Architect - a fateful mission or everyday work?

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ABSTRACT: The authors of this article discuss the ambiguous necessity of talent for the execution of architectural practice. It opens the question of its assessment and whether the attainment of knowledge, skills, competencies and artistic creativity within this professional realm can be achieved through training and the use of various guidelines. The authors highlight the importance of tacit knowledge and its transformation within the knowledge spiral based on socialisation, externalisation, combination and internalisation phases, and the related contexts. This can contribute to increasing the effectiveness of education and raising the level of a knowledge-based society. They describe the main characteristics of Generation Z (Gen Z) the first cohort of which has already entered the labour market. In light of this and considering the results of an alumni on-line survey carried out in the Faculty of Architecture and Design at Slovak University of Technology in Bratislava (STU), Slovakia, on the most important skills for the enforcement for practice, the authors argue for changes in architectural education.

INTRODUCTION

Theories on architecture and various interpretative approaches to architectural design and profession predominantly qualify as suitable for practice those persons who are gifted with exceptional inborn talent. Creation, as the act of making an original work of art, inventing or producing, is ordinarily related to human *creativity* (originating from Latin *creare*). Although an intuitively simple phenomenon, creativity is, in fact, quite complex and is defined as the intellectual ability to create, invent and discover. It brings novelty, originality, new relationships, entities, and/or unexpected solutions into existence to solve real-world problems and transform the surrounding world [1]. It leads to creative, new, progressive and communicable products, which help to form a personality of a person in a long-term way [2].

An architect is occasionally designated for the role of *deus architectus mundi*, respectively, *architectus secundus deus.* In such cases, he/she is supposed to be equipped with exquisite competencies that meet the requirements for the equilibrium/ultimate synthesis of *firmitas* (commodity), *utilitas* (firmness), *venustas* (delight), as well as, highly demanded nowadays and forced *restituitas* (sustainability) [3]. Literally, these interpretations have probably originated in art/non-fiction literature or publications on the history of science, culture and philosophy that use the terms *deus artifex*, *deus architectus*, *deus geometra*, *deus protogeometer* or a *creator* and depict God, with a pair of compasses while forming the world according to the Old Testament *Genesis*, as the great architect or creator of the universe [4].

The authors are of the opinion that there are two types of architect or two possible ways of becoming an architect. One is represented by endowment as a *gift from God*, destiny or a genetic lottery, the other by the opportunity to learn to design or by receptivity, empathy and diligence. This opinion confirms the statement of Walter Gropius, one of the pioneering masters of modern architecture and founder of the Bauhaus School:

> *Art itself cannot be taught, but craftsmanship can. Architects, painters, sculptors are all craftsmen in the original sense of the word. Thus it is a fundamental requirement of all artistic creativity that every student undergo a thorough training in the workshops of all branches of the crafts* [5].

GUIDING THE ARCHITECT'S HAND

In general, *creative thinking* involves cognition (the mental act of acquiring knowledge and understanding through divergent thought, experience and senses), production and evaluation [6]. Admittedly, the architectural design process has some specific immanent attributes. Sometimes, they are compared to those of monastic society characterised by a commitment to humility and strict discipline. The *horror vacui* which architects are usually in *fear of*, is surpassed by waiting for inspiration, impulsion and caresses with a muse. On the one hand, the eternal questions of architectural

education remain the following: what is talent, and respectively, what are the predispositions to execute the architectural practice? What are the crucial required abilities, skills and knowledge the student should have at his/her disposal? And finally, what is genius or greatness in regard to architecture?

On the other hand, there exist books, guides, catalogues, manuals or design books dealing with a typological and collective understanding towards architecture. Vitruvius described the fundamentals of architecture and how to gain knowledge through practice. Similarly, among many others, Leon Battista Alberti, Giorgio Vasari or Palladio did so. In this context, the second book of Jean-Nicolas-Louis Durand (1760-1834) comprises his lecture notes with accompanying drawings, hypothetical building types, basic building elements, as well as variations and combinations of these basic types and elements systematically analysed through schemas. These schemas can be used as a tool for understanding, recording, communicating and designing in different ways according to flexibility, level of abstraction, formal approach or temporality [7]. In the end, the purpose of such *Master Buchen* was (and, undoubtedly, still is) to learn how to *perform* architecture.

Other stimuli for inspiration and tools that *guide* the architect's hand are nature itself, nature laws and different fields of study or arts, indeed. Several architectural intersections with other fields have already been introduced by some authors of the current article [8]. The golden ratio as the basic etalon of harmony is definitely a rationally derived phenomenon, even though it has a piece of magical infinity. Is it a standard of aesthetics or solely the domain of mathematics? Aesthetics, logic and ethics are mutually interconnected not only in the works of Charles Sanders Peirce. Aesthetics has its mathematics, mathematics has its aesthetics, elegance. Then, designing a house in proportions of the golden ratio can be understood as a purely rational and teachable decision. The five features of modern architecture defined by Le Corbusier are simple to learn and follow. Such basic compositional principles can be quantified not only in geometry but also in music. *I call architecture* petrified music. *Really there is something in this; the tone of mind produced by architecture approaches the effect of music*, Goethe stated in 1829 [9]. His idea reveals a universal theme of expression underscoring all creative disciplines and suggests all processes of creation and invention are connected by a human need to express something, despite the final medium of construction.

The essence of music and architecture lies in the laws of physics. For example, these laws model buildings and urban structures with respect to the movement of the sun, which can be designed on passive/active solar principles using the IT generative tools, programs and scripts. Nature, in turn, inspires architects with its perfect (anti-)gravity-shaped bionic forms. At first glance, creating rational Cartesian/cubic systems requires less talent than to curve surfaces influenced by nature. Is that really true? Creation is sometimes identified with innovation, but architecture is also based on repetition. Urban planning, respectively, the architecture of the city is often a rhythm of types and typologies. One will never learn/grasp the *thinking of starchitects*, such as Gehry, Hadid or Calatrava. He/she can just imitate their works and principles. On the other hand, are not all cuboids, cylinders and other archetypes also imitations and repetitions of what has been learned or preserved in one's subconscious? Many similar examples could be mentioned.

Architecture means the *art of building*, it is considered the *Mother of All Arts* combining artistic beauty with scientific and mathematical precision. Rather, as a field of study, it can be perceived as a cultural phenomenon. In the early 2000s, there emerged a strong need to emphasise the links between prosperity, knowledge-intensive jobs dependent on science and technology, and continuous innovation to address societal problems mainly through STEM education. Most of the aforementioned guidelines can be classified as principles of science, technology, engineering and mathematics. Admittedly, as an interdisciplinary field of study, architecture deals with the *bridge effect* issue. In addition to STEM, it includes the humanities, arts and social sciences (HASS) disciplines, the importance of which lies primarily in developing and securing the cultural values of societies. Nowadays, discussions and this concept of discipline division go further.

There appear other divisions, such as STE*A*M in which the *A* means the *arts*, ability to formulate ideas and present them convincingly, respectively, to create and present arts in a broader context, not only as visual, musical or dramatic expressions, but also including industrial and artistic design, as well as language arts, skills, etc. Another one is ST*R*EAM, where *R* means *reading and writing* or mastering the language of science as part of the OECD recommendations; or STEAM*IE*, where *IE includes everyone* who can be educated or involved in this process. Then each individual can discover and get to know each other on their level. Extracurricular activities that focus on STEM subjects can also play an important role and can even compensate for school failures while motivating students to continue learning [10]. All these disciplines are inherent to architecture.

TACIT DIMENSION

The difference between the two types of architects underpins the tacit dimension of architectural knowledge in particular. Architecture by its nature uses both explicit and tacit knowledge, expressing its concepts and ideas to realise a (projected) material reality. The built environment is shaped and created on the state of art and underlying assumptions *driving more than just emotions and sensibilities thereby driving out thoughts and actions in manners that cannot be explained only from the perspective of rationality* [11].

Transformations in a new emerging 21st Century information and knowledge society have often brought with them not only clear, distinct and tangible changes, but also those that are only implicitly perceived. In the future, the change in

society marked by materialism and individualism, and its direction towards intangible values and co-operation through *knowledge management* and *knowledge productivity* seem fundamental. The basis is to work with information (answering the questions: *who? where? when? what?*) and knowledge (*how?* and *why?*). Nonaka and Takeuchi consider information to be more factual. In contrast, knowledge is about belief and subjective opinion, and is always linked to action. They argue that learning to transform tacit knowledge into explicit knowledge is the key to success and *creating* knowledge, not only its *acquisition* and *application*, will become crucial to maintaining a competitive advantage in the future [12]. A general rule proceeds. *When turning information into knowledge, there is a need to have some previous knowledge, skills, experience, mental models, etc.* [13]. Then, Katuščáková, defines knowledge as a) *a set of information meaningfully placed in a broad context (explicit, implicit)*; and b) *a set of experiences, abilities, skills, values, competencies, etc. (tacit) that together predispose someone to the ability to act* [14].

Explicit knowledge (*knowing that*) can be expressed in formal language, including grammatical or mathematical expressions, specifications and manuals. They can, therefore, be stored in document management systems, library systems, marketing information systems, etc. *Implicit knowledge* (*knowing how*) is not yet expressed, knowledge gained through education or training. In the case of *tacit knowledge*, the definition is more complicated. This idea was posited more than 50 years ago by Hungarian intellectual Michael Polanyi, *as a perspective that helps the discipline of architecture to (re)connect its practices and theories and contributes to a better understanding of the built environment as a phenomenon that both reflects and shapes cultures and contexts* [11]. In essence, he argues that *we can know more than we can tell* [15]. The tacit knowledge is a hidden kind of knowledge that is normally acquired by socialising with surroundings and about the existence of which one often does not even know.

Schrijver states that [...] *in this complexity, architects have regularly been confronted with the distinctions and discrepancies between what they can* tell *and what they can* know, *as well as what they can* show *in drawings and models* [11]. Truly, in presenting their work, students and architects are often exposed to self-deception, called the Dunning-Kruger effect introduced in 1999. In psychology, it is *a cognitive bias whereby people with limited knowledge or competence in a given intellectual or social domain greatly overestimate their own knowledge or competence in that domain relative to objective criteria or to the performance of their peers or of people in general* [16]. In such examples, even tendentious criticism is based on overexposed formulations or abstract language.

In 1995, Nonaka developed a multi-phase SECI model (Figure 1) on how organisations create knowledge [17]. The first phase is *socialisation* based on sharing tacit knowledge among people without verbal or written documentation, e.g. by sharing experiences and telling stories, similar to when an apprentice learns from his master. *Externalisation* represents the process of verbal expression and codification of tacit knowledge, its transformation into explicit knowledge. The third one is *combination* as the conversion of explicit knowledge into more complex sets of explicit knowledge that can be shared and transmitted using documents and e-mails. Using contemporary information technologies, the user can store it, understand it and put it in a new context while sharing it with other employees of the organisation. Finally, the *internalisation* phase uses explicit knowledge, its inclusion in its own knowledge structures. The key in this process is to work with explicit knowledge or information, their understanding and subsequent internalisation. In this process, the tacit knowledge of the individual should be created [12].

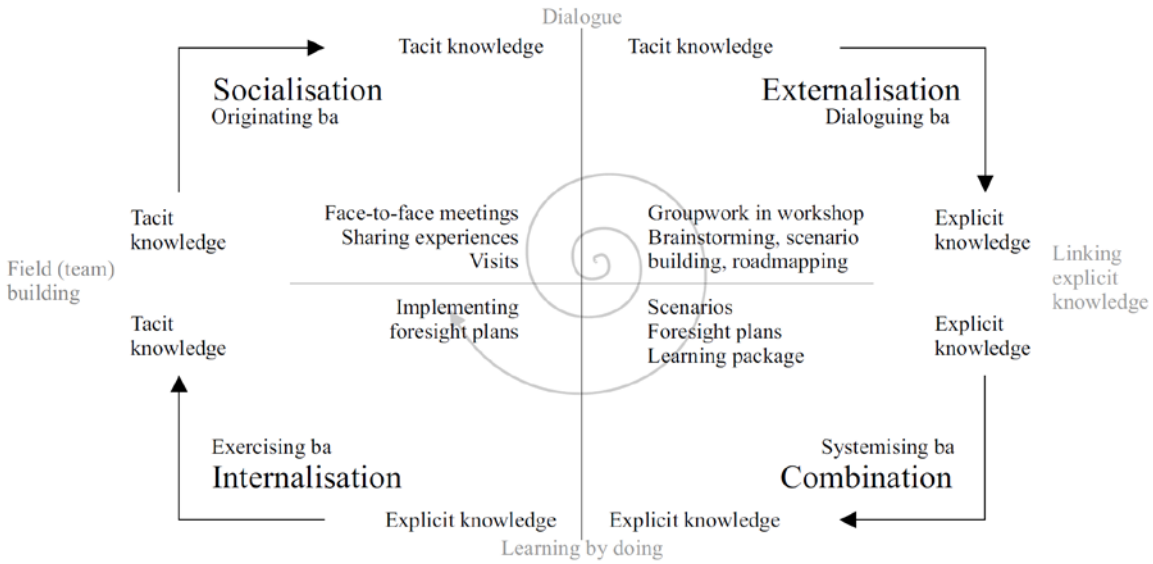


Figure 1: The SECI model and knowledge spiral based on socialisation, externalisation, combination and internalisation phases and the related contexts (called *ba*), such as originating, dialoguing, systemising and exercising. *Ba* is a temporary common place for exploring new insights, learning, socialising and developing new ideas. The authors modified the graph by Nonaka et al [17].

This work is important not only for the performance of work in companies and architectural studios but also for increasing the effectiveness of education. Today, with access to vast amounts of information, the value of tacit,

non-digitised knowledge is logically increasing. This value is based on two reasons. One is rarity, the value of expertise that cannot be easily copied and disseminated. The second reason is the importance of this knowledge in organising and selecting in the flood of information, so that this information can be used.

ENTRANCE TALENT EXAMINATION

The issue of talent and predispositions of students to study is a subject of interest for many researchers and educators. In collaboration with their colleagues, the authors have already stated that there are ten levels of talent based on typology, the assessment of which is a professional matter, and at the institutional level of a faculty, objectivity in determining talent is quite difficult or even impossible to achieve [18]. Repeatedly, according to Coyl, talent needs *practical practice, eagerness, and a masters coaching, which influence the development of talent, genius, gift*. It is not just a gift, but can be improved, while the most expressive variable is not genes, but discipline in practice [19]. Other variables are motivation, persistence or co-operation. Many universities still consider the entrance examination the most appropriate way to assess creativity, respectively, talent. The most humanly sensitive question is whether candidates who do not prove their talent or cannot draw by hand are prematurely disqualified. In this framework, Figure 2 reveals various requirements placed on applicants for Bachelor's studies in three selected architecture schools. Then Figure 3 shows the on-line admission examination procedure and tasks in the Faculty of Architecture and Design at Slovak University of Technology in Bratislava, Slovakia (FAD-STU), which were made difficult due to restrictions from the Covid-19 pandemic. Therefore, the results of such an admission procedure may be ambiguous and distorted.

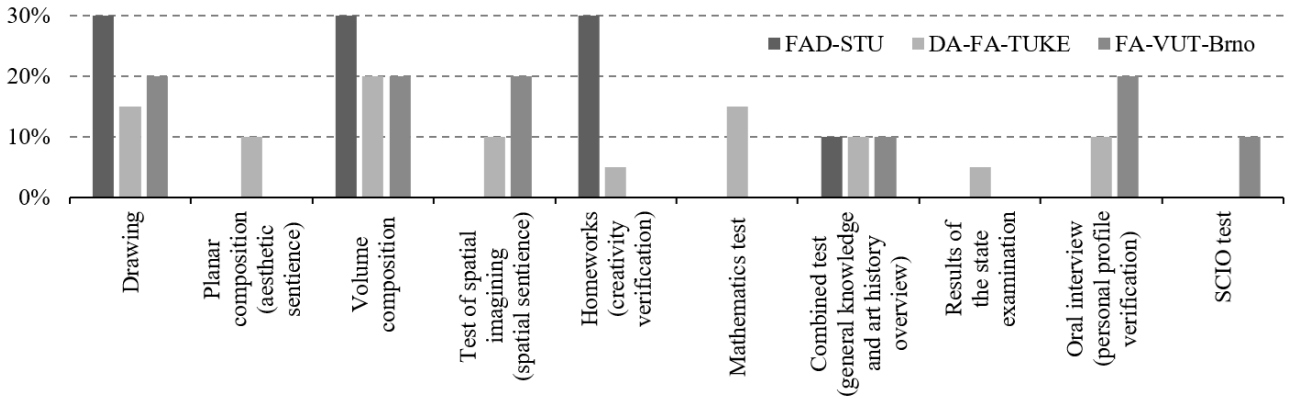
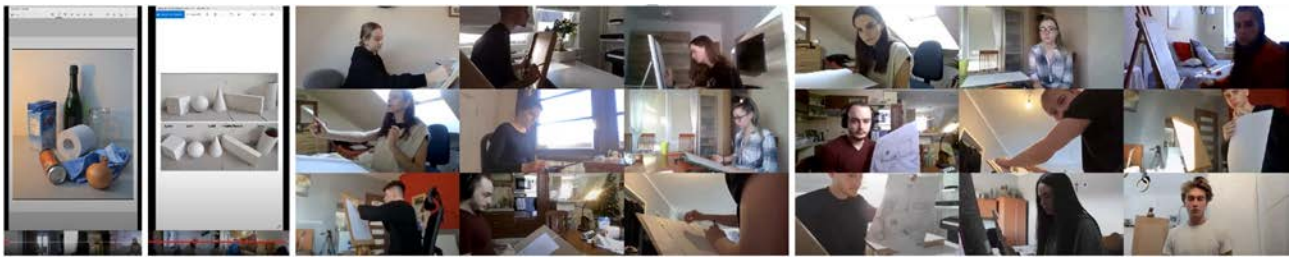


Figure 2: Comparison of the percentage stratification of requirements at admission examinations for Bachelor's studies at three schools of architecture - FAD-STU [20], the Department of Architecture, Faculty of Arts, the Technical University of Košice, Slovakia (DA-FA-TUKE) [21], and the Faculty of Architecture, Brno University of Technology, Czech Republic (FA-VUT-Brno) [22] for the academic year 2022/2023.



a) b) c) d)

Figure 3: On-line admission examination for Bachelor's studies for the academic year 2022/2023 at the FAD-STU. From left to right: a) still-life model; b) basic geometrical bodies; c) a students participating in drawing the still-life model; and d) students engaged in the task of composing volume from the geometrical bodies.

As a starting point for performing the profession, education must be perceived in the context of demographic cohorts, colloquially also known as generations with specific attributes. The generation that implies the main challenges regarding current architectural education is *Generation Z* (also known as *Gen Z, iGen*, *Zoomers*, *Post-Millennials*, *Plurals* or *Homeland Generation*) generally defined as *digital native* people born between 1995 and 2012 into a world of peak technological innovation (they have always had ubiquitous Internet access). Since graduating from high school in 2013 and college in 2017, the first cohort of *Gen Z* has already entered the labour market [23].

According to numerous studies, Zoomers have the following main characteristics. They are looking for the best cultural fit for them at their future workplace characterised by a flexible schedule, with a view to making a significant contribution there. Many will need to be trained on skills, such as vital rules of conversation, listening, asking questions, interjecting in a way that is seen as respectful to others, building relationships, solving problems and conflicts in real time [24][25]. Generation Z has been growing up within a culture of safety without opportunities to learn life skills

acquired when facing difficulties to become autonomous, make responsible decisions, and take actions in ambiguous and uncertain situations. [26][27]. It is the most achievement-oriented generation and wants to participate in decision making and to have their ideas valued. They are not afraid to forge their own path, as they expect a frequent sense of accomplishment in their pursuit of constantly changing the *status quo* in environments [28]. Unlike Millennials, who either will be or already are their supervisors, Generation Z wants to achieve success alone. They achieve professional development through continuous learning, advancement and the use of their abilities [29]. And finally, they are positive about the future of technology in education [30].

ALUMNI - QUESTIONNAIRE ON ENFORCEMENT IN PRACTICE

Regarding the topic of the article and hand in hand with the ongoing accreditation procedure at the FAD-STU, the authors carried out an alumni on-line survey that enrolled 215 respondents in the middle of 2021, specifically, 128 women (59.5%) and 87 men (40.5%). The main objective was to help pedagogues to innovate subjects and teaching methods, as well as to draw attention to the requirements for enforcement in praxis. In total, from the cohort, 188 participants (87.4%) were in practice up to 5 years after graduation, 26 (12.1%) of them worked in the realm up to 10 years after graduation, and one respondent (0.5%) performed the profession for more than 10 years. The results of the questionnaire revealed that most of the graduates worked in the field of study and identified the preferred software used in architectural design studios. In addition to this, each participant selected his/her top three hard and soft skills that he/she reckoned most important for professional practice. Detailed results are shown in Figure 4.

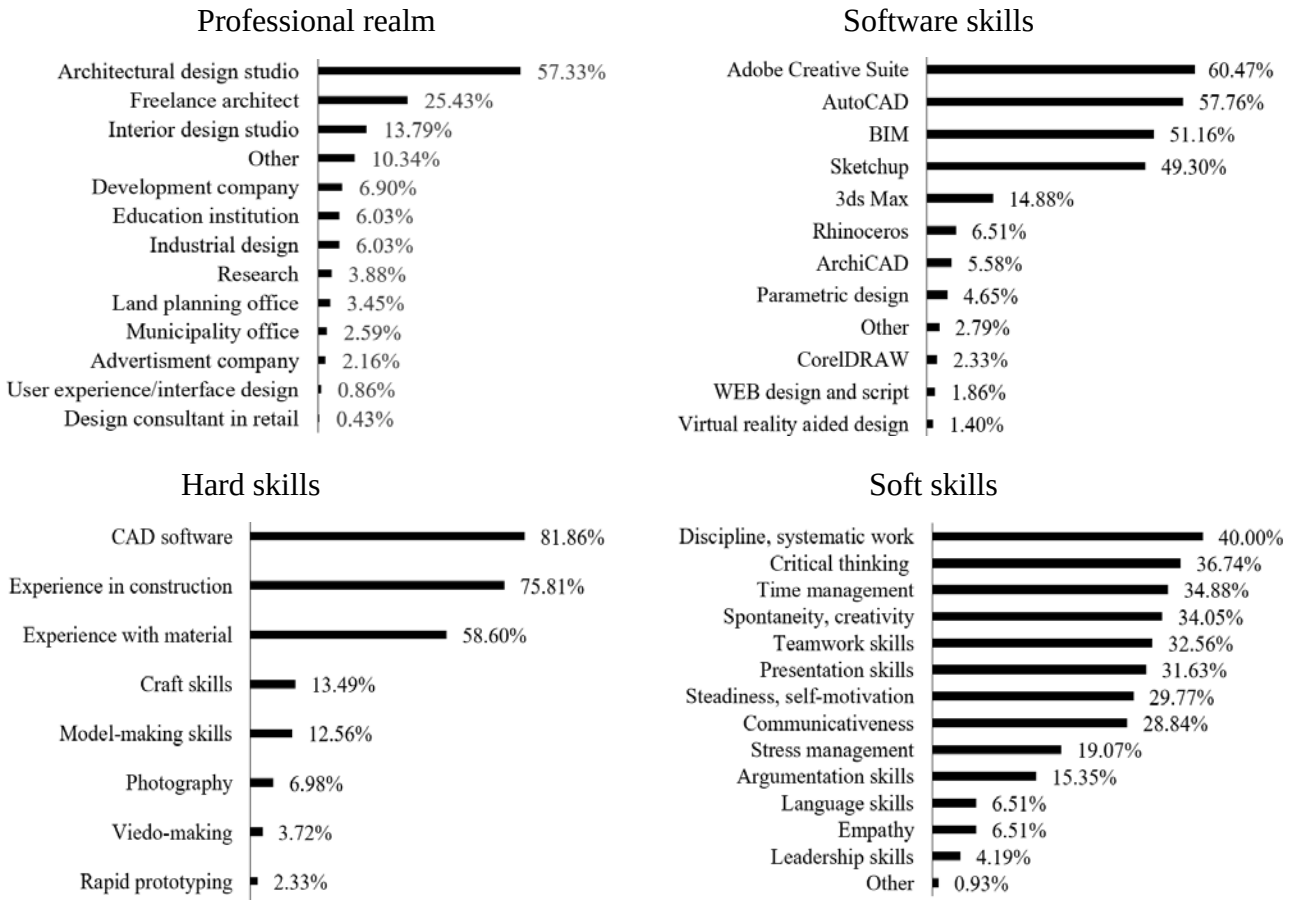


Figure 4: Results of the on-line alumni survey carried out at the FAD-STU in Bratislava.

DISCUSSION AND CONCLUSIONS

The development of society in all areas brings rather positive effects, but also generates new challenges that need to be addressed. Information technologies enable many improvements, such as home-office, networking of workers regardless of their location, more efficient management of time, or a rapid expansion of the global knowledge base (unfortunately, also together with false/unverified information known as fake news or hoaxes). The first three identified most important soft skills, such as discipline/systematic work, critical thinking and time management, will therefore play a key role. The architectural profession and construction will probably always differ slightly from many other industries as, at least for now, their subject of interest is related to a specific location. However, it is being largely dislocated in the virtual space, and individual predispositions play only a partial role in the creative process, particularly for larger projects. The fifth teamwork skill is, in general, very characteristic of the architectural profession, not only in this case. The authors assume that the last four soft skills (except for the answer *other*) were low rated mainly due to the young age of the respondents.

The authors of the article want to highlight that their objective is not to deny the importance of talent in the architectural design process. Based on their research and experiences, practicing a specific profession, such as architecture, will require a reconfiguration of the educational system. Therefore, as one of the most rigorous and conservative systems, education must begin to respond to the needs of society more quickly to generate graduates who will meet the demands of the labour market. The light must be shed on the increasing interest in alternative modes of knowing, such as precognitive thought, tacit knowledge and embodied reflection. Defining the boundaries of what we can rationally understand and what we can codify to gain insight into how people work, communicate or which unstated assumptions inform our perceptions and ideas should become the objective of architectural education and research. Some architecture schools are already abandoning talent interviews, which may naturally result in a lower quality of education for a certain spectrum of people/applicants. This issue has also been discussed openly on the FAD-STU ground. However, as presented in the article, some knowledge, skills and competencies can be acquired through practice. After all, authorisation - the process of recognition of professional qualifications, includes the evaluation of creative talent but is predominantly focused on trivial everyday work. Thus, architectural education must become tolerantly diversified and Gen Z oriented.

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