Global Journal of Engineering Education

New challenges in teaching architecture students in the third decade of the 21st Century

Jacek Gyurkovich

Cracow University of Technology
Kraków, Poland

ABSTRACT: This article signals new challenges in the process of teaching architecture students, both in terms of organising teaching and the substantive content being taught. Several topics remain relevant and important, including environmental protection in the context of human life, the philosophy of sustainable development, and the elimination of architectural and urban barriers to provide equal accessibility to buildings and outdoor structures. However, a new approach is needed to address continuously emerging new challenges; for example, to shaping public spaces, associated with increasingly frequent terrorist attacks. At present, it is essential to develop both new criteria for carrying out teaching, and for the design of buildings and public spaces in light of the COVID-19 pandemic threat. In regard to methodology, seamless on-line course delivery and effective electronic communication across various platforms for both academic staff and students are some of the challenges.

Keywords: Architecture education, environmental protection, sanitary regulations, shared space, virtual education, COVID-19

INTRODUCTION

The international platform for exchanging thoughts on education issues provided by the cyclical WIETE-co-organised conferences (EADE-2020) is undoubtedly a significant contribution to the progress and dynamism of innovation in teaching specialist engineering personnel to satisfy local needs and for the global economy - this is a short greeting that the author directed remotely to the participants of the EADE-2020 Conference in June. The Conference was supposed to take place in a beautiful Polish city - Gdańsk - but instead was conducted on-line, in virtual reality, connecting scholars interested in engineering education from all over the world.

The rapidly spreading COVID-19 virus has resulted in a pandemic that forced significant change to practically all spheres of life, and the activity of individuals and communities. Out of the necessity, relationships between members of local and global communities have changed, as have those in workplaces and private life. The direct personal contact, once natural and spontaneous, is now subjected to sanitary regulations, so that the far-from perfect immune defence system, backed up by awareness and psychological resilience could provide some barrier to the threatening virus.

Changes to the surrounding reality appear to come at a rate directly proportional to the growth of the global population. Issues of environmental protection, and the associated philosophies of ecology and sustainable development, have not come to be widely understandable precepts, and function neither in global and local legal systems nor in socio-economic policies.

The necessity to ensure equal access to public spaces, outdoor structures and buildings to all community members, regardless of their physical ability and mobility - remains an imperfectly realised postulate. The internationally growing threat of terrorism - particularly after the 9/11 attacks on the World Trade Centre in New York in 2001, and the constantly changing and unexpected forms taken by terrorist attacks lead to the necessity to ensure safety and security. It affects the design of the surrounding space.

Those issues are challenges to educators, and require constant modification of substantive content as new needs emerge. The COVID-19 pandemic has also forced changes to the previously used knowledge transfer systems. In view of the issues highlighted above, the cyclical WIETE conferences are undoubtedly a perfect international platform for sharing thoughts, and to search for and propagate innovative solutions.

Space is a shared value. Shared space - used by all members of a given local community and visitors (tourists and consumers who make use of all sorts of services) - is public space, such as streets, parks, pedestrian boulevards, etc. Semi-public/semi-private space is likewise shared space, it is intended for a specific group of users; for example, the residents of housing estates and complexes. Internal recreational areas inside urban blocks or housing complexes fulfil this function as places for rest, playgrounds for children or landscaped greenery complexes, which provide contact with the natural environment to residents. The full accessibility of shared space - public space - is an achievement of recent centuries that is now lost due to the COVID-19 pandemic [1].

Cities are the natural environment of human life, whence civilisation and culture have originated. Since the dawn of history, cities have been built on a foundation of exclusion, as they were supposed to protect specific communities from external threats. Embankments, defensive walls, moats, as well as the skilful use of natural terrain, were to hinder access to cities and enable effective defence for their inhabitants. Gates were filters used to segregate access. One can find them in all historic urban complexes as surviving fragments of historic urban tissue or relics uncovered during archaeological digs. To ensure internal security, special services were established that differed throughout history. The liberation of European cities from the confines of their walls and defensive gates took place at the turn of the 19th Century or even near the start of the 20th Century. It was not as much the effect of progressive ideas, but the loss of military value by previous defensive structures in the face of changing military tactics and the needs of rapidly developing industry, which resulted in a sudden population growth in many cities.

Without delving into the tragic past of the cities that had been destroyed by the Second World War and their residents, who had often been stripped of all rights and affected by exclusion from public life and ordinary social activity by brutal systems, as well as the problems associated with recreating damaged urban tissue and urban public spaces, it should be stated that despite the often visible mark of war, they have gradually regained the distinct characteristics of urbanity [2].

In today's cities, there are still numerous spaces and buildings with limited or controlled access and which are accepted by urban communities. Urban tissue, built over the span of centuries up to the start of the 20th Century, is traditional urban block-based development with hybrid functions, accessible from the street level of public space via ground floors or several other storeys with varied, service-oriented functions and mysterious courtyard interiors, guarded by groundskeepers and inaccessible to outsiders. The fact of this ongoing partial exclusion is not contested and does not result in public protests. Monastic complexes and gardens or those belonging to villa districts with fenced premises, are areas of the city that are still excluded from public use and often surrounded by walls and closed by gates, in addition to being quite large. The wave of criticism of *gated communities* that were built in Poland after the most recent change in the country's political and economic system requires commentary against the background of the aforementioned issues [3].

It is undoubtedly unfavourable to exclude large areas of cities from public accessibility. Yet cameral housing complexes, with interiors allocated to residents and ground floors that offer needed, attractive services to the public are considered by the author to be proper for all participants of urban life, both under normal urban conditions and exceptional ones, including the ones that are currently dealt with. Without a doubt, free access to the public spaces of contemporary cities, free and widely available, yet not completely without supervision (municipal guard, police and ever-present monitoring, etc) has become an essential characteristic of urbanity, an inalienable value to urban communities.

Free access to public spaces and buildings, service infrastructure and housing should be ensured by legal provisions applicable in each country, following the Convention on the Rights of Persons with Disabilities of 2006 adopted by the UN and ratified by Poland in 2012. Also, in Poland, the Charter of Rights for Persons with Disabilities includes appropriate provisions [4], but the implementation of them (as well as of the ones that preceded them) in regard to city spaces is unsatisfactory. Large-scale social education, including the specialist education of architecture students, remains necessary [5].

Urban housing complexes that were built in the 20th Century based on the modernist concept of the *neighbourhood unit* [6] or that of the *social neighbourhood* [7], unlike historical urban complexes, were characterised by complete openness and accessibility to buildings and their nearby spaces, in addition to common parks, and sports and recreation areas. Housing complexes built in alignment with these ideas, though often later criticised for the amorphousness of their space, still provide their residents with a much greater degree of saturation with shared green and recreational spaces, closely tied to housing buildings and complexes, when compared to so-called private developer housing estates currently built in Poland. This fully accessible and open space provides residents with much better conditions for recreation and contact with nature [8].

The post-modernist concepts of returning to tradition meant a renaissance of urban spatial forms in urban design. It was a return to city streets and squares, to noting the significance of clearly defining open and generally accessible public spaces of the city or housing areas designated for specific users. The post-modernist concepts saw designs of cameral housing complexes, often with square-shaped spatial layouts, offering an internal private space near apartments (terraces, balconies, gardens near the ground floors), as well as green, recreational urban spaces that are defined by

development and feature commonly used space that is semi-private or semi-public. These green, landscaped recreational spaces in complexes addressed to specific users are a peculiar *soft form of exclusions* - without the use of physical enclosure. Proximity and access to greenery and recreational areas in housing complexes ensure a high-quality housing environment, which is essential for the comfort of living and social relations. This asset, which is highly valuable to housing environments, was noted by numerous scholars [9]. Apart from its impact on the shaping of social, neighbourly relations and providing a sense of safety, this form of shaping housing development can play an important role in affecting the comfort of life and health of residents who are forced to use rest spaces in their own apartments or on their terraces or balconies due to the COVID-19 pandemic.

The intensifying threat of terrorism endangers the traditional functioning of urban public spaces and the services they offer, as well as public buildings, those owned by state administration, international corporations, buildings that congregate numerous employees and users, such as office buildings, banks or cultural or religious buildings [10].

After 2001, terrorist attacks have started to take on new forms; however, it is the users of public spaces and buildings who are under the greatest threat. It appears that ensuring complete safety is not possible, even when applying intrusive surveillance systems, which reinforce the already ongoing abandonment of the right to privacy in public space and increase control by special services. Apart from individual cases, city residents have not given in to intimidation and have not allowed the threat to pressure them - traditionally lively urban public spaces, cultural buildings, churches, parks and boulevards, beaches, cafes and restaurants have not become deserted because of terrorist attacks.

It was the 2020 COVID-19 pandemic that forced city residents not only to abandon their previous freedom to use public spaces and participate in public life, but also to sever individual and even familial contacts. This is not only about sanitary restrictions imposed by the government, but the growing awareness of the threat to human health and life. Shared spaces became deserted, and this phenomenon is global.

Climate changes felt all over the globe, across all continents, are undoubtedly associated with human economic activity and greenhouse gas emissions, primarily carbon dioxide (CO_2). Greenhouse gas emission sources are well known - the construction sector, which is the closest to architects, is responsible for 40% of atmospheric CO_2 emissions. For over 30 years, the notion of *sustainable development* as formulated in the *Report of the World Commission on Environment and Development: Our Common Future* in 1987 has been discussed and disputed. Tomasz Kapecki noted the lack of effective action in terms of widespread application of technologies and construction solutions in the building sector associated with the development of *green* buildings that would be energy-efficient throughout all of the phases of construction and occupancy [11].

Economic profit still dominates over the need to protect the environment. On the global scale, the approach to sustainable development philosophy varies. Wealthy countries with highly developed economies implement environmental protection strategies that result in observable decreases in CO_2 emissions. However, a rise in CO_2 emissions is continuously observed in less affluent countries with developing economies. There is an obvious need for solidarity and joint efforts by wealthy societies to act through their governments and international organisations towards implementing a common strategy of sustainable development in all of the world's economies. This problem was also noted by Špaček et al who stated that poverty was the greatest enemy of global sustainable development [12]. The authors had no doubt that environmental protection efforts should be enforced by Western countries with highly developed economies and *imported to developing countries*.

Space is a shared value - and the Blue Planet, Earth, the space where all of us live in - most of all. The continuously deteriorating state of the living environment is the cause of wave after wave of new crises - climate change that causes local cataclysms in various areas around the globe - cyclones, tornadoes, heavy rainfall and flash floods occur in places where they were not seen before.

The hypothesis that the current global crisis, the COVID-19 pandemic, is the result of environmental degradation and the economic activity of the latest generations that have not minimise and balance the impact of their activities on the living environment, appears to be true by all accounts [13]. Co-Chairs of the 2019 IPBES Global Assessment Report on Biodiversity and Ecosystem Services, Josef Settele, Sandra Díaz and Eduardo Brondizio, and Dr Peter Daszak, President of EcoHealth Alliance and a scoping expert for the new IPBES nexus assessment on the links between biodiversity, health and food - clearly opined that:

> *There is a single species that is responsible for the COVID-19 pandemic - us. As with the climate and biodiversity crises, recent pandemics are a direct consequence of human activity - particularly our global financial and economic systems, based on a limited paradigm that prizes economic growth at any cost. We have a small window of opportunity, in overcoming the challenges of the current crisis, to avoid sowing the seeds of future ones* [13].

They also warned that if current economic development strategies do not change to more eco-friendly approaches: *Future pandemics are likely to happen more frequently, spread more rapidly, have greater economic impact and kills more people if we are not extremely careful about the possible impacts of the choices we make today* [4].

The current satisfactory level of Internet access across the Polish territory allows most universities, including the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland, to practice remote learning. E-learning classes that have been developed and delivered for several years have become the best option after the decision of sanitary authorities, the relevant ministry and university management to suspend on-campus classes during the 2019/2020 summer semester due to the COVID-19 pandemic. All of the students and teaching staff had to shift to remote learning.

To gauge students' opinions about remote learning, the Cracow University of Technology Student Council conducted a survey distributed to all students across all university courses (architecture students comprise 11% of the University's student population and constituted 12% of the survey's respondents). The survey results are presented in Figure 1 and Figure 2, and the author's interpretation of them in the following paragraphs.

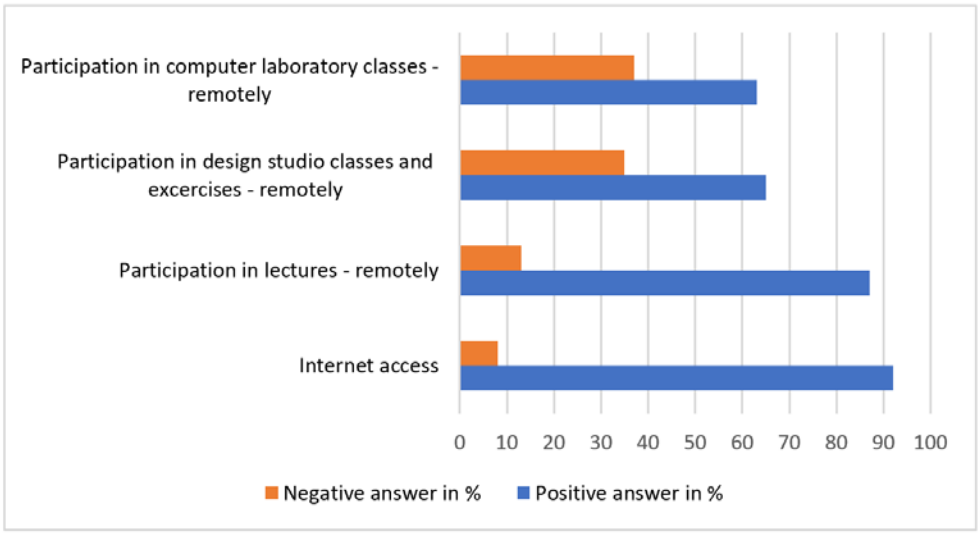

Figure 1: Students' participation in remote classes and lecturers.

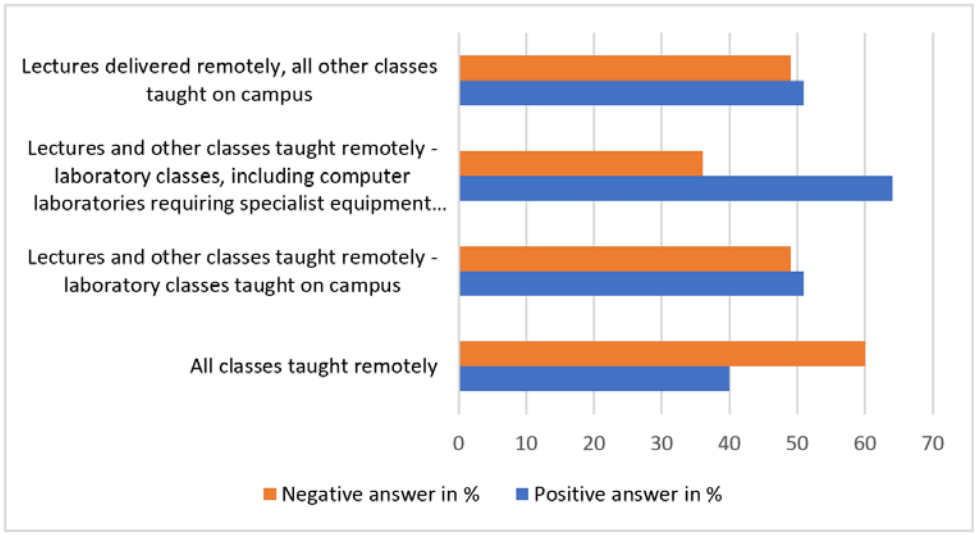

Figure 2: Students' views on lectures and other classes conducted remotely.

In the Faculty of Architecture, remotely-taught major design studio classes, as well as on-line design project defences, have resulted in a favourable outcome. Students who worked on-line were able to devote much more time to design. On the other hand, teaching personnel had to spend much more time on remote communications, reviews and assessments. Ultimately, the final results were satisfactory. However, practical training, particularly design and construction training, did pose a considerable difficulty for the Faculty.

For several years, practical design training has been carried out in cooperation with the Lesser Poland Chamber of Architects, which is a professional organisation, primarily focused on local architecture firms perfectly prepared for remote work both substantively and in terms of equipment. Due to architects' work that involves constantly evolving digital tools, perfecting one's skills in this type of work is of critical importance. The positive aspects of e-learning have been discussed by numerous authors with an academic focus on education [14].

The specificity of studying at the Faculty of Architecture allows for interpretation of the survey's results in a slightly different manner. Despite the lack of laboratory classes that would require specialist equipment and the physical presence of students, the reliable and steady access to the Internet allows to expect a positive remote learning outcome, while delivering only selected classes on campus.

CONCLUSIONS

The dynamism of the surrounding world, threats to the natural environment, and the necessity to shape built spaces by creating accessible yet safe physical frameworks for the existence of individuals and communities, are new challenges in the process of teaching engineering students, including architecture. It is also a challenge in the broad education of societies on the local and global scale.

International WIETE conferences are a perfect platform for sharing experience and shaping new ideas. As the organisation of the remote Gdańsk WIETE conference has proven - it is also possible on-line, although all its participants, of course, wish for the situation to return to normal, and would like classes to be conducted *traditionally - face to face, as this is the most effective and satisfying communication* - as written by Jakub Szczepański [15].

In light of the threats listed above, there is a need to further improve education systems with the intent to:

- develop theoretical and practical precepts of shaping safe public spaces and buildings that can form barriers against terrorist attacks without limiting access to users with varying degrees of disability;
- ensure the effective application of eco-friendly techniques and technologies via the continued transfer of the latest knowledge in this field through the process of training future engineering personnel;
- apply previous experiences and knowledge to create a living environment that is friendly also during extremely unfavourable conditions, such as those of the COVID-19 pandemic, by the programmatic and spatial shaping of open spaces and buildings;
- share experiences and implement good practices in remote teaching by using electronic communication tools and systems to better train future engineering personnel to function in the reality of contemporary threats and the requirements of the information era.

REFERENCES

1. Jasiński, A., Public space or safe space - remarks during the COVID-19 pandemic. *Technical Trans.*, 2020/020, 1-10 (2020), 8 August 2020, https://doi.org/10.37705/TechTrans/e2020020
2. Racoń-Leja, K., *Miasto i Wojna: Wpływ II Wojny Światowej na Przekształcenia Struktury Przestrzennej i Współczesną Kondycję Urbanistyczną Wybranych Miast Europejskich*. Kraków: Wydawnictwo Politechniki Krakowskiej (2019) (in Polish).
3. Gądecki, J., *Za Murami - Osiedla Grodzone w Polsce - Analiza Dyskursu*. Wrocław: Monografie Fundacji Nauki (2009) (in Polish).
4. Sejm Rzeczpospolitej Polskiej, Karta Praw Osób Niepełnosprawnych Uchwała z dnia 1 sierpnia 1997 (MP z 13.08. 1997 r., nr 50, poz. 475) (1997) (in Polish).
5. Gronostajska, B.E. and Berbesz, A.M., Universal design in the education of architecture students. *World Trans. on Engng.and Technol. Educ.*, 18, **3**, 345-349 (2020).
6. Perry, C., *The Neighborhood Unit, Regional Survey of New York and its Environs, Neighborhood and Community Planning*. Monograph I, 7 (1929).
7. Syrkus, H., *Ku Idei Osiedla Społecznego 1925-1975*. Warszawa: PWN (1976) (in Polish).
8. Gyurkovich, J., Living space in a city - selected problems of shaping modern housing complexes in Cracow - a multiple case studies: Part 2 - the casestudy of high density forms of multi-family residential buildings, Prague, Czech Republic: *IOP Materials Science and Engeneering* (WMCAUS 2018), 471, **9**, 1-9 (2019). 1 August 2020, https://iopscience.iop.org/article/10.1088/1757-899X/471/9/092016/pdf
9. Bednarz, M. and Schneider-Skalska, G., Common places - analysis of spatial structures conducive to their functioning. *Technical Trans*, **6**, 5-15 (2019).
10. Jasiński, A., *Architektura w Czasach Terroryzmu. Miasto - Przestrzeń Publiczna - Budynek*. Warszawa: Wydawnictwo Wolters Kluwer (2013) (in Polish).
11. Kapecki, T., Elements of sustainable development in the context of the environmental and financial crisis and the COVID-19 pandemic. *Sustainability*, 12, **15**, 1-12 (2020).
12. Špaček, R., Legény, J. and Gregor, P., Challenge and response at all levels in sustainable architecture education. *World Trans. on Engng. and Technol. Educ.*,18, **1**, 18-23 (2020).
13. Settele, J., Díaz, S., Brondizio, E. and Daszak, P., IPBES Expert Guest Article: COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics (2020), 16 August 2020, https://ipbes.net/covid19stimulus
14. Siagian, S., Sinambela, P.N.J.M. and Wau, Y., Effectiveness and efficiency of e-learning in Instructional Design. *World Trans.on Engng. and Technol.Educ.*,18, **1**, 73-77 (2020).
15. Szczepański, J., Guest Editorial. *World Trans. on Engng. and Technol. Educ.*, 18, **3**, 263 (2020).

BIOGRAPHY

Jacek Gyurkovich is a titular professor - in the years 1994-1999, he was deputy dean, and since 2012, he is Dean of the Faculty of Architecture at Cracow University of Technology. For 30 years he headed the Chair of Urban Composition. Professor Gyurkovich is an architect and urban designer - a member of the Association of Polish Architects (SARP), a member of the Architecture and Town Planning Committee of the Polish Academy of Sciences (KAiU PAN) and the Polish National Committee of the International Council on Monuments and Sites (ICOMOS). Professor Gyurkovich is a professionally active architect - he is licensed by the Chamber of Architects of the Republic of Poland. He is the author and co-author of many projects that have won awards and distinctions at national architectural and urban competitions, as well as a number of completed projects - including five churches, many residential buildings, hotels, interiors and furniture. Professor Gyurkovich was the initiator and organiser of a series of international conferences devoted to the condition of the modern city - Future of the Cities - Cities of the Future. As an academic teacher, he was the promoter of several hundred engineering and Masters' diplomas and 11 doctoral dissertations. Professor Gyurkovich is also the author of numerous scientific publications - combining his practical experience with theory and implementing them in academic teaching, he shapes the emotionality and spiritual foundations of respecting his own architectural and urban heritage and cultural landscape.