Saja Kosanović, Branislav Folić

ZELENE VSEBINE V ARHITEKTURNIH UČNIH NAČRTIH – OBSEG IN VSEBINA

GREEN THEMES IN ARCHITECTURAL CURRICULUM – SCOPE AND CONTENT

UDK:
378.1:504 1.01 Izvirni znanstveni članek

IZVLEČEK

Okoljski dejavniki imajo pri iskanju optimalnih prostorskih rešitev na arhitekturni in urbanistični ravni vse večji pomen, zato teh vsebin ne moremo več prezreti. Zeleni vidik prodira v načrtovanje v različnih fazah in v različnem obsegu, in to že pri začetnem oblikovanju zasnov. Znanje o tem torej potrebujemo. Vprašanje je, ali arhitekti znanje o zelenih vsebinah pridobijo iz knjig, revij, medijev in posebnih tečajev, ki jih izvajajo nevladne organizacije, ali v šoli.

Cilj tega članka je predlagati zelene izobraževalne vsebine, potrebni obseg, širino in vsebino ter primerne metode za prenos znanja na študente arhitekture in nato na tej podlagi pregledati učne načrte različnih arhitekturnih šol. Rezultati primerjalne analize odgovorijo na vprašanje o sedanji različni prisotnosti zelenih vsebin v učnih načrtih arhitekturnega izobraževanja na mednarodni ravni.

KLJUČNE BESEDE

arhitekturni učni načrt, načrtovanje, okoljski, znanje, metode poučevanja in učenja

ABSTRACT

The significance of environmental factor in the course of searching for optimal space solutions on architectural and urbanistic level is increasing and the theme can no longer be excluded from the creation process. Green aspect penetrates the design in its various phases and scales, starting from early conceptual ideas. The knowledge is, therefore, necessary. Where from do architects learn about green themes: books and magazines, media, specialized courses organized by various nongovernmental organizations or do they acquire necessary knowledge at school?

The aim of this paper is to propose educational green themes, their necessary scope, depth and content and suitable methods to transfer knowledge to the students of architecture and then to, based on the set criteria, examine curricula of different schools of architecture. The results of comparative analysis give an answer on current variable presence of green themes in architectural educational curricula on international level.

KEY-WORDS

architectural curriculum, design, environmental, knowledge, teaching and learning methods

1. INTRODUCTION

Architecture of the major part of the 20th century and its various design laboratories rarely bond with natural context, whether in inspiration or in result. At the culmination point, architecture became international and universal, and its appearance, no matter of the climate and natural conditions, is the same all around the world. But, the energy crises, figured finiteness of resources and estimated reserves, political issues and a series of problems occurring in buildings fully depending on mechanical systems changed the trend, and shortly after, the term energy efficiency emerged. Scientists reported and warned about many growing environmental problems. As a response, more than 30 years ago, the slogan "Think globally, act locally!" was created. At the end of the last century, the term environmentally friendly buildings was coined. Today, we use the same term or its synonyms: green, eco-friendly, ecological, environmentally responsible or sustainable buildings, although the latest has wider meaning, involving as well social and economic aspects.

Contemporary environmental science puts the emphasis on protection or promotion, which is more beneficial. Efforts to meet the goals have spread into different sciences and disciplines, architecture among them. Buildings use significant amount of natural resources: water, energy, land and raw materials and consequently produce significant negative environmental impacts. These facts caused shift in our branch. Exploring possibilities to reduce negative environmental impacts today is considered more of an imperative and less a challenge. The responsibility has increased and "urbanists and architects are looking for answers. We no longer simply follow the predetermined typological forms of buildings following the experience of another era and different social, economic and climate conditions, we wish to create solution for each individual problem. We try to solve it by content, not formally" (Gabrijelčič, 2012, p.28). Ecological ethic becomes general cultural and artistic norm (Gabrijelčič, 2012, p.32), increasingly followed by legislative norms.

Green themes in this paper relate to education on ecological aspect of architecture and urbanism. "Ecological design is the careful meshing of human purposes with the larger patterns and flows of the natural world and the study of those patterns and flows to inform human action" (Orr, 2002, p. 20). It is the result of thinking process in which both technical and artistic parts of architect's mind are working simultaneously to create a structure that satisfies human needs for space, comfort and beauty, but does not jeopardize the nature.

2. WHAT ARE THE GREEN THEMES?

Environmental study during the 1960s was focused on nature. In the 1970s, awareness through practical activity and investigation started to develop. Teaching about conservation issues and about built environment was initiated. In the following decade, a wider, global vision of environmental issues opened. Environmental education was given a political dimension. During the 1990s, communication, capacity – building and problem – solving orientation and action became tools for resolution of socio – environmental problems; education for sustainable future began. In the 2000s all groups of interests – students, teachers, NGOs, politicians, started working together to identify and resolve socio – ecological problems (Dejesus Estrada, 2002). Architects and urbanists have engaged themselves. Today, the significance of environmental factor in the course of searching for optimal space solutions on architectural and urbanistic level is increasing and the theme can no longer be excluded from the creation process. Green aspect penetrates the design in its various phases and scales, starting from early conceptual ideas. The knowledge is, therefore, necessary. Many authors today are emphasizing the importance of introducing environmental design as a compulsory component of education. Architectural education needs to face radical improvement to be capable of accepting new challenges and strives to give the sustainable development the central role (Buchanan, 2012).

To understand the position of architecture in new environmental paradigm, students need to be equipped with previously gained knowledge about the environment itself. Significant part of this knowledge, however, is acquired during primary and secondary education, through the subjects studying natural sciences. Pupils in school learn about mass flow, food chain, flora and fauna, climate and weather, energy, resources, etc. But not all students come to architectural school with the knowledge about pollution and current state of environment on any level. Just few of them, according to our experience, recognize the responsibility of architecture for present ecological image. Very rarely, primary motivation to study architecture is a wish to engage and take actions to conserve or, even better, improve the existing ecological conditions. Taking these facts as a starting point means that we should, at early stage of studies, provide students with the knowledge about the environment and its systems.

Students should develop ecological thinking at the beginning of their architectural education, so to be capable of understanding all forms of environmental design (Buchanan, 2012) and skilled for applying acquired knowledge in their future work. However, the presentation mode requires a careful approach, without underestimating all other aspects of architecture and its wide meaning. When introducing architecture to students, to say, we need to integrate the ecological aspect as well, but in a way that is allowing comprehension of full complexity and beauty. A building has its purpose, aesthetics values, structure and is belonging to space (place) and time, but this same building must have satisfying ecological quality. This is how we should teach our students.

Students will best understand the full significance of environmental factor when we educate them about the architectural ecological responsibility. For complete understanding of the facts stating that buildings use, for example, 50% of energy or 20% of total fresh water, i.e. of relation between buildings, environment and resources, we need to provide students with the knowledge about Life Cycle. How certain building will relate to the environment in every phase of its life cycle is of crucial importance for decisions taken during planning and designing processes. Knowledge about life cycle also means knowledge about recycling, reuse, renewal, brownfield activation and other popular, even commercialized topics. Equipped with this knowledge, students will be able to recognize negative environmental

impacts of buildings and building materials. Here we need to present to them necessary quantitative and qualitative facts, data and parameters.

Gathering all learned about ecological aspect of environment, architectural responsibility and share, life cycle and negative environmental impacts presents the knowledge integration point where students gain awareness about the reflection of their work on environment and skills to analyse effects and predict consequences of their design decisions and of all further environmental impacts, since all ecological processes are followed by the chain reaction effect. "For a successful transition to professional practice, students of architecture should have experience in environmental analysis from the pre – design stages to post – occupancy environmental assessment" (Altomonte, 2012, p. 11).

When faced with one of the greatest challenges of environmental design – harsh fact that, in essence, green architecture is nothing else but minimized damage to the environment and that every built structure, apart from greening strategies, produces just negative ecological effects on outdoor environment, students react either with negation, disappointment or instant motivation to look for new "greener" solutions of this environmental – human – architectural puzzle. Responsibility to make the positive thinking group prevalent, is to a great extent on us, the educators.

A set of green themes in architectural curriculum should relate to possible interventions to reduce negative environmental impacts to the least possible scale. Architectural response on damaged quality of living – natural and built environment is based on the development of environmentally friendly (responsible) buildings. Environmentally responsible architecture uses resources efficiently ("more with less"), does not pollute the environment, neither outdoor nor indoor and is made of environmentally friendly building materials. It aims to reduce negative environmental impacts down to a minimum; for that purpose and at the same time, environmentally friendly architecture uses positive conditions of the outdoor environment (Kosanović, 2009).

While teaching about environmentally friendly architecture, we need to emphasize to our students the following, more detailed green themes:

- Independence from building typology and size in terms that environmental impacts are measured and shown by unit scale and dependence in terms of specificity of produced environmental impacts, especially in phase of use and maintenance,
- Strong dependence on the context – site, local and regional natural and made conditions and required comprehensive analysis for proper response (climate and microclimate, land configuration, soil content and quality, level of air pollution, pollution sources, water quality, possibilities for renewable energy use, existing vegetation and habitats, infrastructure, public transportation availability, local building materials, characteristics of previously built nearby structures, characteristics of traditional local and regional architecture, etc.),
- Proper and efficient land occupation and organization strategies (construction planning, reduced land use and materialization, reduction of a building footprint),
- Energy efficiency (reduced use of energy originating from conventional resources and promotion of renewable energy, operational energy, embodied energy, heating, cooling, ventilation, lighting, water heating),
- Efficient use and reduced pollution of water (efficient faucets, shower heads and toilets, installations, greening, waste water reuse and recycling, rainwater use),
- Proper and efficient use of environmentally friendly building materials (life cycle of building materials and the ecological characteristics),
- Strategies for minimization of negative impacts of a building towards outdoor environment (waste minimization, air, noise and light pollution prevention, microclimatic and natural mechanisms' unwanted changes prevention),
- Strategies for achieving and maintaining good quality of indoor environment (air quality, comfort).

We need to present to our students built examples to support the theory: new or renewed small and big structures all over the world, designed and constructed by following ecological principles in certain scale. We can also point at many contemporary negative examples, and try to develop students' critical thinking by offering them both. Certainly, we should present to them examples belonging to historical, traditional and vernacular architecture and urbanism that are ecological and particularly bioclimatic.

Students should be given assignments to analyse different case studies and develop skills to recognize and distinguish low and high – tech interventions which they will later apply in their work in studio / workshop. For this purpose, it is desirable to introduce green design measures though their systematization, for example, through the system of environmentally friendly buildings.

The system of environmentally friendly buildings is consisted of the subsystems: Passive Mechanisms, Active Mechanisms, Physical Frame and Indoor Environment (Kosanović, 2009). Achieving balance among these subsystems in planning and design is considered essential. On the contrary, by over activating just one of them, the function of other subsystems may be jeopardized. We need to teach our students, therefore, how to search for optimal solutions, not alone, but with the other team members involved in this complex task. Environmental design requires switch to architect as a "team player", not an "architect the hero" model (Boyer and Mitgang, 1996).

Ecological quality of a building mostly depends on decisions made in the phase of planning and design, therefore it is necessary to have skills to check the environmental friendliness of a project. Various computer programs and simulations were developed for the purpose of simplifying and unifying this project checking procedure.

Studying and teaching about the sustainable design, beside above discussed ecological aspect, also involves social and economic themes. Students will deepen their knowledge if we teach them about cost analysis and payback period, cultural and psychological aspects or role of occupants, for example.

Individual (a building) and general (rural or urban settlement) should be put in green synergy. Hence, a package of green themes in architectural curriculum should be dedicated to urban design. Among architecture, urbanism and landscape architecture, the architecture has the central point and position which is providing synthetic view (Allen, 2012, p. 223).

Noting that environmental problematique is hardly ever discussed in its complexity, authors Guy and Farmer (2001) suggest six different types of eco architectural logic: eco-technic, eco-centric, eco-aesthetics, eco-cultural, eco-medical and eco-social. Eco-technic logic is oriented towards solutions for global environmental problems and is based on techno-rational and scientific knowledge. Eco-centric logic is founded on an idealized concept of place, in which harmony with nature through decentralized, autonomous building with limited ecological footprint is achieved. With eco-aesthetic logic, the role of sustainable architecture becomes metaphorical, with the aim to inspire and convey an increasing identification with nature and non-human world. "The eco-cultural logic emphasizes a fundamental reorientation of values to engage with both environmental and cultural concerns. The eco-medical logic shifts debates about sustainability from concerns about appropriate form and the wider cultural context of design towards a humanist and social concern for the sustaining of individual health. The eco-social logic extends the social agenda of sustainability beyond a concern for the individual to encompass a political discourse that suggests that the root cause of the ecological crisis stems from wider social factors" (Guy and Farmer, 2001).With understanding the phenomenology of place (site) and knowledge about environmental systems, life cycle, negative environmental impacts, measures to put building into more proper position toward the environment, wider built context and all aspects of sustainability, the development of complex synthetic eco logic is more probable. Just with comprehensive educational courses, we will avoid simplification that, many times, cannot give us satisfying results and fulfilment of a goal which is environmentally correct design.

Advanced green themes in architecture and urbanism generally are related to graduate and postgraduate studies or to specialization in the field.

3. TEACHING AND LEARNING FORMS FOR GREEN THEMES

Authors of EDUCATE Framework for Curriculum Development (Altomonte, 2012) noted that educators should seek to promote sustainable environmental education through pedagogical methodologies which are allowing direct and experimental learning, fostering critical thinking, lifelong learning and making inter-, intra-, trans-, cross-disciplinary and systems connections between seemingly disparate cognitive domains.

Architectural education is a combination of theoretical subjects and practical and research work in design studios, workshops, practical placement and individual research work. Lectures consisted of various green themes represent the base of education.

Knowledge acquired during theoretical university lectures must be embodied into work in design studio. The main element here is the ability to integrate this theoretical knowledge with specific practical design assignment. The importance of integration of environmental design with design studio is great; sustainability is becoming the part of design process which students will use in their future careers (Dejesus Estrada, 2002).

Universal recipe for successful environmental architectural and urban design doesn't exist. Interventions that we apply to put our designed project into proper relation towards environment are numerous and the ideal combination doesn't exist. Accomplishment of results, presented in a form of optimal solution, depends on several factors, such as knowledge and skills embodied in work, team collaboration or adequacy of response to the place and its peculiarity. Aiming to find optimal solution, every of these factors demand research and the component needs to be present in studio. Today we research more in practice, too; many architectural firms are conducting researches (Allen, 2012, p. 222).

Seminars, as a form of theoretical support to the studio and, generally, short educational course on a peculiar topic, also are the useful method for providing information and facts on different environmental – designing trends and challenges. In less formal atmosphere comparing with classic lecture class, students in seminar are feeling freer to discuss, participate in debates or to ask questions to the visiting professors or practicing experts. Topics for seminars may range from psychological and cultural to technical, depending on the subject of studio work, but also on the direction of students' interest and set goals.

Students' workshops certainly are good method to enhance ecological creativity. There, students are able to link theory and practice, and many times, they are freed from burdens of real conditions, official procedures and limits, which make workshop a terrain to practice organized form of realistic utopia and offer solutions – alternatives to the existing situation. Workshops may be especially important for work on ecological problems in urbanistic scale, as "the topics of the workshops are often urbanistic tasks of great proportions or demanding development projects" (Koželj, 2012). Characterized by limited duration and intensive work on specific problem with more conceptual than detailed approach, which is opposite from semester or year lasting studio, rarely the workshop will include all aspects of green design; more likely, it will focus on a narrower scope of interventions on architectural or urbanistic level, such as recycling, reuse, energy use reduction, renovation, condensing instead of extensive expansion (Fikfak, 2012, p. 44), etc.

Field trips are good opportunity for students to examine different case studies and get a picture about green measures applied in real cases. They are also considered needed in the context of location analysis, which precedes planning and design phases.

Ecologically responsible architecture and urbanism must be supported with knowledge acquired in other nearby fields and through other separate subjects which are not necessarily carrying the term ecological or environmental in their name. We cannot avoid anymore, for example, teaching students about mechanical properties of building materials without teaching them about ecology of these. This justifies the need for greater

Table 1: Comparative analysis on presence of green themes in different schools of architecture.

Institution	Year (Semester, Trimester)	Character	Methods	Content	Green Themes
Faculty of Architecture, Belgrade BArch &MArch	II (4)	M	L	IN	Physics: Comfort and materials
	III (6)	E	T, IW, SM	IN	Application of basic green design principles in designing
	IV (7)	E	L	ISO	Comprehensive themes on green architecture
	IV (8)	E	L	ISO	Recycling
	IV, V (7,8,9)	E	T,IW,SM, S	IN	Green design principles and their application in designing
	IV, V (7,8,9)	E	W, SM	ISO or IN	Selected green themes
	V (9)	M	L	IN	Energy efficiency themes
University of Patras, Department of Architecture BArch &MArch	IV (7)	M	L, EX	ISO + IN	Qualitative and quantitative green themes and their practical application in architectural designing
	IV (8)	M	L, EX	ISO + IN	Qualitative and quantitative green themes and their application in urban projects
Faculty of Architecture, Ljubljana Single Masters Study Programme	I-IV (2-8)	M	L, T, IW, TW, FT	IN	Environmental issues of buildings and cities
	II (4)	M	L, EX	IN	Comfort, energy efficiency and ecological sustainability
	II, III, IV (4, 6, 8)	E	W, SM	ISO or IN	Selected green themes
	III (5)	M	T, T, IW	IN	Energy and water efficiency, comfort and well being, in context of utility technologies
	III, IV or V (5, 7 or 9)	E	L, IW	ISO	Integrating principles of ecological building into the buildings, settlements and regional plans
	III, IV or V (6, 8 or 9)	E	L, IW, FW	IN	Vernacular architecture
	III, IV or V (6, 8 or 9)	E	L	IN	Design of green surfaces
	III, IV or V (6, 8 or 9)	E	L, IW	IN	Environmental psychology
	IV or V (7 or 9)	E	L, T, IW	ISO	Environmental assessment of buildings
	V (9)	E	T, IW, TW, FT	IN	Environmental issues of buildings and cities
École nationale superieure d'architecture, Grenoble BArch &MArch	I (2)	M	L, EX	ISO	Bioclimatic design
	II (3)	M	L, EX, IW	IN	Natural light and sun control
	II (4)	M	L	IN	Basics of green design principles
	III (5)	M	L	IN	Physics and comfort
	IV (7)	M	L	IN	Sustainable principles in urban design
	IV (7)	M	L, FW, E	IN	Urban acoustics and light
	IV, V (7,8,9)	E	T, IW, SM	IN	Architecture and culture sensitive to environment
	IV, V (7,8,9)	E	S	ISO	Architecture and culture sensitive to environment
Faculty of Technical Sciences, Department of Architecture, Mitrovica BArch &MArch	II (4)	M	L, EX	IN	Comfort and building materials
	III (5)	E	L, EX, IW	ISO+IN	Green design principles and their integration into small scale project
	IV, V (7,8,9)	E	T,IW,SM, S	IN	Green design principles and their application in designing
	IV, V (7,8,9)	E	W, SM	ISO or IN	Selected green themes

Institution	Year (Semester, Trimester)	Character	Methods	Content	Green Themes
ETH Zurich Department of Architecture BArch &MArch	I (1)	M	L	IN	Life cycle of building materials
	I, II (2,3,4)	M	L	IN	Physics and comfort
	III (5, 6)	M	T, IW, SM	IN	Elements of sustainability
	III (5, 6)	E	L, EX	IN	Urban physics
	IV (7, 8)	E	L	IN	Ecological properties of wood, polymers, **metals and glass**
	IV or V **(7, 8 or 9)**	E	L, EX	ISO	Sustainable building systems
	IV or V **(7, 8 or 9)**	E	S	ISO	Life cycle assessment
	IV or V **(7, 8 or 9)**	E	T, IW, SM	IN	Urban parameters for environmental design
	IV or V **(7, 8 or 9)**	E	T, IW, SM	IN	Energy efficiency and renewable energy
	IV or V **(7, 8 or 9)**	E	L, EX	ISO	Advanced themes: Environmental Management The Economics of Climate Change Corporate Sustainability International Environmental Politics Environmental Regulations Environmental Sociology The Energy Challenge - The Role of Technology, Business and Society
Architectural Association School of Architecture, London Undergraduate and MArch	I (2 from 3)	M	L	IN	Basics of environmental issues
	II (2)	M	L	ISO	Environmental impacts and principles of environmental design
	III	M	L, EX	IN	Environmental design and integration with technical project
	IV (2)	E	L	ISO	Green principles and tall buildings / Sustainable urban design
	IV	E	L, EX	ISO	Software
	IV	E	L, EX	ISO	Energy issues
	IM (1, 2)	M	EX, T, IW, SM	ISO	Urban environmental assessment
	IM, IIM (1-4)	M	EX, T, IW, SM	ISO	Variable environmental designing topics
	IM (1)	M	L	ISO	Topics on theory of sustainable architecture
	IM (1, 2)	M	L	ISO	Structure of eco - friendly buildings
	IM (1, 2)	M	S	ISO	Environmental assessment for cities
	IM (2, 3)	M	L	ISO	Sustainable environmental design - **practitioners experience**
	IM (1, 2)	M	L, EX	ISO	Software for assessment and simulation
	IM (1, 2, 3)	M	W, SM	ISO	Application of computer tools and research techniques
	IM (1, 2, 3)	M	S	ISO	Research work in sustainable design

Legend of abbreviations:
Character: M - Mandatory course; E - Elective course
Methods: L - Lecture; T - Tutorial; IW - Individual work; SM - Supporting methods; S - seminar; W - Workshop; EX - exercise; TW - team work; FT - field trips
Content: ISO - Isolated content; IN - integrated content

reform in approach, to the point when sustainable development becomes the backbone of architectural education (Buchanan, 2012).

The postgraduate students, guided by their mentors, conduct individual researches on various green themes. Interdisciplinary aspect comes here to the full light. We must find the way to enhance their researches as much as possible; many themes yet are not explored and some of them may be vital for our local, regional and global environment and its living world, including us.

4. GREEN THEMES IN INTERNATIONAL CURRICULA

Based on the study on green themes (chapter 2 of the paper), as well as on the forms of teaching for green themes (chapter 3), the following criteria for analysis among different schools of architecture can be set:

- the year/semester or continuous architectural education in which the course occurs in curriculum, as it was concluded earlier that the time of introduction of green themes into architectural curriculum is of importance,
- mandatory or elective character of the course,
- teaching and learning methods for green themes: lectures, tutorial, individual or team work, exercise, field trips etc.,
- isolated (specific and narrow oriented) of integrated (mixed) content of detected course dealing with green themes,
- green content, to examine scope and similarities and differences among architectural curricula.

Using these derived criteria, we examined seven different architectural curricula on international level. Comparative analysis, presented in Table 1, encompasses bachelor - undergraduate and master studies.

Conducted comparative analysis showed that green themes are present in every of analysed study programmes, but there are significant differences among schools in terms of chronological introducing green themes into curriculum, their character, content and extent. Most commonly occurring themes are related to green architectural and urban design principles and then to their application on project, and, earlier, to aspects of building physics. More rarely occurring topics relate to environmental impacts of buildings and materials, other aspects of sustainability, life cycle assessment, bioclimatic and vernacular architecture. Most rarely occurring are the topics on environment and its systems and software for assessment and simulation of ecological behaviour.

Regarding teaching and learning methods, it can be concluded that analysed curricula offer variety of methods for knowledge transfer, depending on the way in which a course is being organized.

5. CONCLUSION

We proposed general green educational themes that should be chronologically introduced into architectural curriculum:

- Environment and its systems,
- Architectural environmental responsibility: Environmental impacts of buildings,
- Life cycle assessment of buildings and building materials,
- Environmentally friendly architecture,
- Bioclimatic and vernacular studies,
- Software and simulation of ecological behaviour,
- Other aspects of sustainability,
- Green urban design and planning,
- Other advanced green themes.

"National differences in terms of curricular structure and requirements of legislative and regulatory bodies" must be taken into consideration, as well (Altomonte, 2012, p. 15).

Comparing our proposal with seven international existing architectural curricula (Faculty of Architecture in Belgrade; University of Patras, Department of Architecture; Faculty of Architecture in Ljubljana; École nationale supérieure d'architecture in Grenoble; Faculty of Technical Sciences, Department of Architecture, Mitrovica; ETH Zurich Faculty of Architecture and Architectural Association School of Architecture in London), it was concluded that programmes on ETH Zurich Faculty of Architecture, in AA School of Architecture, London and École nationale supérieure d'architecture in Grenoble correspond to the largest extent. Significant presence of green themes, comparing to our proposal, was also noticed in curricula of Faculty of Architecture in Ljubljana (comprehensive and broadly integrated themes). More moderate presence of green themes was noticed in curricula of University of Patras, Department of Architecture (isolated, but comprehensively studied mandatory themes), Faculty of Architecture in Belgrade (less comprehensive, but well integrated themes) and Faculty of Technical Sciences, Department of Architecture in Kosovska Mitrovica (less comprehensive, but well integrated themes).

The importance of introducing green themes in architectural educational curricula is already recognized, as shown by our analysis of different schools of architecture. In the next step of curricula upgrading, the themes should be widened and deepened, until the point where environmental design is established as an educational priority and is, as such, introduced in the curriculum at its basis.

REFERENCES

AA Prospectus 2012/2013 (2012). London: Architectural Association School of Architecture. http://www.aaschool.ac.uk/downloads/prospectus/2013-14/AA_PROSPECTUS_12-13.pdf (Accessed: 25 June 2013).

Aesopos, Y. (Ed.), Evripioti, A. (Ed.) (2012). Course Catalogue 2012-13. Patras: Department of Architecture of the University of Patras. http://www.arch.upatras.gr/admin/cms-patra/_images/252395140b31d56868.pdf (Accessed: 17 September 2013).

Allen, S. (2012). The Future That is Now. In: Ockman, J. (Ed.) Architecture School – Three Centuries of Educating Architects in North America (p. 221–229). Washington D.C.: Association of Collegiate Schools of Architecture.

Altomonte, S. (Ed.) (2012). Environmental Design in University Curricula and Architectural Training in Europe. Framework for Curriculum Development. EDUCATE PRESS, University of Nottingham.

Bachelor and Master academic programme at École nationale superieure d'architecture de Grenoble (2013). Grenoble: École nationale superieure d'architecture de Grenoble http://www.grenoble.archi.fr/en/studies/overview.php# (Accessed: 17 September 2013).

Bachelor's Programme and Master's Degree Programme at ETH Zurich Faculty of Architecture (2013). ETH Zurich Course Catalogue. Zurich: ETH Zurich Faculty of Architecture http://www.vvz.ethz.ch/Vorlesungsverzeichnis/sucheLehrangebotPre.do?lang=en (Accessed: 20 August 2013).

Boyer, E. L., Mitgang, L. D. (1996) .Building Community: A New Future for Architecture Education and Practice. A Special Report. Princeton, NJ: The Carnegie Foundation for the Advancement of Teaching.

Buchanan, P. (2012). The Big Rethink: Rethinking Architectural Education. http://www.architectural-review.com/digital-issues/october-2012-1388-volume-ccxxxii/8636590.article (Assessed: 1 November 2012).

Dejesus Estrada, S. M. (2002). Environmental Design and Sustainability: Strategies for Teaching and Learning in UK Schools of Architecture. Doctoral Dissertation. Faculty of Architectural Studies – School of Architecture, University of Sheffield.

Fikfak, A. (2012) Workshops as a Form of Empirical Learning: Researching the Term: "Sustainable Development". In: Gabrijelčič, P. (Ed.), Fikfak, A. (Ed.). The Creativity Game: Urban Design Workshops, Urban Architectural Workshops and Spatial Planning Workshops. Scientific Monograph.First Edition. (pp. 41–47). Ljubljana: University of Ljubljana, Faculty of Architecture.

Gabrijelčič, P. (2012). Workshops as Artistic Practice. In: Gabrijelčič, P. (Ed.), Fikfak, A. (Ed.). The Creativity Game: Urban Design Workshops, Urban Architectural Workshops and Spatial Planning Workshops. Scientific Monograph.First Edition. (pp. 28–33). Ljubljana: University of Ljubljana, Faculty of Architecture.

Guy, S., Farmer, G. (2001). Reinterpreting Sustainable Architecture: The Place of Technology. Journal of Architectural Education, February 2001, Volume 54, Issue 3, pp. 140–148.

Kosanović, S. (2009). Ekološki ispravne zgrade – uvod u planiranje i projektovanje. Monografija. Beograd: Zadužbina Andrejević.

Koželj, J. (2012). Workshops Are the Best Method to Study Architecture and Urbanism. In: Gabrijelčič, P. (Ed.), Fikfak, A. (Ed.). The Creativity Game: Urban Design Workshops, Urban Architectural Workshops and Spatial Planning Workshops. Scientific Monograph.First Edition. (pp. 12–13). Ljubljana: University of Ljubljana, Faculty of Architecture.

Orr, D. W. (2002). The Nature of Design: Ecology, Culture and Human Intention. Oxford University Press, Inc.

Studijski program diplomskih akademskih studija arhitekture 2012/2013 (2012). Beograd: Arhitektonski fakultet. http://www.arh.bg.ac.rs/upload/dokumenta/StudijskiprogramDAS_092008-2.pdf (Accessed: 11 September 2013).

Studijski program osnovnih akademskih studija arhitekture 2012/2013(2012). Beograd: Arhitektonski fakultet. http://www.arh.bg.ac.rs/upload/dokumenta/Studijski_program_OAS_102011.pdf (Accessed: 11 September 2013).

Studijski programi osnovnih i diplomskih akademskih studija arhitekture (2009). Materijal iz fakultetske arhive. Kosovska Mitrovica: Fakultet tehničkih nauka.

Zupančič, T. (Ed.) (2009). Single Masters Study Programme Architecture. Ljubljana: University of Ljubljana, Faculty of Architecture.