

Znanstvena revija, št. 6 / leto 2018	Scientific journal, no 6 / Year 2018
Univerza v Ljubljani	University of Ljubljana
Fakulteta za arhitekturo in	Faculty of Architecture and
Fakulteta za gradbeništvo in geodezijo	Faculty of Civil and Geodetic Engineering
Ljubljana, 2018	Ljubljana, 2018

Naslov revije: Title of the Journal:

IGRA USTVARJALNOSTI	THE CREATIVITY GAME
teorija in praksa urejanja prostora	Theory and Practice of Spatial Planning

Urednici: Alenka Fikfak, Alma Zavodnik Lamovšek Editors: Alenka Fikfak, Alma Zavodnik Lamovšek

Oblikovanje in naslovnica: Gašper Mrak	Design and Title page: Gašper Mrak
Lektoriranje: Mojca Vilfan	Slovene text proofread by: Mojca Vilfan
Prevod: Mojca Vilfan	Translation: Mojca Vilfan
Klasifikacija: (UDK) Renata Stella Čop, (DOI) Teja Koler Povh	Classification: (UDK) Renata Stella Čop, (DOI) Teja Koler Povh

Založila: Univerza v Ljubljani,	Published by: University of Ljubljana,
Fakulteta za arhitekturo in	Faculty of Architecture and
Fakulteta za gradbeništvo in geodezijo	Faculty of Civil and Geodetic Engineering

Spletna stran revije: Journal's Web Page:
<https://www.iu-cg.org/>

Spletna stran številke Current Issue Link
<https://www.iu-cg.org/stevilka.php?vol=6&lang=si>
<https://www.iu-cg.org/stevilka.php?vol=6&lang=en>

ISSN 2350-3637 ISSN 2350-3637

Univerza v Ljubljani
Fakulteta *za arhitekturo*



JAVNA AGENCIJA ZA RAZISKOVALNO DEJAVNOST
REPUBLIKE SLOVENIJE

Revija je sofinancirala The journal is financially
Javna agencija za supported by the Slovenian
raziskovalno dejavnost RS. Research Agency

Univerza v Ljubljani
Fakulteta *za gradbeništvo in geodezijo*



Saja Kosanović, Branislav Folić, Olivera Lekić, Alenka Fikfak: OBLIKOVANJE LABORATORIJEV ZNANJA ZA TRAJNOSTNO GRAJENO OKOLJE NA ZAHODNEM BALKANU

DESIGNING THE KNOWLEDGE LABS FOR SUSTAINABLE BUILT ENVIRONMENT IN THE WESTERN BALKANS

DOI: <http://dx.doi.org/10.15292/IU-CG.2018.06.074-081> ■ UDK: 72:378 ■ 1.01 Izvirni znanstveni članek / Scientific Article ■ SUBMITTED: August 2018 / REVISED: September 2018 / PUBLISHED: November 2018

IZVLEČEK

Članek na podlagi standardnega pristopa k raziskavam in metodologije opisuje več ključnih izobraževalnih in raziskovalnih dejavnosti, ki so potekale v okviru projekta EU Erasmus+ »Creating the Network of Knowledge Labs for Sustainable and Resilient Environments – KLABS« (Mreža laboratorijev znanja za trajnostna in odporna okolja). KLABS je pionirska skupna pobuda 11 visokošolskih ustanov Zahodnega Balkana in Evropske unije, katere cilj je zagotoviti sistemski odziv na strokovne in družbene potrebe, z uvajanjem programov, ki se ukvarjajo s trajnostjo grajenega okolja v kontekstu Zahodnega Balkana. Metodološko smo se pri razvoju trajnostno usmerjenih učnih načrtov osredotočili ne le na vsebine, temveč tudi na izobraževalne in raziskovalne metode, interpretacije holistične trajnosti, povezave med trajnostjo in odpornostjo na podnebne spremembe, vplive kulturno-regionalnih posebnosti in nenazadnje na raven ponujenega znanja, veščin in kompetenc. Članek podaja pregled nekaterih splošnih izzivov v povezavi z vključevanjem trajnosti v izobraževanje v grajenem okolju in pojasni, kako smo se z njimi spopadli v primeru Zahodnega Balkana.

KLJUČNE BESEDE

učni načrt, pedagoške metode in oblike, raziskave, specializacija, trajnost, odpornost.

ABSTRACT

By applying standard research approach and methodology, this paper describes several key educational and research actions undertaken through the Erasmus+ EU project "Creating the Network of Knowledge Labs for Sustainable and Resilient Environments – KLABS". KLABS is a pioneering joint initiative of eleven Western Balkans and European Union higher education institutions, aimed to provide a systemic response to professional and societal needs by introducing programmes dealing with sustainability of the built environment in the Western Balkan context. Methodologically, attention in sustainability-related curricula development was given not only to contents, but as well to educational and research methods, holistic sustainability interpretations, interconnections between sustainability and resilience to climate change, impacts of cultural-regional specificities, finally the level of offered knowledge, skills and competencies. The paper reviews some universal challenges referring to the integration of sustainability into education in the built environment and explains how these were overcome in specific Western Balkans case.

KEY-WORDS

curriculum, pedagogical methods and formats, research, specialisation, sustainability and resilience

UVODNIK
EDITORIAL
ČLANEK
ARTICLE

RAZPRAVA
DISCUSSION
RECENZIJA
REVIEW
PROJEKT
PROJECT
DELAVNICA
WORKSHOP
NATEČAJ
COMPETITION
PREDSTAVITEV
PRESENTATION
DIPLOMA
MASTER THESIS

1. INTRODUCTION

Sustainability became an important issue in several branches of higher education sector: teaching, research, operations, and community outreach (UNESCO, 2012). Higher education institutions are gradually reorienting their profile towards openness, participation, transparency and justice (Hill et al., 2004), thus paving the way to the dialogue with outside society. Academic programs in sustainability are growing and the pedagogies are renewed with sustainability-related forms of interactive, integrative, systemic and critical learning that can help students to understand and engage in sustainable development (UNESCO, 2012). New generations of university students believe that sustainability skills are going to be important for their future employment and accordingly expect their acquirement during the studies (Bone et al., 2011; Sterling, 2012).

The traces of what today is known as sustainability-related education can be found in architectural curricula from the 1900s. During the first half of the 20th century, the main educational themes were nature, climate control, thermal efficiency, materials, technologies, land use, and vernacular studies. In the 1950s, the common term 'ecology' was introduced (Khan et al., 2013a). By the end of the 1960s, the social component became dominant but its application, according to Omann et al. (2002), was unsuccessful. Already in seventies, there was a return to 'basic needs', so that the environmental and economic issues took over the supremacy in debates until social issues were again taken into account in the late 1990s, this time within the sustainability agenda (Colantonio, 2007). Nowadays, the development of architectural education in Europe is governed by the directives 2005/36/EC and 2013/55/EC. Here, sustainability principles are embedded into several knowledge and skills areas (The European Parliament and the Council of the European Union 2005, 2013).

With the harmonisation of national legislation with European framework, sustainable development became a significant subject in the Western Balkans. At the end of the UN Decade of Education for Sustainable Development (2014), however, university programmes related to sustainability were rare and focused on energy issues; specialized programmes offering comprehensive education on sustainability of the built environment were not registered at this time. In existing university programmes, topics on sustainability were most often delivered to students in the form of isolated classes. Separation from curriculum backbone makes negative impact on knowledge integration and its practical application in professional work and real-life situations. Additionally, many past generations of students didn't get any education in the field of sustainability. The lack of knowledge, manifested as 'malpractice', leaves significant and permanent damage in the built environment and contributes to the increment of environmental, social and economic risks.

Aforementioned facts have shaped the initiative for the development of study programs in the Western Balkans region that are accessible both to graduate students and already employed professionals dealing with the built environment. It is believed that by determining the optimal duration of these programs, by developing and using a comprehensive system of support for their implementation and by looking at a set of priorities and the

realistic but also dynamic conditions in the surrounding space as an input in curricula design, it is possible to efficiently compensate the accumulated lack of knowledge from the previous period, and to synchronize further development of the built environment in the Western Balkans with the principles of sustainable development. Such an approach to the problem made the foundation for the European Union project "Creating the Network of Knowledge Labs for Sustainable and Resilient Environments – KLABS" that was implemented in the period between 2015-2018. By applying standard research approach and methodology, this paper describes some of the key aspects of development of higher education in the Western Balkans through the mentioned project.

2. DEVELOPMENT OF KNOWLEDGE LABS

Erasmus+ Capacity Building in Higher Education project "Creating the Network of Knowledge Labs for Sustainable and Resilient Environments – KLABS" is a joint initiative of six Western Balkans and five European higher education institutions (<https://klabs.pr.ac.rs/consortium.php>), aimed at modernising the higher education in Western Balkan region through the development of innovative knowledge labs for sustainable and resilient environments. Project methodology relied on the definition of realistic problem in considered Western Balkans urban and rural areas that today are faced with significant challenges in terms of sustainable development and adaptation to climate change. During the three-year work, project produced diverse results among which the most important are: study programmes, literature supporting programmes' implementation, institutional centres and labs, and the network that higher education institutions from the Western Balkans have formed to provide long-term cooperation and to foster multiplication of positive effects within the education sector and the society at large.

Different methods and approaches to integration of sustainability principles into higher education have been developed internationally during the last decade, but there is a general concord that, due to the extensiveness, sustainability cannot be thought as a discreet subject. Instead, it should be treated with holistic approach and spread over the whole curriculum (UNESCO, 2005). Rusinko (2010) suggested that integration of discipline-specific sustainability into higher education may refer to existing or to creation of new structures - courses, modules or programmes. On the other hand, Khan et al. (2013b) introduced the three layer model for integrating sustainability issues in designers' curriculum: deepening component, consisted of specialists vertical knowledge courses about certain sustainability aspects (such as environmental, technical, socioeconomic, cultural and political); connecting component, made of one or more horizontally integrated (synthesizing) courses dedicated to theorizing sustainability (i.e. to the integration of the aspects of specialist courses in a meaningful way); and design studios (whole systems thinking platforms) which bring together all components and enable students to reach sustainability in architectural design. By joining these proposals with existing contextual challenges and having regarded that sustainability in higher education in Western Balkans represents a new but relevant field, the decision was made to establish programmes that will be opened both to graduate students and already employed professionals dealing with the built environment.

Developed programmes belong to the second cycle of higher education and offer contemporary, specialised educational themes, introduce IT educational tools and methods (such as virtual mobility, or utilisation of software, and virtual platforms and libraries), connect knowledge gaining with the real-life problems, support interdisciplinary, multidisciplinary and transdisciplinary approaches to education, and promote learner-centred and lifelong education.

Specialised topics encompassed by programmes were systematised in "Reviews of Sustainability and Resilience of the Built Environment for Education, Research and Design" – state-of-the-art thematic collection that contributes to the comprehensive understanding of the two approaches and their interrelations in the built environment by retrospectively investigating their development, addressing current issues, and speculating on possible futures. The main narrow objective of the book series was to inform the development of specialised knowledge, build critical awareness of interdisciplinary and transdisciplinary knowledge issues, and connects university education with the domain of scientific research. The broad aim was to develop the collection of reviews of sustainability and resilience of the built environment that are useful for students, educators, professionals, and researchers, all of whom are dealing with these two important subjects.

Implementation of developed programmes and courses is further supported with the foundation of six institutional units – centres and labs for sustainable and resilient environments. Their main purpose is to enable practical part of teaching and learning, but these units also represent a link between academia and external non-academic sector and as such play role in established Network of Knowledge Labs for Sustainable and Resilient Built Environment in the Balkans – the pioneering regional academic network dealing with sustainability and resilience to climate change in educational, research and professional terms. Every Western Balkans network member has the primary operational area that corresponds to the scope of developed programmes. These are: resource efficiency, and sustainability and resilience assessments; energy efficient and green architecture; fire protection of buildings; energy efficiency of settlements; integrated architectural and urban design; and environmental infrastructure management.

3. SPATIAL-CULTURAL RELEVANCE AND THE RESEARCH COMPONENT

Universally applicable formula that would ensure success in sustainability-related pedagogical practice doesn't exist. The competencies are most successfully acquired when students' work is related to a specific context (de Haan, 2010), and knowledge application most effective when students respond to peculiarities of a given task (Kosanović et al., 2014). Differences among the countries in terms of environmental systems, ecosystems, climatic and geographical conditions, ratio between predominant rural or urban spatial contexts, political, economic, social, cultural, institutional, technological, environmental, legal/ regulatory and educational situations and demands, etc. clearly indicate that the knowledge needs to be used for solving local/regional problems. Same as there is no single sustainable urban development strategy to suit all societies (Zavadskas et al., 2004), there neither exists such an education. As diversity represents the best

instrument for addressing the sustainability (Borden, 2009), the institutions must develop (and revise) their own way of dealing.

The goal to address local/regional needs and sustainability challenges and to preserve cultural identity of Western Balkans was reached following the proposal to keep theoretical courses at general level and to tackle specific situations, problems and fields of actions through practical problem solving (Khan et al., 2013). In that function, established Western Balkans knowledge labs feature pedagogical formats such as design studio, workshops or professional practice.

Multiple methods responding to general and sustainability-specific teaching and learning are integrated in design studio. These include project-based learning, designing exercises, seminars and theoretical lectures, case study analyses, identification of best practices, field trips, team work, debates, presentations, etc. Interdisciplinary, value-driven, learner-centred, praxis-oriented and problem-solving approach in design studio allows for the development of holistic, critical thinking and professional skills applicable in encompassed context of the Western Balkans. Besides being responsive to the specificities of a socio-spatial frame, pedagogical studio is seen as a suitable ground for connecting research with design, and further, for addressing different sustainability pillars.

Practical work in the form of design (or design-build) workshop is another suitable method of teaching and learning about sustainability. Characterized by limited duration and intensive work on specific problem, the workshop seems to be the ideal for concentrating on a narrow scope of sustainability interventions (Fikfak, 2012). During the first school year of programmes' implementation – 2017/2018 – Western Balkans universities have organised several workshops dealing with narrow spatial frames and precisely defined sustainability-related problems.

The syllabi of professional practice in Western Balkans programmes were designed according to the general constraint that is the lack of systemic approach to sustainability. The course professional practice, therefore, rather follows a bottom-up approach: students who are referred to an external organization, and a specific position within it, apply previously acquired knowledge in real-life circumstances, conduct analyses and submit their own proposal for improving the scope/methods of organisation's work or functioning in the domain of undertaken sustainability-related specialisation.

Besides being context-specific, the terms 'sustainability' and 'sustainable development' are also evolving and transformative (UNESCO, 2005). The complexity of multi-layered notion is growing together with new scientific findings, technological innovation and societal changes, and sustainability education needs to be enough flexible to accommodate emerged shifts. A rapidly changing world raises the risk of educating students for a future that no longer exists (Sterling, 2013). To prevent the risk from obsolete knowledge, Western Balkans knowledge labs feature deep integration of education with research and up-to-date circumstances.

In "conditions characterised by change, uncertainty, risk and complexity"

Figure 1: Workshop "Urbanisation of Gračanica" organised between the Faculty of Technical Sciences in Kosovska Mitrovica, Faculty of Architecture – University of Ljubljana, Municipality of Gračanica, Tourist Organisation of Gračanica, and the Norwegian Embassy in Priština, March 2018.



(Sterling, 2012) the design of the built environment must be accompanied by research that adequately addresses socio-spatial dimension and encompassed issues of importance and urgency. The main function of research in education related to the built environment is to allow generation of design responses to determined sustainability demands (Folić et al., 2014). To bring closer research to the design in any of the three forms: design of research, research as design, or research for design, means to make transition from the architecture of problem solving to the architecture of intelligent discussion (Salomon, 2011). Research prevents from negative oversimplification of the term 'sustainability' resulting with "a set of aesthetic and cultural clichés based around green roofs, wind turbines and open-toed sandals-wearing vegetarians" (Borden, 2009, 34). In Western Balkans knowledge labs, research represents one of the main features of innovative character of curricula and a precondition for effective work of professionals specialised in sustainable and resilient environment. Programmes introduce separate courses dealing with the research methodology, support the execution of individual research work and application of complete scientific apparatus, and promote the application of research results in design.

4. SUSTAINABILITY PILLARS

Imperative for a balance between economic growth, environmental quality, and social well-being (Khan et al., 2013b), additionally compounded by dynamism and permanent transformation, represents the challenge in education. Complex demand requiring organised and all-inclusive thinking is difficult for many and, due to deficiency in interdisciplinary knowledge and experience, a potential source of frustration and the lack of motivation (Merck et al., 2015). Any simplified and fragmented response, on the other hand, potentially leads to the dissolution of the concept, so that the sustainability becomes "what you make of it" (Khan et al., 2013b, 175), which in relation to the built environment most often implies the environmental (technical) sustainability.

Figure 2: Presentation of results from the workshop "Bebića Luka – Eco-village for a self-sufficient community" organised between the University of Belgrade – Faculty of Architecture and the IUAV Venice, July 2018.



4.1 Environmental Sustainability

Supported by determined physical referents, environmental sustainability appears as the least abstract (Kosanović et al., 2014), and the most often applied concept in European educational space (Kosanović et al., 2013). To many, 'sustainable' persists as a synonym to the attributes like 'environmentally-friendly', 'eco-friendly' or 'green', as seen by reviewing published literature or by comparing syllabi with titles of the courses, i.e. the programmes with their titles. Even though the narrowed approach offers limiting results, which may put its justification into question, there still exist challenging issues concerning environmental sustainability itself.

Two major challenges set in front of students with regard of environmental sustainability of the built environment are measure and balance. The failure to suitably respond to these challenges is reflected through the application of as many green interventions as possible, by simple thinking that 'more is greener' (which consequently leads to the loss in overall quality), or through overemphasising just one technical segment on account of the others. To determine 'how green is green enough', KLABS programmes introduced a variety of methods for the assessment of environmental performance, based on quantification and life cycle considerations, and available in the form of assessment tools or computer modelling and simulation software. The application of either tools or software offers the possibility to compare different design options and assists in making the right choice. The assessment allows for observation, reflection on the consequences of design decisions, and making the informed judgments about the work; in this way, students can learn much more about environmental impact of the built environment than by simply discussing the issues (Erdel-Jan et al., 2001). By introducing quantification-based methods for sustainability assessment into the education formula, future professionals learn how to conduct an experiment, which in turn unites research and design. Finally, the incorporation of software skills with sustainability education is of paramount importance to graduates (Bone et al., 2011) in terms of their future employment facilitation.



Figure 3: Teachers' training workshop at the Laboratory for Sustainability and Resilience of the Built Environment, Faculty of Technical Sciences, Kosovska Mitrovica, April 2018.

To overcome constraint regarding the educators' skills in the field of environmental assessments, KLABS organised multiple teachers' training sessions. Furthermore, all Western Balkans universities included in KLABS project have strengthened their capacities by establishing new institutional units – centres and labs – for experimental part of teaching and learning.

4.2 Social Sustainability

In the process of developing the curricula for sustainable built environment in the Western Balkans, the need to clarify notion of social sustainability was raised as a prerequisite for its incorporation into educational programs. Answering this question, due to multiple interpretations and the lack of consensus, opened a new research topic that ultimately resulted in the state-of-the-art research publication *Sustainability and resilience: Socio-spatial perspective* (Fikfak et al., 2018) representing the introductory part of thematic KLABS book series.

Designers produce materialised space intended for people who then transmute it into a social environment. Populated built entities are at the same time social communities. The education on social sustainability, as understood by KLABS, should relate to acquisition of knowledge, skills, and competencies necessary to carry out those spatial interventions which contribute to social identity, responsibility, justice, inclusion, health, well-being and happiness, diversity, evolution and growth, security, stability, activity, networking, etc., i.e. to the quality of a community, finally, the quality of life. In engineering branches, the scope of interventions on social sustainability may be understood as a spatial response to demand for the development and growth of sustainable communities - places where people want to live and work, now and in the future, because they meet the diverse needs, are sensitive to environment, safe, inclusive, well planned, built and run, contribute to a high quality of life, and offer equality of opportunity and good services for all (ODPM, 2006). To successfully integrate social sustainability concepts (Edvardsson Björnberg et al., 2015) into design and design-related research, there is a need to enrich the studio social milieu with external

groups. For students, this means that the education on social sustainability implies the acquisition of both profession-specific and general competencies, and, for educators, that an optimal methodology of fostering the skills that are tacit rather than formal (Johnston, 2015) needs to be shaped. According to Gould et al. (2006), social sustainability will be best tackled upon the creation of socially sustainable learning environment where personal will transform to communal, and individual to collaborative.

There is a variety of interpretations of general sustainability competencies in the literature. In fact, universal attitude about what general competencies in sustainability should precisely be doesn't seem to be adopted yet (Murga-Menoyo, 2014). De Haan (2010) proposed *Gestaltungskompetenz* – universally applicable model of competencies for education for sustainable development in formal sector, describing them as a specific capacity to act and solve problems. Wiek et al. (2011) and, later, UNESCO (2012) suggested somewhat different lists of key (generic) sustainability competences. In all mentioned proposals, there exist multiple common issues, and one of these, considered as especially significant, is the empathy. Adomßent et al. (2013) emphasised the 'We' term and noted that the development of empathy and its relative values as well as a widened perception of time and space in the consciousness are central within the concept of education for sustainable development. In de Haan's model, the empathy is put into relation with disadvantaged; for Wiek et al., the limits of cooperation and the empathy represent a part of interpersonal sustainability competence; in UNESCO list of generic sustainability competencies, the importance is given to the ability to feel empathy, sympathy and solidarity.

Indeed, the task of higher education schools is not just to produce sustainability-conscious designers, but also the citizens. In this respect, Johnston (2015) argues that by empathy students engage as citizens actively pursuing positive social visions through design, and that the empathy is essential attribute which allows the designers to place themselves in the role of others and to understand the world as if they are that person. By involving community, practitioners, decision-makers, enterprise sector,

Figure 4: KLABS word cloud designed for Venice Biennale, July 2016.



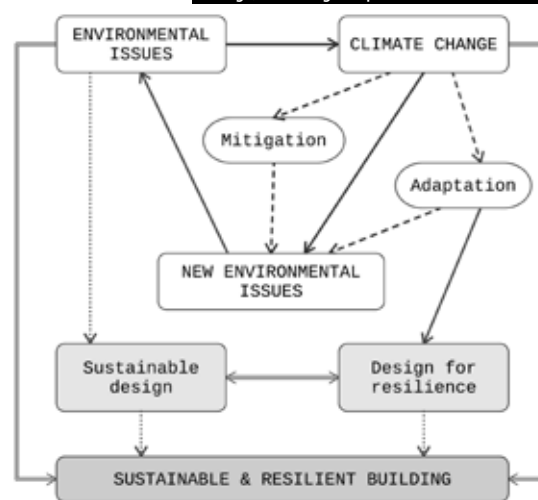
teachers specialized in other disciplines, etc. into the studio scene, students will develop general sustainability competencies and learn how to tackle social and economic sustainability challenges, while at the same time sustainable design's emphasis on logical principles and communal values will be embraced (Gould et al., 2006). In difficult and conflictual periods of this dynamic participative process, the empathy as perspective of the other can both be understood and clarified, which in turn promotes recognition and understanding (Johnston, 2015).

Guergachi et al. (2010) believe that the empathy may also assist in the dilemma of 'economy versus environment' and that the environmental and economic sustainability of community as a whole depends on the interrelations among its individual members; the more empathy in these micro-relations, the more sustainable the community will be.

4.3 Economic Sustainability

The integration of economic sustainability into curricula of Western Balkans knowledge labs was proved as the most challenging, due to overall economic constraints. Nevertheless, it was recognised that students need to understand that a successful project, besides being environmentally and socially sustainable, should also be competitive in the marketplace, and learn how both direct (such as lower costs) and indirect economic benefits (such as promotion of better health, comfort, well-being and productivity) (EERE) can be achieved through design. To reach economic sustainability also means to make the shift from cost strategy to value strategy which has more potential to last over time (Williams, 2007). Architectural-urban renewal, economic performance of buildings through life cycle, studies of potential consumers of sustainable architectural products and of production-consumption patterns, decrement of pollution and waste, utilization of renewable resources, calculation of the pay-off period, etc., are all important economic issues tackled by developed curricula.

Figure 5: Causal relations between environmental issues, climate change, and design responses (Kosanović, Fikfak and Folić, 2018a).



In developed economies, professionals equipped with sustainability-related knowledge, skills and competencies may pursue the employment within the 'green jobs' sector (Murga-Menoyo, 2014), where the final goal would be the whole profession becoming 'green'. In Western Balkans context, the role of professionals specialised in sustainability of the built environment is pioneering. While trained professionals are in position to act directly, the educators who teach sustainability perform the 'green job' in a more indirect way, but nonetheless make significant contribution to sustainable development. This role must be well understood and accepted.

5. CONNECTING SUSTAINABILITY AND RESILIENCE

Sustainability achievement is recognized as fundamental condition for progress of society at all levels. However, the development process and its main credo by which the needs of present generation must be met in a way that will not compromise the ability of future generations to meet their own needs, today is compounded by manifestation of consequences of past unsustainable actions of society - the climate change. The increased pressure on environment thus doesn't origin just from population, their activities or technology, but as well from the nature. New facts on climate change and its past occurred and future possible catastrophic negative implications in social environments call upon the need to develop adaptive capacity. Therefore, interrelated concepts of sustainability and adaptation to climate change, i.e. the resilience, need to be studied concurrently.

In Western Balkans knowledge labs, the interrelations between sustainability and resilience to climate change were first researched and presented in the book series *Reviews of Sustainability and Resilience of the Built Environment for Education, Research and Design* (Kosanović et. al., 2018b). The elaborated topics were subsequently embodied into Western Balkans study programmes. Innovative knowledge brought by KLABS was made availa-

ble to world-wide educational, research and professional communities by using open access format of published books.

6. DISCUSSION AND CONCLUSIONS

The main subject of study in conventional architectural education is built environment. The main subject of study in future-responsive architectural education should be environmentally, socially and economically sustainable and healthy built environment. The education on these attributes must become the essential part of training, woven into theory, history, technology, design, building and research. Sustainability, because the future depends on its achieving, cannot be treated anymore as an individual expression of the personal understanding (Johnston, 2015), or a subjective taste (Gould et al., 2006), but a fundamental quality (Kosanović et al., 2014).

Erasmus+ project “Creating the Network of Knowledge Labs for Sustainable and Resilient Environments – KLABS” took a brave step to modernise higher education in Western Balkans by developing a pioneering educational platform that applies holistic approach to sustainability and integrates it with the resilience. Nevertheless, every Western Balkans knowledge lab has its defined operational field, while they together form the network offering a possibility for knowledge exchange. KLABS promotes the diversity; similarly, sustainability looks for a variety of right solutions. The search for establishing the interrelationships between local and global scale, present and future (Sterling, 2012), can only simulate creative development.

Sustainability-oriented curriculum is a result of organised, systemic approach and whole-institution engagement, and a vast responsibility is placed in front of educators. Teachers play a key role in the development of learning environment which is, according to de Haan (2010), a decisive factor for the construction of knowledge. Success is conditioned with the appeal to educators to “come out of their disciplinary silos”, as Khan et al. (2013b) named required reorientation towards interdisciplinary, multidisciplinary or system thinking. Educator is the first and the main responsible to communicate sustainability in a way that will raise students’ interest and gain their seriousness, build commitment and enlarge motivation. By enhancing motivation instead of needs, the possibilities for changes towards sustainability will be better shown (Merck et al., 2015). To that end, the use of formalistic pedagogical expressions should be decreased, and new accent placed on informal debates, discussions, reasoned dialogue, interactive conversations, open communication, role-play and other forms and methods allowing for creation of a learning environment that secures better understanding of sustainability and the obtainment of general sustainability competencies. Tutor’s ‘whole person’ approach should ideally lead to *gestalt* experience (Trowler, 2001).

REFERENCES

AdomBent, M., Hoffmann, T. (2013). *The Concept of Competencies in the Context of Education for Sustainable Development (ESD)*. Concept Paper. ESD Expert Network. Accessed on 9 December 2018: <https://pdfs.semanticscholar.org/9ec3/118c915b2b11fd1017a1691398346f46af45.pdf>

- Bone, E., Agombar, J. (2011). *First-Year Attitudes Towards, And Skills In, Sustainable Development*. Heslington, York: The Higher Education Academy. Accessed on 12 May 2016: http://efsandquality.glos.ac.uk/toolkit/NUS_HEA_2011.pdf
- Borden, I. (2009). Sustainability and Architectural Design, *Palette 2009 – the Grand Challenge of Sustainable Cities*, Summer 2009, pp. 32–34. Accessed on 18 April 2018: <https://studylib.net/doc/12611043/sustainability-and-architectural-design-perspective-ia-in-...>
- Colantonio, A. (2007). Social Sustainability: An Exploratory Analysis of its Definition, Assessment Methods, Metrics and Tools. In: *Measuring Social Sustainability: Best Practice from Urban Renewal in the EU*. 2007/01: EIBURS Working Paper Series. Oxford: Oxford Brookes University. Accessed on 15 October 2015: http://oisd.brookes.ac.uk/sustainable_communities/resources/SocialSustainability_Metrics_and_Tools.pdf
- De Haan, G. (2010). The Development of ESD-related Competencies in Supportive Institutional Frameworks, *International Review of Education*, 56(2), 315–328. Accessed on 15 October 2015: <https://doi.org/10.1007/s11159-010-9157-9>
- Edvardsson Björnberg, K., Skogh, I-B., Strömberg, E. (2015). Integrating Social Sustainability in Engineering Education at the KTH Royal Institute of Technology. *International Journal of Sustainability in Higher Education*, 16(5), 639–649. Accessed on 10 October 2017: <http://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A858007&dsid=9328>
- Erdel-Jan, L., Frame, I. (2001). Theory and Practice of Learning and Teaching: Environmental Issues. In: *Proceeding of the Architectural Exchange 2001 Conference*, 11–12 September, CEBE, Welsh School of Architecture, Cardiff University, pp. 1–10. Accessed on 25 April 2018: https://www.worldcat.org/title/aee2001-architectural-education-exchange/oclc/53457461&referer=brief_results
- Fikfak, A. (2012). Workshops as a Form of Empirical Learning: Researching the Term “Sustainable Development”. In: Gabrijelić, P., Fikfak, A. (Eds.). *The Creativity Game: Urban Design Workshops, Urban Architectural Workshops and Spatial Planning Workshops*, pp. 41–47. Ljubljana: Faculty of Architecture.
- Fikfak, A., Kosanović, S., Konjar, M., Anguillari, E. (eds.) (2018). *Sustainability and resilience: socio-spatial perspective*, (Reviews of sustainability and resilience of the built environment for education, research and design). Delft: TU Delft Open. Accessed on 10 November 2018: <https://books.bk.tudelft.nl/index.php/press/catalog/view/isbn.9789463660303/726/608-1>.
- Folić, B., Kosanović, S., Glažar, T. (2014). Contemporary Debates on the Education of Architects – Selected Examples, *Architecture Research* 2014/1, pp. 5–14. Accessed on 25 April 2017: http://www.fa.uni-lj.si/filelib/9_ar/2014-1/ar2014-1-email.pdf
- Gould, K., Hosey, L. (2006). *Ecology and Design: Ecological Literacy in Architecture Education*. Report and Proposal. The AIA Committee on the Environment. Accessed on 10 September 2018: <https://network.aia.org/HigherLogic/System/DownloadDocumentFile.aspx?DocumentFileKey=09eb4e0a-51a1-41dc-96ac-afa57907a4ae&forceDialog=0>
- Guergachi, A., Ngenyama, O., Magness, V., Hakim, J. (2010). Empathy: A Unifying Approach to Address the Dilemma of Environment versus Economy. In: Swayne, D.A., Yang, W., Voinov, A. A., Rizzoli, A., Filatova, T. (Eds.). *2010 International Congress on Environmental Modelling and Software Modelling for Environment's Sake, Fifth Biennial Meeting, Ottawa, Canada*. International Environmental Modelling and Software Society (iEMSS). International Congress on Environmental Modelling and Software July 5–8 2010, Ottawa, Ontario, Canada. Accessed on 1 October 2015: <http://former.iemss.org/sites/iemss2010/proceedings.html>
- Hill, S.B., Wilson, S., Watson, K. (2004). Learning Ecology – A New Approach to Learning and Transforming Ecological Consciousness. In: O’Sullivan, E., Taylor, M. (Eds.) *Learning Towards Ecological Consciousness*:

- Selected Transformative Practices*, pp. 47–64. New York: Palgrave Macmillan. https://doi.org/10.1007/978-1-349-73178-7_4
- Johnston, A. (2015). From Consumer to Citizen: Engaging Students with Participative Methods in Design. In: Leal Filho, W., Brandli, L., Kuznetsova, O., Finistera do Paço, A.M. (Eds.). *Integrative Approaches to Sustainable Development at University Level - Making the Links*, pp.245–258. Springer. https://doi.org/10.1007/978-3-319-10690-8_17
- Khan, A., Hornbaek, K. (2013a). Sustainability through Computation. In: Zander, J., Mosterman, J.P. (Eds.). *Computation for Humanity: Information Technology to Advance Society*, pp. 35–68. Boca Raton: CRC Press. <https://www.taylorfrancis.com/books/9781439883297/chapters/10.1201/9781315216751-9>
- Khan, Z.A., Vandevyvere, H., Allacher, K. (2013b). Design for the Ecological Age: Rethinking the Role of Sustainability in Architectural Education, *Journal of Architectural Education*, 67(2), 175–185. <https://doi.org/10.1080/10464883.2013.817155>
- Kosanović, S., Fikfak, A., Folić, B. (2018a). Sustainability and resilience: (In)consistencies in two design realms. In Kosanović, S., Tillmann, K., Konstantinou, T., Radičević, A., Hildebrand, L. (Eds.). *Sustainable and resilient building design: Approaches, methods and tools*, pp. 67–81. Accessed on 10 November 2018: <https://books.bk.tudelft.nl/index.php/press/catalog/view/isbn.9789463660327/730/612-2>
- Kosanović, S., Fikfak, A., Novaković, N., Klein, T. (eds.) (2018b). Reviews of Sustainability and Resilience of the Built Environment for Education, Research and Design. Book series (1–6). Delft: TU Delft Open. Accessed on 10 November 2018: <https://books.bk.tudelft.nl/index.php/press/catalog/results>
- Kosanović, S., Folić, B. (2013). Green Themes in Architectural Curriculum: Scope and Content, *The Creativity Game: Theory and Practice of Spatial Planning*, 1/2013, pp. 60–67. Accessed on 20 October 2015: <https://www.iu-cg.org/stevilka.php?vol=1&lang=si>
- Kosanović, S., Folić, B. (2014). Reviewing the Sustainability in Students' Design Work. In: Fikfak, A. (Ed.). *Book of proceedings of the scientific meeting on the topic of urbanism "Smart Urbanism - Teaching Sustainability"*, Ljubljana, Slovenia, 19–21 June 2014, pp. 117–124. Ljubljana: Faculty of Architecture.
- Merck, J., Beermann, M. (2015). The Relevance of Transdisciplinary Teaching and Learning for the Successful Integration of Sustainability Issues into Higher Education. In: Leal Filho, W., Brandli, L., Kuznetsova, O., Finistera do Paço, A.M. (Eds.). *Integrative approaches to Sustainable Development at University Level - Making the Links*. Springer. pp. 19–26. https://doi.org/10.1007/978-3-319-10690-8_2
- Murga-Menoyo, M.A. (2014). Learning for a Sustainable Economy: Teaching of Green Competencies in the University. *Sustainability*, 6, 2974–2992. doi:10.3390/su6052974
- Office of the Deputy Prime Minister (ODPM) (2006) *UK Presidency: EU Ministerial Informal on Sustainable Communities*. European Evidence Review papers. London: Office of the Deputy Prime Minister.
- Omann I., Spangenberg J.H. (2002). Assessing Social Sustainability. The Social Dimension of Sustainability in a Socio-Economic Scenario [Online]. Paper presented at the 7th Biennial Conference of the International Society for Ecological Economics, 6–9 March 2002, Sousse, Tunisia, pp. 1–20. Accessed on 14 October 2017: <https://pdfs.semanticscholar.org/01bb/c45e359f0be5503c864b73bbd0cc374eac23.pdf>
- Rusinko, C. J. (2010). Integrating Sustainability in Higher Education: A Generic Matrix. *International Journal of Sustainability in Higher Education*, 11(3), 250–259. <https://doi.org/10.1108/14676371011058541>
- Salomon, D. (2011). Experimental Cultures: On the End of Design Thesis and the Rise of the Research Studio. *Journal of Architectural Education*, 65(1), 33–44. <https://doi.org/10.1111/j.1531-314X.2011.01172.x>
- Sterling, S. (2012). *The Future Fit Framework – An Introductory Guide to Teaching and Learning for Sustainability in HE*. York: The Higher Education Academy. Accessed on 14 November 2017: https://www.heacademy.ac.uk/system/files/future_fit_270412_1435.pdf
- Sterling, S. (2013). The Sustainable University - Challenge and Response. In: Sterling, S., Maxey, L., Luna, H. (Eds.) *The Sustainable University - Progress and Prospectus*, pp. 17–50. Abingdon: Routledge.
- The European Parliament and the Council of the European Union (2005) *Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications* [Online] EUR-Lex: Access to European Union Law. Accessed on 11 October 2015: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02005L0036-20140117>
- The European Parliament and the Council of the European Union (2013) *Directive 2013/55/EC amending Directive 2005/36/EC on the recognition of professional qualifications and Regulation (EU) No 1024/2012 on administrative cooperation through the Internal Market Information System ('the IMI Regulation')* [Online] EUR-Lex: Access to European Union Law. Accessed on October 2015: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013L0055>
- Trowler, P. (2001). Captured by the Discourse? The Socially Constitutive Power of New Higher Education Discourse in the UK. *Organization*, 8(2), 183–201. <https://doi.org/10.1177/1350508401082005>
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (2005) *United Nations Decade of Education for Sustainable Development 2005–2014: Draft International Implementation Scheme*. Accessed on 20 October 2017: <http://unesdoc.unesco.org/images/0013/001399/139937e.pdf>
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (2012) *Shaping the Education of Tomorrow: 2012 Report on the UN Decade of Education for Sustainable Development, Abridged*. Accessed on 12 October 2017: <http://unesdoc.unesco.org/images/0021/002166/216606e.pdf>
- US Department of Energy, Energy Efficiency and Renewable Energy (EERE) *The Economic Benefits of Sustainable Design* [Online]. Accessed on 11 November 2015: https://www1.eere.energy.gov/femp/pdfs/buscase_section2.pdf
- Wiek, A., Withycombe, L., Redman, L.C. (2011). Key Competences in Sustainability: A Reference Framework for Academic Program Development. *Sustain Sci*, 6, 203–218. <https://doi.org/10.1007/s11625-011-0132-6>
- Williams, D.E. (2007). *Sustainable Design: Ecology, Architecture and Planning*. Hoboken: John Wiley & Sons, Inc.
- Zavadskas, E.K., Kaklauskas, A., Vainiunas, P., Šaparauskas, J. (2004). A Model of Sustainable Urban Development Formation, *International Journal of Strategic Property Management*, 8(4), 219–229. <https://www.tandfonline.com/doi/abs/10.1080/1648715X.2004.9637519>