, proactive and interested? Such questions are now highly debated among architectural academic staff.

Teaching is a power passed on from one to another. It requires a reciprocal operation of empathy between student and teacher and for architecture itself. The base lies in a creative space, engaged and erudite people - pedagogues capable of transferring knowledge and motivating students. *It doesn't matter how much knowledge a teacher has, if there is not an understanding about the pathos of teaching then that knowledge will become ineffectual* [12]. Learning architecture is a rather complicated matter, because it is a combination of theoretical and practical knowledge. Schools of architecture with their limited flexibility must constantly react to the transformation of the architectural profession. Nowadays, students often live abroad, they become members of large foreign work teams or they seek enforcement in border sectors of architecture even in completely different specialisations. In this way, tutors with their abilities, as well as the system of hiring them, are becoming a key question. Other important aspects are the choice of practicing architects to participate in the pedagogical process or their motivation and willingness to share their *design thinking* with students. A type of compensation package may be necessary, in order to attract practicing architects deeper into the education process.

AN ARCHITECT AS A PEDAGOGUE

If an architect decides to take the role of a teacher, there is a risk of error transmission from his or her praxis to students. An additional question is whether one can teach through an analysis of one's own mistakes. The creative/practicing

architect always uses the *learning by doing* method. Teaching students to avoid mistakes is just as important as teaching them how to design, draw plans or cultivate their creativity. Consequently, very important is the issue of how capable of (self) reflection the architect is and at what level he or she is able to transfer it into education. There is no doubt that practicing architects are of absolute necessity for architecture schools. Their teaching competencies are subdivided into the future position of efficient drawers, managers of studios, construction supervisors and creators of ideas. Sometimes, they teach those who will be a dab hand in competitions. Great potential lies in providing experiences in building economics.

Very specific are architects without a continuous creative handwriting who may not be inclined to educate epigones - to motivate students imitatively making mistakes. The risk is that their approaches within design thinking may not be consistent. At the outer border of architectural education stand teachers/architects who are not very productive in praxis. Their contribution to architectural education may be in the preparation of lawmakers, construction administrators, architecture theorists, building assessment specialists, researchers or can lead the discourses about the architectural ethics.

Since education is a two-way process, practicing architects can often be enriched or inspired by student works - their design proposals. The complication arises when a student is betting on a better grade or on passing the subject without any difficulty. Often they opt for the secure and/or easier ways, when they are afraid to experiment or to come up with unconventional solutions. Therefore, it is very important to stimulate discussion at schools, to motivate and teach students how to pose questions, clarify the context and understand the role of architect or architecture itself.

STUDIO AS A FUNDAMENT FOR ARCHITECTURAL PRACTICE

Keeping the studio represents the basic responsibility. However, after many years of teaching, a pedagogue can sink into a certain form of routine. Architectural design studios represent the backbone of architectural study programmes and fundamentally form the graduate's profile. The overall quality of studies is often rated by students mainly according to the experience with the pedagogues that a student encountered during his or her studies. Thus, the studio plays a key role in this evaluation.

Some tutors start the process of design from underground garages as the basis of the future operation of the building, others push ahead their design from the beginning, whereas another one prefers compositional or more functional attributes or someone advocates a philosophical aspect of the concept. Every approach has something positive. In some schools, for example, students begin to design an object from the inner space (the building is mostly intended for its user), the *envelope* of the building is secondary and is drafted at the end of the project. In this case, the idea of how an object will work prevails. There are many approaches and methods.

Designing is the basis of practice. Students should feel a certain degree of freedom, but ought to be directed, supported and not suppressed. In this way the school provides only the systematic framework for acquisition of a professional title. Students should conduct a self-study, which extends their basic knowledge. Increasing the quality level of proposals is crucial for higher quality of construction all around, but also for a successful graduate practice. The school is the bearer of ideas. In practice, concepts are often reduced due to investment or legislative limits. It is easier to phase down a design than to create a better project. In the academic area, if it is justified, it is possible to partially break some rules and laws of praxis. Students have to be aware of the frameworks of practice they knowingly violate.

No ideal models of architectural education for practice exist. They vary according to country, school and history of education or even according to tutors. In the following lines, the authors introduce some basic models/methods and their main characteristics with the focus on studio.

Teaching in Student Groups

The first model represents the studio with three execution methods. The most common and traditional system is *teaching in student groups*. This strategy is mainly based on teamwork using the existing spaces and facilities at schools for its application.

In this studio, one tutor leads usually approximately 3-10 students and assigns to them tasks of a group or individual character. Such a model enables the comparison of student works and their ardour for work and architecture itself during the semester. Other advantages are the automatic reciprocal exchange of information, open final defence and mutual criticising among students. The rate of (self) reflexion is therefore relatively high.

At some schools, tutors prefer the *vertical* - cross class system of education where students of various years of study are gathered into one studio. Through this system, students from higher classes can participate in education, can support their younger schoolmates or motivate them. However, according to Weiner, there may be a dispersal effect of IT on the scene [12], which makes it partially non-functional nowadays (using cell phones, PCs) and distracts the students' attention. Because of that, each student starts to represent his or her own (exclusive) studio and collaboration in groups experiences difficulties. The personal presence of students in the classroom is required in order to ensure interaction. Today, this model is struggling with students' motivation to stay at school, because of their ancillary work in practice or other interests. The role of the teacher's quality (and personality) is, therefore, becoming more and more significant.

Such a studio is especially led by the highly recognised and awarded architect in the home country or abroad. Based on the *big name* architects (*starchitects*) with long experience in practice, it is easier to teach students to take responsibility for their claims and solutions/design, not only during the subject duration, but also after in praxis. The natural respect for such authority can ease the knowledge acquisition, raise the motivation or ensure greater participation in consultations of studio projects. A direct contact with a practicing studio through such tutors may allow students to visit the construction site, experience the atmosphere of a practicing studio or, if they prove their qualities, subsequent employment in the tutor's studio. The risk of forcing one's own manuscript into the student's design is always present, but might not be detrimental. Due to the often-one-sided typological focus and distraction by practice and laws, practicing architects might tend to limit the students' creativity. Therefore, sharing their own mistakes is of great importance.

Digital Studio

The new/contemporary way of teaching architecture is the *digital studio* using IT, which is tightly connected to simulation and generative programs. Introduced by Patrik Schumacher who uses the term *parametricism* to denote the use in architecture of advanced computational design techniques, this model enables searching for new modes and concepts of architecture while using the simulation of energy consumption software or advanced generative processes, etc. Once it was a fiction, but today the 3D pen allows drawing in the air. 3D printers or drones can single-handedly build small buildings. New technologies and programming are becoming an integral part of contemporary architecture and also need to be reflected in architectural study programs.



Figure 3: Using the contemporary information technologies in presentation of architectural projects at the Faculty of Architecture, Slovak University of Technology in Bratislava, Slovakia. A virtual reality headset can transfer the user into the realistic virtual space of a building. The future will show if virtual reality will be able to materialise the idea of an investor to the last detail [13][14].

On the one hand, students able to control specific CAD programs are well employable abroad in large, widely recognised studios. On the other hand, the architectural practice is often driven by economic imperatives and requires more deliberated concepts. These skills are becoming increasingly popular and applied in practice, which is also related to the tightening of legislative frameworks. An emerging topic is also introducing the concept of design culture within the CAD software interface - a sort of corporate work standard. Although concrete drafting standards are defined in most architecture offices, the student ought to be prepared to make adaptive use of CAD software. This requires a deep familiarity with the software to be used, but today, a great portion of teachers cannot provide much support in this sphere. Another issue is that *isolation* in the virtual world can negatively affect the communication skills of students, resulting in a weak appreciation of teamwork. Communication is crucial due to the formulation of client requirements, coordination of construction process - dealing with investors, specialists, craftsmen or various authorities. Finally, the absence of hand work is a characteristic of this model. In contrary, Juhani Pallasmaa, a Finnish architect and great thinker, advocates for the immediate connection between the architect's mind and his or her drawing hand - *the thinking hand*.

Design-build Projects

Among the most motivating learning approach for the student is a simulation of practice with the opportunity to finalise the project until its physical construction. This model is becoming widely popular, because it enables students to work with materials, structures and tools that enrich their practical skills. Besides becoming familiar field work, they learn how to coordinate the teamwork of many specialists, craftsmen and schoolmates, while improving their communication skills. The final result primarily comes from the building skills of students (*ars fabricandi*), which are in parallel supported by many specialists and artisans. Highly important is the aspect of learning the consistency in thinking and taking responsibility for different steps during the design and construction process. Even though this method often depends on financial support, this downside is compensated for by acquiring specific know-how about financial ensuring of the project, system of fundraising, ordering items, logistics, bureaucracy procedures, etc.

At the end of the project, students generally must present their outcomes to public. This improves their presentation skills and impels them towards self-reflexion. This model is also useful in terms of marketing and school promotion.

Furthermore, it enables the number of students to be increased. One of the disadvantages is the usage of existing/rented equipment and machines that is limited to the semester. Very important is the topic of work security (especially with machines) or the use of such built structures after the studio. Other issues are the subsequent copyright, sustainability of a piece of work or even property management. In order to respect the Education Act and accreditation system, design-build project studio is mostly applied only as a supplement subject to traditional teaching in *classic* studios.

Practicing Studio

Finally, the authors would like to present a solely teaching model, which seems to be a fiction today. As was mentioned above, some questions regarding the general existence of architecture schools or the studio as a fundamental subject of architectural education are emerging. The practicing studio model completely abolishes the school as an *architectural container* of knowledge. Education is provided solely by practice, as was the case in the past (e.g. Renaissance workshops). The tutor as a practicing architect chooses his pupils to work in his or her studio team. She/he teaches them about direct communication with clients, specialists and crafters even the economy of design and construction. It might seem to be the perfect solution.

On a more in-depth analysis, one starts to think about the selection procedure and defining the requirements for a prospective employee. The compatibility of such emerging architects with other architectural offices is also questionable. For sure, elementary knowledge about architecture and construction will be needed. Who would be responsible for providing these knowledge basics? Would such a pupil be a benefit or a burden to a practicing studio? A leading architect would have to invest more time into teaching and correction of drawings than into design itself. It would also have a great impact on the studio's income. Another issue is the turnover of employees. With a person leaving a job, the know-how would also go away. Afterwards, the education process has to start anew. Can this model be effective and sustainable? And if yes, for what kind of studio would it be suitable?

COMPARISON OF MODELS

Models of architectural education focusing primarily on design studio vary in their methods, use of technology, costs for their implementation, etc. The common denominator is the tutor who represents the bearer of knowledge to be transferred to next generations. The *law of conservation* of knowledge coming out of nature predetermines the maintaining and development of current models or finding new ones to be tested and upgraded for a long time in education praxis. In order to obtain a relevant comparison of the models mentioned, ten measurable indicators were chosen. The percentage ratio of specific criteria characterising architectural education was set in accordance with today's debates in the Faculty of Architecture at the Slovak University of Technology in Bratislava (FA-STU) and the main issues that need to be addressed (Figure 4). All criteria were rated for all described models (Figure 5). The final results of evaluation can be seen in Figure 6.

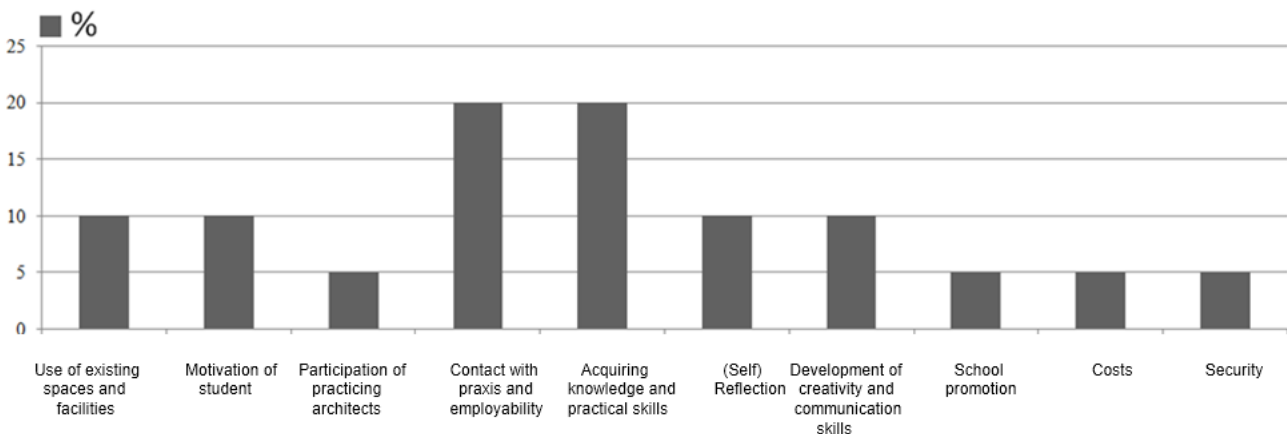


Figure 4: Percentage ratio of specific criteria characterising the architectural education as discussed at FA-STU.

Table 1: Different models/types of architectural teaching.

Type of architectural teaching	Method of execution	Pros (+)	Cons (-)
Studio	Traditional system - teaching in student groups (one tutor has approximately 3-10 students in one studio)	<ul style="list-style-type: none"> • common way of teaching, affordable facilities for its application • enables the comparison of student works and their ardour for work and architecture itself 	<ul style="list-style-type: none"> • dispersal effects of IT, which make it non-functional nowadays (cell phones, PCs) • students do not want to spend much time in studios at school (ancillary work in practice, other interests)

		<ul style="list-style-type: none"> • automatic reciprocal exchange of information, open defence and mutual criticism • enables the <i>vertical</i> - cross class system of education (students in various year of study in one studio) 	<ul style="list-style-type: none"> • affected by contemporary IT (each student represents his/her own studio), need for innovative ways of approach to teaching of students • difficult to motivate students
	Architectural <i>Grand Old Man</i> system (studio is led by the highly recognised and awarded architect in home country/abroad)	<ul style="list-style-type: none"> • <i>big name</i> architects (<i>starchitects</i>) with great experience in practice • easier to teach students to take responsibility for their claims and design proposals • natural respect for authority • enables students to visit construction site, experience the atmosphere of practicing studio • enables the <i>vertical</i> - cross class system of education (students in various year of study in one studio) 	<ul style="list-style-type: none"> • the risk of forcing one's own manuscript into the students' designs • practicing architects are often distracted by reality and practice: risk of limiting students in creativity • limited level of self-reflection (discussion of and learning from errors) and its transfer to the educational process • often one-sided typological focus of tutors
	Digital studio (new/contemporary way of teaching using IT, tight connection with simulation and generative programs)	<ul style="list-style-type: none"> • IT skills widely (necessary) applicable in practice • new models and concepts of architecture (simulation of energy consumption, generative process, etc) • students are employable abroad in big/widely recognised studios • enables the <i>vertical</i> - cross class system of education (students in various years of study in one studio) 	<ul style="list-style-type: none"> • frequently poor skills in communication (weak assumption for teamwork - not always valid) • deviation from architectural practice, tradition, reality • absence of hand work (no connection between mind and drawing hand - J. Pallasmaa: <i>the thinking hand</i>)
Design-build projects	Implementation/construction of design	<ul style="list-style-type: none"> • simulation of practice (possible project finalisation with building it) - motivation • practical work with materials, structures and tools, learning how to coordinate the teamwork - improving communication skills (with specialists, too) • learning consistency in thinking and responsibility for steps being taken • practical know-how on management of the construction process in different phases • grasping the presentation skills and self-reflexion • quick propagation of school, architecture itself • enables the <i>vertical</i> - cross class system of education (students in various year of study in one studio) 	<ul style="list-style-type: none"> • limited by financial support • <i>ars fabricandi</i> - result/piece of art comes from the building skills of students, artisans needed, limited in using of equipment and machines • bounded by time (school semester) • security of work (especially with machines) • further use of built structures and subsequent copyright, sustainability, property management • parallel <i>classical</i> education respecting the accreditation system - just as a supplement to traditional teaching
Practicing studio (fictive in current conditions)	By practice/real job	<ul style="list-style-type: none"> • real architectural practice • teamwork, direct communication with client, specialists and crafters • teaching the economy in design • better preparation of pupils for practice 	<ul style="list-style-type: none"> • basic knowledge about architecture and construction needed • limitation by reality - no utopian or experimental concepts, dreams • fluctuation • leading architect spends time in education, correction, not by designing, income impact • worse adaptability of students to changed conditions due to company standards

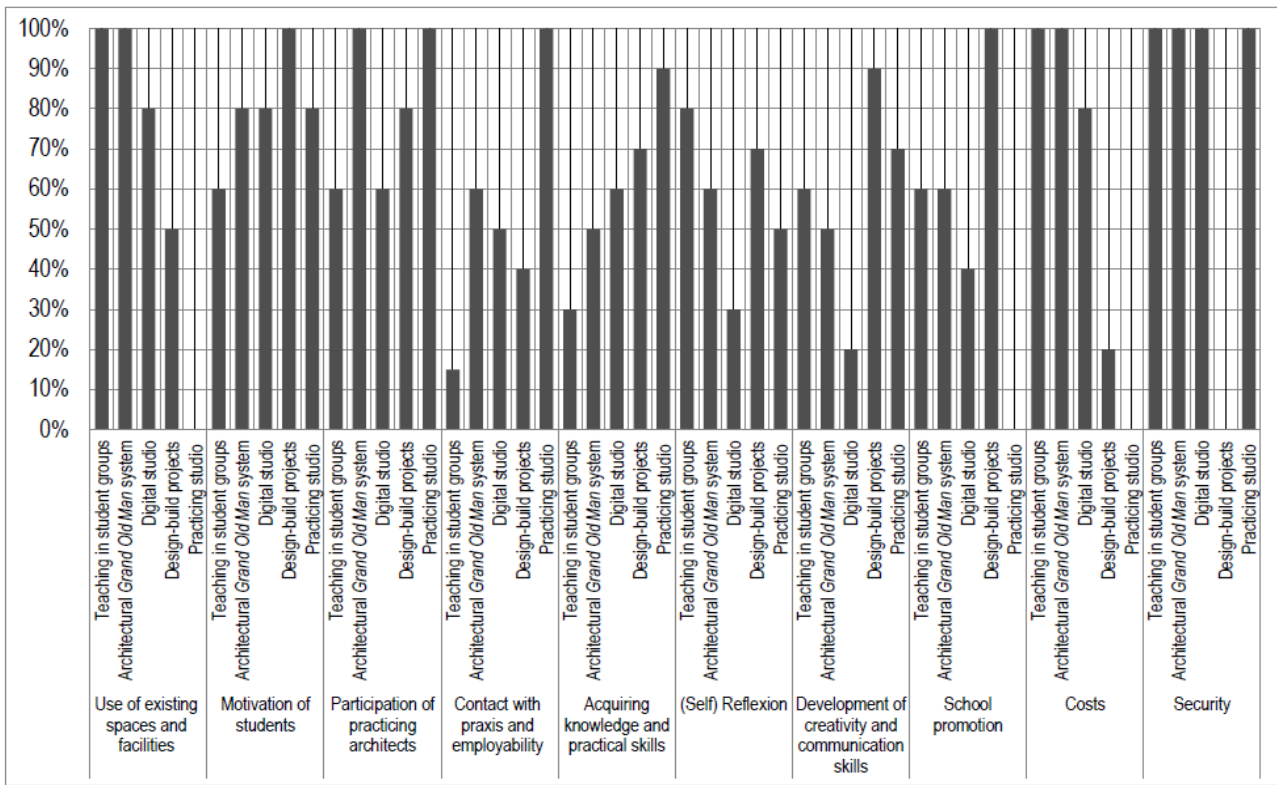


Figure 5: Evaluation of teaching models under the set criteria. In case of costs and security, higher rate represent lower financial load on architectural education and more secure teaching process.

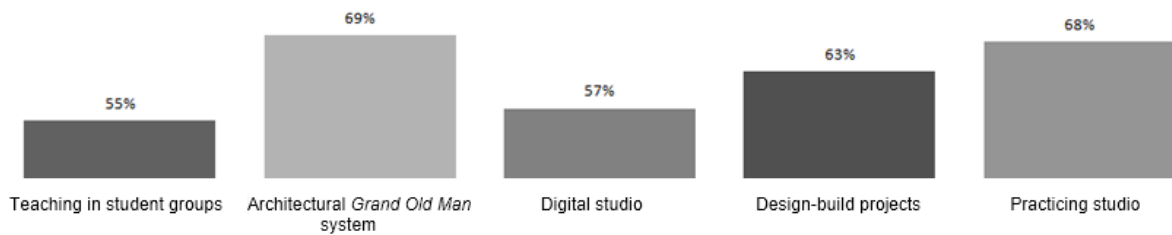


Figure 6: Comparison of the overall degree of fulfilment of the set specific criteria characterising the architectural education by the described individual teaching models.

CONCLUSIONS

The authors of this contribution consider the architect's role to be an immanent part of society, its culture, manifestations of traditions, because even a nice house can have a devastating effect on its surroundings. The personal role of the teaching practicing architect is a crucial one in architectural education. Through a constant interaction with students and practice, he or she is able to reflect and anticipate the development of society's needs, as well as corresponding the technical advancement of architecture and offer these reflections to students. Looking into the future of architecture and architectural education, Weiner's words should not be forgotten: *...If architectural education could have one clear goal it should be to educate and sustain the next generation of talent that has a sympathetic awareness of its origins* [12]. One must start to document the tradition of architectural education, teach using the best educators, and build and develop new models, which may become an inspirational or deterrent example written in its history.

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BIOGRAPHIES



Ján Legény is an honours graduate in architecture from Slovak University of Technology in Bratislava, Slovakia, where he also earned his PhD in 2013. His doctoral thesis title was the Typology of Solar Town Planning: Urban Structures Generating. Presently, he is working in the Institute of Ecological and Experimental Architecture at the Faculty of Architecture of Slovak University of Technology in Bratislava. He has authored or co-authored 14 articles. Further, he has peer reviewed conference papers in the field of solar town planning, solar design and sustainability, and has presented papers at international conferences in Slovakia and abroad. He co-authored the monograph titled Solar Strategy of a Sustainable City. He is a freelance architect and a co-founder of an architectural studio TRESArchitects, and has also experience from the office of Chief City Architect in Bratislava.



Professor Robert Špaček graduated with a Master's degree from the Faculty of Civil Engineering of Slovak University of Technology in Bratislava (FA-STU) in 1976, and in 1984, he finished doctoral studies. He has undertaken many research fellowships: in Weimar (1980), Hannover (1981-82), Manchester (1993-98, occasionally) and Graz (2001). He is a co-founder of the Institute of Ecological and Experimental Architecture at the Faculty of Architecture of Slovak University of Technology in Bratislava, Slovakia (1990). His appointments include the following: Dean of the Faculty of Architecture of Slovak University of Technology in Bratislava (1990-94 and 1996-2002), Vice-Rector of Slovak University of Technology (2003-2007), Head of the Institute of Architecture II at the Faculty of Architecture of Slovak University of Technology (2004-05). Since 2010, he has held a post of the Vice-Dean for Foreign Affairs and Human Resources, and is a member of the scientific board of FA-STU. He is a member of the editorial boards of several Slovak architecture magazines: *Architektúra & Urbanizmus*, *ARCH*, *ALFA*, *Eurostav*, *Projekt*, *Revue slovenskej architektúry*. In his academic career, he has been a member of nine scientific boards at several universities and faculties. He is an honorary member of the Slovak Green Building Council. He has published nine chapters in internationally recognised monographs, four teaching aids (one of them abroad), more than 60 scientific publications and more than 150 professional publications. He is an author of 22 architectural projects and 48 architectural designs. He has presented at many conferences and has participated in a number of foreign projects, e.g. in Auckland, Bangkok, Budapest, Buenos Aires, Cairns, Cork, Dresden, Edinburgh, Graz, Grenoble, Hague, Hannover, Hobart, Chania, Cologne, Krems, London, Manchester, Bombay, Paris, Perth, Prague, Vienna, Weimar and Wismar. As a researcher and university teacher he occupies himself with sustainable and experimental architecture.



Peter Morgenstein is member of the academic staff of the Department for Building and Environment of the Danube University Krems, Austria. He graduated in architecture from Slovak University of Technology in Bratislava, Slovakia, where in 2013, he also finished his doctoral studies (Typology of Solar Town Planning: Energy Cooperativeness of Urban Structures). Presently, he also works as a researcher at the Institute of Ecological and Experimental Architecture at FA-STU. His research is focused on sustainable urban design, smart cities and utilisation of solar energy in architecture and urbanism. He authored and co-authored scholarly publications, conference papers and a monograph (Solar Strategy for a Sustainable City). He has been a core researcher in a number of national and international research projects and has tutored and co-tutored diploma and Bachelor architectural studio projects at the FA-STU and worked in the office of Chief City Architect in Bratislava.