From micro to MACRO_ The Scope and Scale of Contemporary Design Competences Expressed in Interdisciplinary Student Collaborations

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Abstract

The paper aims to define a universal formula for the profession of architecture, expressed through student activities and experiments, as a collective and interdisciplinary profession resulting from the integration of broadly understood design tools, based on an understanding of contemporary phenomena and their integration into the landscape.

In the face of drastic changes in the world (social, environmental), deepening the relationship between design on a spatial scale and design on an object scale increases the creative possibilities for both professions. It defines new skills that are responsive and versatile in relation to contemporary needs. The method of teaching design during studies should be based on a process involving countless experiments, attempts to prove and implement ideas that may even be somewhat utopian, as this is a time when one is not yet burdened with responsibility.

Teaching students – involves redefining established concepts, and this is what this work will primarily focus on. It requires explaining and presenting familiar issues repeatedly, thus allowing for the discovery of new phenomena and possibilities. Confronting a fresh perspective on architecture, one that is not yet subject to any mannerisms, helps avoid clichés. A system of cooperation and collaboration, used across various scales, demonstrates how architectural and design practices combine. This combination creates a new design method as the two professions merge.

Keywords architectural education | interdisciplinarity in architecture and design | collaboration in architecture an design | profession of architecture | micro_credential

Introduction

'More important than learning skills is learning an approach, which should be a continuous process developing concentrically, like the rings of a tree'[1].

[1] W. Gropius, *The Fullness of Architecture*, Berlin 1951, p. 74.

Learning design refers to acquiring the ability to view the world, recognize the potential hidden in various fields of knowledge, and coordinate and solve everyday problems. Perceiving the design process in the context of collective work, the integration of craftsmanship and technology, experimentation, and risk-taking allows you to exploit the potential of this profession fully. A contemporary approach to design should be primarily multidisciplinary. The primary goal is to learn how to consult and integrate design with related fields, as well as to explore new technologies. An intelligently planned design process, consisting of creating models and prototypes and systematically thinking through the method and individual stages of building architecture/design, allows creative ideas to be realized. Without constant verification and experimentation, using the available tools, an idea remains only a figment of the designer's imagination.

The author believes that teachers of design subjects should therefore be both theorists and practitioners, as this allows them to maintain the right balance.

The current state of knowledge

Although technical universities, including architecture departments, offer limited industrial design education, there is a notable exception at the Faculty of Architecture at Warsaw University of Technology, where industrial design has been part of the curriculum for 37 years. Despite this, integrating and applying design tools across different scales remains rare in practical presentations.

Prototypes of systems at the intersection of architecture and design, from which larger functional structures can be created and which position architecture as the art of operating on a tangible, everyday, object-based scale, can be admired at the Venice Biennale exhibitions[2].

Experiments undertaken in public space, similar activities, but on a research scale, are present in the Micro-credentials strategy that is reforming education; however, still in the realm of research and theory[3]. In the field of education and student activities, this is still an area that requires review and development based on practical experiments.

The paper will describe projects and initiatives that constitute a model experiment, the aim of which is to demonstrate in practice and through its structure that both architecture and design are not isolated islands. Therefore, interdisciplinary knowledge should be fundamental for students in design courses, and new forms of activity should be sought.

An example of such practices can be found in the activities of the De_Sign Interdisciplinary Student Scientific Circle[4]. The collective was established on the

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2 A current example of a system that straddles small-scale architecture and design could be Canal Caffe created by Diller Scoffidio+Renfro, Biennale di Venezia (2025). Source material: https://arch.rice.edu/latest/news/diller-scofidio-renfro-wins-golden-lion-venice-architecture-biennale (access 30.10.2025).

3 'A Micro-credential is a proof of the learning outcomes that a learner has acquired following a short learning experience. These learning outcomes have been assessed against transparent standards': *A European approach to micro-credentials brochure*, European Commission 2020, p.10, and in a broader definition in the source material led by the Danish Technological Institute: H. Shapiro, T. Andersen and K.N. Larsen, *Final Report. A European approach to micro-credentials*, Luxembourg 2020, https://education.ec.europa.eu/sites/default/files/document-library-docs/european-approach-micro-credentials-higher-education-consultation-group-output-final-report.pdf (access 30.10.2025).

4 https://www.instagram.com/de_sign_wapw/ (access 30.10.2025).

initiative of the author of this paper to implement a new teaching method through ongoing experimentation. The small scale of the interventions undertaken at the intersection of different fields in space allows the validity of the idea to be tested in situ and quick prototypes to be made. Imagining the operation of such a design object as a broader system makes these attempts verifiable over time.

The creation of new teaching methods and the implementation of students' design ideas took place in several stages from the outset:

- Training and theory: international workshops for students, divided into a series of online lectures given by experts, followed by collective work in the ephemeral Venetian landscape.
- Preliminary implementation: development of the concept in project subgroups.
- Representation: creation of projects.
- Comparison: presentation of projects at the International Warsaw Light Fair, in the form of an exhibition in an independent pavilion.
- Publication and post-production: description of student activities, observations, and experiences in a book[5].
- Continuation and updating of the state of knowledge: preparation of further projects for exhibition at the Fair, based on observations made up to that point and after analysis of past mistakes and potential current needs.

Scope of the research

From the perspective of an architect and product designer, analyzing and understanding the potential that can be obtained from a material is fundamental. It allows us to see the possibility of moving between scales – both in terms of architecture and objects, as well as in terms of the object's position in the landscape – at the levels of perception, application, and the emotions it can evoke.

At the beginning of a project, it is crucial to focus on the material itself, including its properties, its place in the landscape, its texture, its resistance to time and environmental conditions, its durability, and its adaptability. At the same time, working on a 1:1 scale prototype allows the author to understand how it works. What seems evident in practice, without understanding the above facts, is that learning design becomes superficial, and the support of technological tools becomes practically useless when the author is unable to envision their purpose.

As part of the first activities of the Research Circle, the students' work focused on glass, a material that has many contradictions. In connection with the understanding of various techniques and the potential inherent in reevaluating these age-old techniques in a contemporary context, research materials were created, supported by the projects described in this work.

'My working method has often involved the subtraction of weight. I have tried to remove weight, sometimes from people, sometimes from celestial bodies, sometimes from cities; above all, I have tried to remove weight from the structure of

[5] Last of the publications dedicated to the design process that took place while working on the material, in this case a workshop on glass in Venice, M.A. Barucco, A. Lorens, L. Patachi, *Toolbox_Overtime Glass*, https://issuu.com/antefermaedizioni/docs/toolbox07_overtimeglass (access 30.10.2025).

stories and language... I have come to consider lightness a value rather than a defect'[6]. This is what Italo Calvino wrote about language as the primary means by which humans communicate with the world. Referring to the lightness of glass as a material, in a phenomenological sense, it can be considered the only material that, thanks to the play of light and the imperfections of design resulting from craftsmanship, is a living language, in motion, requiring constant updating and discovery, like the world, like the landscape, like the environment. For glass design work to have a holistic dimension, comparing it with research on the material, seeking methods of reevaluation, and, vice versa, showing students what results can be achieved in practice, is inseparable. At the same time, participants can understand why this research is being done. This approach served as the starting point for organizing the Over_Time Glass, Erasmus BIP Workshop[7].

The students had the great opportunity to visit with us: the artistic glass factories on the island of Murano, several enchanting places, including the little-known and inaccessible to tourists Palazzina Masieri, designed by Carlo Scarpa, the Olivetti Shop, and even an ancient workshop responsible for the reconstruction of the mosaic in St. Mark's Basilica.

Working in international teams, they created designs for glass objects and architectural elements, accompanied by documentation in the form of sketches, photographs, and renderings. All this was made possible thanks to the invaluable supervision and hard work of Prof. Maria Antonia Barucco and experts in the field. Subsequently, to follow up on the initiative and the recently established Student Scientific Circle all were directly presented at the author's exhibition as part of the Warsaw International Light Fair (Fig. 1), showcasing a closed exhibition concept and a narrative about these experiences, as expressed in the project examples described below. A number of interesting design experiments were presented, combining the experiences and observations of students from three different universities[8]. It was a unique opportunity to showcase projects and research to a diverse audience and to illustrate to students how to approach work in a global context.

This paper describes two of them, concerning a completely different approach, method of analysis, and understanding of the material in the context of a specific surrounding and contemporary phenomena, showing how it is possible to understand the multi-level connection between the landscape, its specificity, and the potential of this incredible material. The first one concerns time, its passing, its transience, and its perception of being frozen. Considering the common thread of the impact of human life on Earth and how this presence can be marked as life after life, the Bambù project was created (Fig. 2).

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6 I. Calvino, *Six Memos for the Next Millennium*, Cambridge MA 1988, p. 20.

7 The projects were carried out as part of the Erasmus BIP initiative under the supervision of Prof. Maria Antonia Barucco (IUAV Venice), the author of this paper (Lect. Anna Lorens – Faculty of Architecture, Warsaw University of Technology), and Lect. Laura Patachi (Faculty of Architecture and Urban Planning, Technical University of Cluj-Napoca).

8 Faculty of Architecture and Urban Planning, Technical University of Cluj-Napoca; Universita IUAV di Venezia; Faculty of Architecture, Warsaw University of Technology.

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1. Warsaw Light Fairs' 24, Fot. J. Wieczorek, 2024

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2. Warsaw Light Fairs' 24, Bambù project, Fot. J. Wieczorek, 2024

Exemplification

Bambù[9]

The funeral process in Venice is not only a logistical challenge, but also a deeply emotional and cultural issue. The unique geographical conformation of the

[9] Project team: J. Wieczorek, K. Dopierała, A. Klymiuk, E. Więch, Warsaw University of Technology, Faculty of Architecture.

city has made traditional burial almost impossible, forcing the deceased to be transported to San Michele, the island's cemetery. However, space is running out, and rising water levels are also threatening this sacred resting place.

Manifesto: Death and burial remain sensitive, almost taboo subjects, but we believe that now more than ever is the time to break the silence. Instead of avoiding the conversation, we should seek new solutions that respect tradition while addressing the urgent realities of the city's future.

The island of Murano, renowned for its refined glass production, faces a significant environmental challenge due to the waste produced by the industry. The pursuit of perfection in glass production generates considerable amounts of waste material, with approximately 1,000 tonnes of non-recyclable glass waste produced each year. Over time, this waste has accumulated, rendering areas such as Sacca San Mattia[10] – an artificial island formed from glass industry waste, domestic waste, and dredged sediment – uninhabitable and harmful to the environment. Over the years, layers of glass fragments have accumulated, creating a 40,000-square-meter expanse that poses a potential threat to the surrounding ecosystem. This situation presents a unique opportunity for innovative projects that aim to reuse these wastelands.

The project proposes the development of eco-friendly glass burial containers, providing a sustainable solution to the growing issue of glass waste in contemporary funeral practices. Designed with a bamboo-like shape inspired by the vegetation of Venice, these urns represent a new approach to cemetery design, ushering in a revolution in funeral systems. Stackable and modular, they can form taller towers, each symbolizing a family tree and its history. This design serves as a functional cemetery and a work of art reminiscent of the ornate gravestones of the past (Fig. 3).

'We were deeply struck by the lack of ornamentation and care in places such as the island of Saint Michel, where the personal and aesthetic significance of burial sites seems to have faded. Our project aims to restore dignity and individuality to the commemorative process, ensuring that each person is honored with respect and leaves behind a lasting legacy that is truly unique. This is our vision for a more meaningful and environmentally friendly future for burials (…)'[11].

Solareto[12]

Solareto is an innovative project integrating photovoltaic thin films with Murano glass to promote sustainability and energy efficiency. It combines the elegance of handcrafted glass with advanced solar technology, including CIGS and printed solar foils. The design emphasizes natural aesthetics and functionality while showcasing Murano glass as a unique and eco-conscious material. Utilizing adaptable layering techniques, Solareto provides versatile solutions for a range of building surfaces. The

[10] Data from research project: L. Almarcegui, *Sacca San Mattia, the Abandoned Island of Murano*, Venice 2013, https://www.edbprojects.com/artworks/614-lara-almarcegui-sacca-san-mattia-the-abandoned-island-of-murano-2013/ (access 30.10.2025).

[11] Authors description.

[12] Project by Stud. I. Okhassova, Warsaw University of Technology, Faculty of Architecture.

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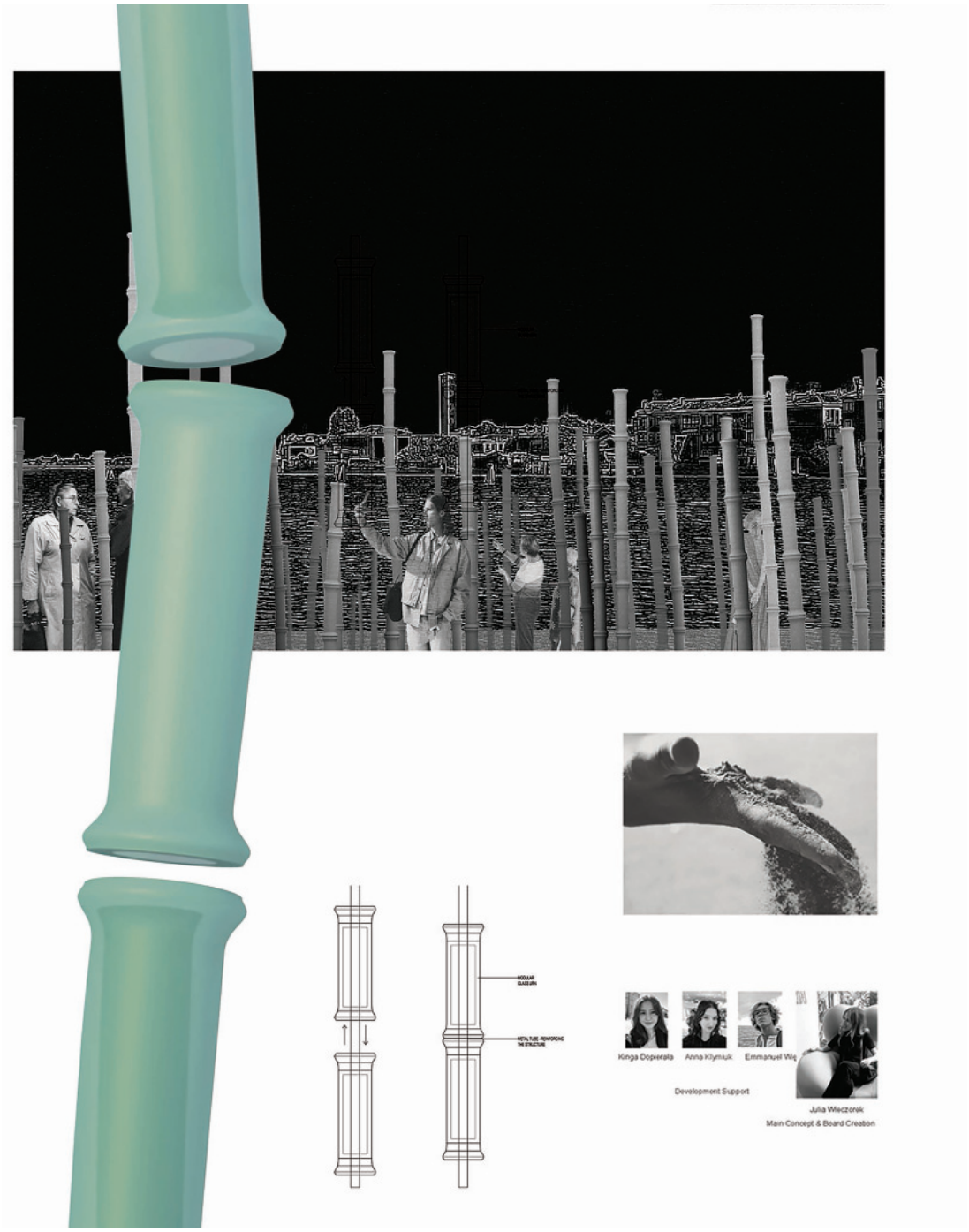

3. Project board, J. Wieczorek, K. Dopierała, A. Klymiuk, E. Więch, Warsaw University of Technology, Faculty of Architecture

project is dedicated to minimizing its environmental impact and adopting renewable energy solutions. It bridges traditional craftsmanship with cutting-edge technology for a sustainable and visually striking future (Fig. 4).

'Thanks to the possibility of organizing a full-scale exhibition at the Light Fair, all observations and ideas could be confronted by various recipients from the business world. However, the main didactic goal of the Erasmus BIP workshop, from which the exhibition was the result, was something more profound in its assumptions

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4. Project visualisation, I. Okhassova, 2024, Warsaw University of Technology, Faculty of Architecture

– a holistic concept – of how to experience the city with all its potential and understand the landscape to express these observations in the glass material'[13].

From the perspective of a designer who remains fascinated by the relationship of glass to the landscape, in the composition of recycled glass (algae and sand), in visual representation – reflectivity, transparency, the dimension of emptiness framed in an object, and above all, the transmittance of light in various intensity and color, as honestly and truly as almost air, fog or rain, the author of this paper believes that the ability to combine craft, technology, material sensitivity with environmental conditions is key. In the form of minor architecture, building systems, or the object itself, with the passage of time and what we can record in that time, is the path that best marks the impact of design on Earth, and of which the above projects are a perfect representation.

'When designing the first collection of lamps for the Venetian brand Siru, – Muzzle, I tried to convey in the name and form of glass blowing through the cage – the etymology of the Polish word, where muzzle meant a portable lantern – a symbol of carrying light in the understanding – the light of knowledge (…) Just as a craftsman shares his work with a designer, designers and educators, share our knowledge and should conduct experiments at universities – this is an inseparable mission. Let the workshop described above remain an example of best practices'[14] (Fig. 5).

[13] Author's description.

[14] A. Lorens, *Details make perfection*, in: *Over-Time Glass. Erasmus+ BIP 2024*, ed. M.A. Barucco, "Officina* Toolbox", 2025, no. 07, p. 38.

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5. Muzzle lamp, A. Lorens, Siru, photo by the author, 2024

Success potential criteria

The basis of this project is to create a framework and strategy for an innovative teaching method. It will be based on cyclical development and further implementation, focusing on inclusiveness, integration, and cooperation between academic and craft communities. Technological support is essential in this process. Altogether, this forms a response to the diagnosed problem – the massive gap between specialization, knowledge, and local technologies in the field of architecture in vocational education (craftsmen and artisans) and the use of the talents and ideas of innovators, university students, knowledge sharing, and all needs in the context of sustainable development. The deployment includes the development of a training method for further implementation in the form of workshops, involving other local knowledge and artisans in the field of small-scale architecture and design. This approach will help bridge the gap between vocational and higher engineering education also by utilizing artificial intelligence tools effectively. The idea behind this method is inverted – it assumes the creation of potential from the threat (AI, automation, extinction of professions) through intelligent cooperation and the integration of international students' skills.

Finally, in contrast to the virtual world, the most realistic of realities is the loss of security caused by several disasters. This reality coexists with the virtual world, fundamentally changing our perspective. In an era when computers, mass media, the internet, and comprehensive virtual phenomena are present in almost every aspect of life, there is a natural need to experience the living space firsthand.

'A pervasive sense of disappointment and helplessness marks the current discourse on the Anthropocene. For this reason, the title of the work incorporates the Greek term 'marasmus' (Greek: marasmós), which denotes decay and withering. In medical science, marasmus describes a condition that severely impairs cognitive and

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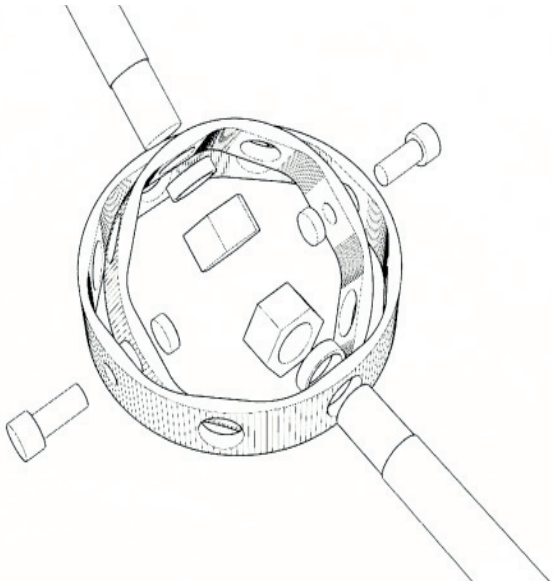

physical function, resulting in apathy. In the context of climate security, society is experiencing a state of inertia and numbness'[15].

The circumstances, in the context of that cause, lead to detachment from places, resources, social bonds, communities, and cultural environments, disrupting education and the sense of identity. Architecture's essential role, beyond providing shelter and supporting reconstruction, is to counteract these effects by creating spaces of temporary belongings that help restore connections and identity. The challenge for young designers is to create engaging spaces where users become co-creators of new utility, and the design process should be based on collaboration. It is more important how much an object, system of objects, or small architectural intervention satisfies the interests and desires of users than how long this architecture is likely to endure (Fig. 6, 7).

To quote Barbara Widera, 'Issues less commonly associated with architecture, such as sound or chance, are also taken into account. Chance is a factor which, under favorable circumstances, can develop and create a basis for possibilities, awaiting a catalyst for a concept that contributes to the creation of architecture'[16].

The most crucial factor that can define space is, therefore, interaction. One form of interaction is encounter, in the sense of spontaneous use of space, giving it ever-new functions. (Fig. 8). This space is treated as a setting for random events, in a sense, an experimental test of what expectations users have of it, how architecture can respond to these needs, how this space can be understood, tamed, felt at home, and arranged.

6. Model, De_Sign, Cerchio, 2024. Authors: K. Dopierała, J. Wieczorek, A. Klymiuk, I. Łataś, E. Chain, W. Nalepka, Warsaw University of Technology, Faculty of Architecture

7. Technical drawing, De_Sign, Cerchio, Authors: K. Dopierała, J. Wieczorek, A. Klymiuk, I. Łataś, E. Chain, W. Nalepka, Warsaw University of Technology, Faculty of Architecture

[15] E. Bińczyk, *Epoka człowieka. Retoryka i marazm antropocenu*, Warszawa 2018, p. 112.

[16] B. Widera, M. Skiba, M. Sztubecka, *Research of Energy Storage and Energy Efficiency in Buildings and Cities. Special Issue Information*, "Energies", https://www.mdpi.com/journal/energies/special_issues/research_energy_storage_energy_efficiency_buildings_cities (access 30.10.2025).

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8. De_Sign, Cerchio-lamp1, Authors: K. Dopierała, J. Wieczorek, A. Klymiuk, I. Łataś, E. Chain, W. Nalepka, Warsaw University of Technology, Faculty of Architecture

Summary

Analyzing and understanding the mechanisms of a given location (the traditions prevailing in a given space, the mutual relations between existing functions) and consciously translating these factors into a new space and adapting it to new needs builds and consolidates its identity (Fig. 9). A small intervention – yet clear and designed with adaptability in mind – can be a universal system. Universal, in the sense of accessible. Accessible means free. There is nothing more sublime in this profession than a free hand for creation. No one has more say in these processes than a young designer. Creating research clubs, interdisciplinary collectives, and working in a team at the stage of acquiring knowledge (including theoretical knowledge) allows one to develop ideas and projects only in the area of interest and thus acquire specialized competencies.

The objects described in this paper are examples of good practices and principles in design that allow users to familiarize themselves with space not in a timeless dimension, but in a momentary, therapeutic one, allowing them to rebuild their sense of belonging and, as a result of cooperation, will enable them to create new values. The profession of architecture is a versatile one, and, particularly in view of the conditions described, it is a combination of technology, environmental considerations,

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9. The Venice Lagoon, photo by the author, 2024

cooperation, knowledge, and empathy. Or perhaps this is a discourse on a new formula – composed of micro-competencies, new utility, where, redefining Vitruvius' Triad, Adaptability will appear instead of Firmitas, and Usefulness instead of Utilitas?

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