

Green building technologies as a part of architecture students' workshops

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Abstract

The purpose of this article is to present how green building technologies impacted contemporary architectural design during students' architectural workshops, using selected examples. The analysis covers a series of student workshops, conducted in collaboration between the Faculty of Architecture and Construction at L.N. Gumilov Eurasian National University (FAC-ENU) in Astana, Kazakhstan, and the Faculty of Architecture at Cracow University of Technology (FA-CUT), Kraków, Poland. The first part of the workshop, presented under the working title *Conceptual Landscape Project of the ENU Recreation Space in Astana*, focuses on conceptual design. The main part of the workshop centres on the theme *Restoration of the Urban Environment of Madrid: Designing a Multi-Comfort House Saint-Gobain*, emphasizing a personality-oriented approach and components of creative independence. The final part describes a student workshop on the theme *Architectural Collage: Transformation of Styles in the New Architecture of Astana*. In these three parts, the article demonstrates how ideas related to green building technologies were implemented in the creation of architectural spaces. The general conclusions highlight the role of workshops as an effective method of educating students about green building technologies applied in shaping the built environment.

Keywords: green building technologies, architecture students' workshops

1. Introduction

“Green building technologies describe technologies and techniques used in built environments to minimize environmental impacts, such as climate change while ensuring that buildings are able to accommodate the functions they have been designed for, and are comfortable and productive to live and work in” (Gibberd, 2020).

In the era of accelerating climate change and increasing ecological awareness, green building technologies are becoming the cornerstone of future architecture. Implementing these technologies not only minimizes the negative impact of buildings on the environment but also promotes sustainable social and economic development.

In today’s high-tech era, the aim is to acquire as much knowledge as possible, particularly by learning from seasoned experts and highly skilled professionals in the field. Modern opportunities for gaining new insights and fostering creativity are plentiful, especially through participation in training events like workshops. These events provide a platform for sharing valuable information and practical experience, enabling individuals to enhance their skills and knowledge base (Franta, 2016; Sadykova, 2016). Student workshops supplement the educational process or are even an integral part of it. Often, architectural workshops attempt to simulate the conditions of the real design process. This is due to the necessity of mastering many skills essential for the profession of an architect.

Modern education is rapidly changing and evolving in response to societal demands and technological development. New educational technologies require new approaches to the organization of space, and modern architecture should provide an adequate response to this need. In the age of high technology, everyone strives to master the maximum knowledge as possible (Sadykova, 2016). Particularly valuable is information obtained from experienced professionals and highly qualified specialists proficient in their fields. Today, one can acquire new knowledge and unleash creativity at training events such as workshops. The topics of architecture students’ workshops increasingly focus on issues related to green building technology. Given the changing climate conditions and the technical and legal solutions being developed to address them, becoming familiar with ways to create a green building environment is becoming a necessity for future architects.

2. Methodology of work

This article attempts to analyse three students’ architectural workshops and to systematize the approaches to the concept of green building technologies from an educational perspective. The research methodology is based on an integrated approach, which includes several methods: study of design, graphic and illustrative materials; analysis of workshops at ENU and CUT; and examination of green building technologies and contemporary architecture inspired by local culture.

The study involved reviewing text and graphic materials on the organization of creative workshops (ENU and CUT) in both domestic and foreign publications and Internet resources, including materials in English, Russian (the old webpage of ENU is in Russian, the second national language in Kazakhstan), and Polish. The synthesis was carried out based on a comparative analysis of various ways of organizing student workshops, as well as a method of systematizing features of a group architectural design.

This article is the continuation of work between CUT and ENU on the presentation knowledge about students’ workshops created together. The first step was the presentations of Sabina Kuc: *Cracow University of Technology and Eurasian National University, bilateral agreement – technical and architectural*

education during the seventh WIETE Annual Conference on Engineering and Technology Education & the fourth Mediterranean Seminar on Engineering and Technology Education (Education for the Global Community, 04–08.04.2016, Piraeus University of Applied Sciences (PUAS), World Institute for Engineering and Technology Education (WIETE) in Athens, Greece) (Kuc, 2016) and *Projecting of Energy Efficient Residential Buildings – ISOVER 2017, ENU, Astana, Kazakhstan – the Educational Role of Student Workshops* during the fifth Mediterranean Seminar on Engineering and 6 Technology Education (Educating – Networking – Evolving, 11–15.09.2017, Piraeus University of Applied Sciences (PUAS), World Institute for Engineering and Technology Education (WIETE) in Athens, Greece) (Kuc, 2017). The next were papers: *Development of students' creative skills through architectural workshops* (Sadykova, 2016), *New educational programmes as a factor in forming students' innovative competencies* (Semenyuk at al. 2019), *Development of eco-architecture in Kazakhstan is gaining ground* (Semenyuk, 2019), *The impact of the COVID-19 pandemic on the organisation of architecture students' workshops and exhibitions* (Mika, 2021).

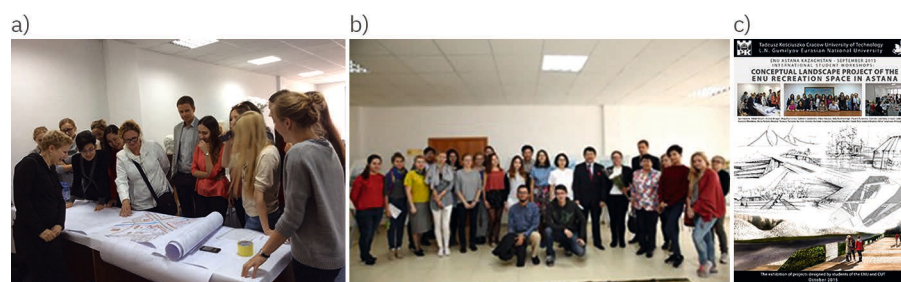
3. Students workshops CUT and ENU bilateral agreement

“Green building design is a concept, process and philosophy of constructing buildings in a way to achieve high performance and greater value over the lifetime of the building” (Green, 2024).

During the period from 2012 to 2019, there were three international student workshops between the FAC-ENU in Astana, Kazakhstan, and the FA-CUT in Kraków, Poland (Mika, 2021) (Semenyuk, 2019). They were closely connected to the experimental educational program “Energy-saving Design of Buildings and Structures”, developed by teachers at the FAC-ENU (Semenyuk, 2019). All these workshops addressed issues related to green building technology. As both a design and educational process, they encompassed the “concept, process, and philosophy” of building a green environment (Green, 2024). This approach allows creating a dynamic and market-responsive educational environment through the development of new programs in high-demand specializations and the continuous updating of existing curricula with relevant modules. This strategy focuses on equipping graduates with practical competencies and skills that align with current employment market demands, thereby enhancing their employability. By fostering co-operation between educational institutions and industry partners, the approach ensures that education remains relevant and forward-thinking, preparing students for both present and future workplace challenges. Ultimately, this philosophy aims to produce innovative and adaptable professionals who are well-prepared to meet the evolving needs of the job market (Semenyuk, 2019).

The first international student workshop was held on the theme: *Conceptual Landscape Project of the ENU Recreation Space in Astana* (Fig. 1). It took place in Astana from 12–18 September 2015, under the guidance of professors Sabina Kuc and Sara Sadykova, senior tutor of the Department of Architecture at ENU Victoria Revtova, and adjunct of the Faculty of Architecture at CUT Paweł Mika (Otchetnaya, 2015).

Fig. 1. Student workshops: *Conceptual Landscape Project of the ENU Recreation Space in Astana* at the Eurasian National University, Astana, Kazakhstan, 12–18.09.2015; a) Tutors: Sabina Kuc (third from left), Sara Sadykova, Paweł Mika (fourth from left), Viktoriya Revtova (first from left) (photographs from the archive of S. Kuc); b) Group of student participants of workshops with the Dean of FAC-ENU Serikbay Baimukhanov (center), head of the Department of Architecture ENU Sara Sadykova (fifth from left), visiting professor Sabina Kuc and Paweł Mika (left) (Otchetnaya, 2015); Poster of the workshops (archive of S. Kuc)



The theme of the workshops was chosen as part of the university's landscaping program; the entire architectural ensemble of the educational institution is one of the main urban areas of the capital, almost at the intersection of the right and left sides. Additionally, there is a rowing channel on the land designed for rowing competitions, which added more features to the general theme of the creative workshops.

The role of modern architects expands beyond traditional design tasks, emphasizing their influence on the broader environment and their capacity to address critical issues. Architects are now seen as integral players in shaping not just the aesthetics and functionality of buildings, but also the environmental and social conditions surrounding them (Semenyuk, 2019). Their work impacts the microclimate and can contribute to solutions for challenges such as resource scarcity, reflecting a shift towards a more holistic approach in architecture. This perspective underscores the importance of integrating sustainability and environmental stewardship into architectural practice, positioning architects as key contributors to creating liveable, resource-efficient, and resilient spaces that address both immediate and long-term ecological concerns.

Those philosophies are implemented during the workshops. By working in teams, students are involved in the process of innovative and creative research that provides the possibility of creating a new concept and vision of development of the general improvement of the university in the context of interfacing with the elements of the urban environment, as well as new ecological, green and modern views on landscape development within the city space (Priglashennyy, 2016). This introduces to students the concept of ecological, green building and environmental construction representing a progressive trend focused on enhancing urban spaces by making them more sustainable and vibrant. This approach aims to improve accessibility and infuse energy and vitality into cities, reflecting a commitment to environmentally responsible development that supports both the well-being of residents and the health of the urban environment (Semenyuk, 2019).

Creating green building spaces was inspired by the city of Hamburg. Hamburg serves as a key model for the concept of creating green building spaces, exemplifying a world-class innovation hub that guides ecological transformations in the 21st century. The Internationale Bauausstellung (IBA) Hamburg 2006–2013 represents a long-term rebuilding initiative that addresses the architectural future of urban environments by showcasing cutting-edge building technologies and future-oriented designs. Similarly, the Internationale Gartenschau (IGS) Hamburg 2013 introduced a new municipal park in Wilhelmsburg, designed to provide leisure, recreation, and educational opportunities for residents. This park exemplifies the creation of a harmonious green space that enhances quality of life by transforming neglected urban areas into attractive and environmentally friendly settings. Together, these initiatives illustrate how sustainable practices can rejuvenate urban spaces, making them both inviting and ecologically responsible (Kuc, 2014).

Presentations on the applied energy visions and exhibition principles were provided by Professor Sabina Kuc through theoretical classes organized in the form of lectures held as part of international meetings between students from two educational institutions. These lectures provided accurate and precise direction for further team and individual work in the workshop. The topics of the lectures and consultations focused on the possibilities of shaping green building environments using principles of green building technology and incorporating traditional Kazakh architectural building solutions (Abdrassilova, 2022).

The second international workshop was held on the theme: *Designing multi-comfortable house Saint Gobain. Restoration of the urban environment of Madrid* in the framework of the twelfth international competition for students (Figure 2), under the guidance of professors S. Kuc and S. Sadykova, with the participation of associate professor Olga Semenyuk and senior tutor

Leila Sabyrbaeva. Astana, November 2016 (International, 2016; Priglashenny, 2016; Tsikl, 2016; Priglasheniye, 2016; Semenyuk, at al. 2019).

This workshop was the supplement to the previously mentioned program. At the first workshops in late 2016, experienced foreign professors were involved in lecturing. Professor Sabina Kuc gave a series of lectures and conducted seminars about the energy design of residential buildings. (Priglasheniye, 2016; Semenyuk, 2019). She presented green building technologies intended for functional and spatial adaptation for existing buildings as the main subject of International Building Exhibition – IBA Hamburg 2006–2013. The task of the contest “designing a multi-comfort house Saint-Gobain” was developed by ISOVER in cooperation with the Department of Architecture of the Municipality of Madrid and was a restoration of the urban environment of the neighbourhood in the district of Gran San Blas in Madrid. The participants had to create architecture that met the requirements of environmental protection and harmoniously integrated into the urban space, while the mandatory condition was to meet the criteria of MAD-RE and the criteria of the concept of multi-comfort house Saint-Gobain, as well as climatic conditions and regional features of Madrid (Priglasheniye, 2016). This can be accomplished by active interaction with a simulated competitive environment.

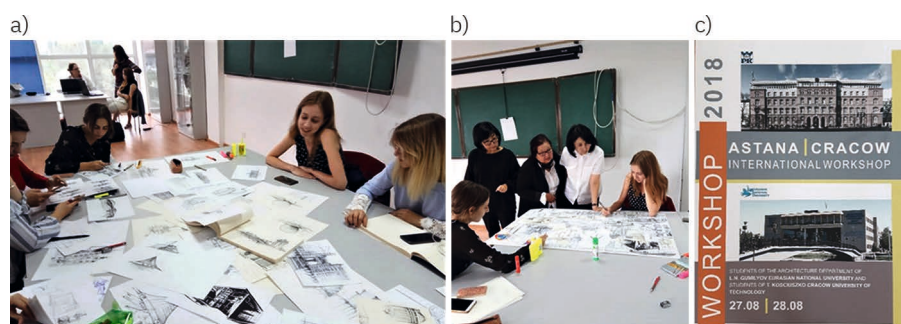
Fig. 2. Student workshops: *Designing multi-comfort house Saint Gobain. Restoration of the urban environment of Madrid city:* a) tutors: Sabina Kuc (third from left), Sara Sadykova (second from left) with student participants (Priglashenny, 2016); b) lecture by visiting professor Sabina Kuc (Priglashenny, 2016); c) student work (Semenyuk, 2019)



The working title of the third workshop was the theme: *Architectural collage. Transformation of styles in the new architecture of Astana* (Fig. 3), which, like the previous ones, was held at the Department of Architecture of the Faculty of Architecture and Construction of the ENU under the leadership of professors S. Kuc, S. Sadykova, with the participation of senior tutors Leila Sabyrbaeva, Aisulu Seisekeeva and Almagul Toishieva at the end of August 2018 (Mezhdunarodnyy, 2018)

This international student workshop was held as a part of the celebration of the twentieth anniversary of the capital of Kazakhstan and was aimed at creating an architectural collage, which is currently popular among architects, designers and photographers, as a powerful method of presenting artistic expression of form and composition. The main theme of the architectural collage was the transformation of styles in the new architecture of Astana as the main city symbol of the country (Tabynbayeva, 2022). The workshops introduced many questions and inspired conversations to resolve them. For example, workshop participants discussed whether implementing green technology in twenty-first century architecture is merely a trend, or if it is connected with

Fig. 3. Student workshops: *Architectural collage. Transformation of styles in the new architecture of Astana* at the Eurasian National University, Astana, Kazakhstan, 26–30.09.2018; a) tutor Sabina Kuc with students; b) tutor Sara Sadykova (second from the right) and senior tutors: (from left) Almagul Toishieva and Aisulu Seisekeeva (Mezhdunarodnyy, 2018); c) Poster of workshops (Wystawa, 2018)



a formal and technical solution using green building technologies (Green, 2024; Gibberd, 2020), or if it is connected with a globalization and traditional form in architecture (Abdrassilova, 2022; Danibekova, 2022). Even though “globalization has penetrated all spheres of life, most people in the world identify themselves not with the planet or continent, but with the region where they were born and live. Architecture creates visual images that support the processes of self-identification of citizens” (Abdrassilova, 2022). During the workshops the architectural forms created by the students showed individualized, well-planned, and original shapes in space: experimental and contemporary architecture “that point to new trajectories of functional spatial solutions in the near future, which also create optimal conditions for society’s existence with care for the environment and nature” (Seruga, 2020).

The logical continuation of the results of the workshop was the exhibition held in the walls of the ENU (Figure 4), where students presented their presentation material in different techniques such as painting, black and white graphics, computer graphics (Mezhdunarodnyy, 2018; Wystawa, 2018; International, 2018).



Fig. 4. Student exhibition connected with workshops: *Architectural collage. Transformation of styles in the new architecture of Astana* at the Eurasian National University, Astana, Kazakhstan, 26.08–30.09.2018; a) Exhibition Hall (International, 2018); b) (from left) Sara Sadykova, Aisulu Seisekeeva, Sabina Kuc, Almagul Toisheva with workshop participants (Mezhdunarodnyy, 2018); c) exhibition poster (Wystawa, 2018)

4. Conclusions

The article aimed to highlight how student creative workshops can effectively disseminate crucial architectural knowledge. These workshops cover a broad spectrum of topics, including ideas, composition, technology, materials, and approaches to space, form, and volume. They provide a dynamic platform for dual training in architecture, enhancing students’ ability to apply their skills to real-world scenarios. Through these workshops, young architects gain new perspectives and insights, particularly in the realm of green building technology. They explore concepts related to the surrounding environment, the building itself, and the architectural style of the city, engaging in the process of discovering forms, green ideas, and sustainable materials.

Student workshops serve as experimental learning environments, where architectural space and its formation are examined as an art form that extends beyond student involvement. Everyone in the field should actively participate in the evolution of composition and design. The workshops successfully achieved their goals, allowing students to engage deeply with green building design as a concept, process, and philosophy. This approach has been realized through diverse program and technological frameworks, underscoring the value of such creative workshops in advancing architectural education and practice.

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