Developing Methodological Framework for Addressing Sustainability and Heritage in Architectural Higher Education—Insights from HERSUS Project

Article *in* Sustainability · April 2022

DOI: 10.3390/su14084597

CITATIONS
3

READS
112

8 authors, including:

Aleksandra Djordjevic
University of Belgrade, Faculty of Architecture
31 PUBLICATIONS **102** CITATIONS
SEE PROFILE

Aleksandra Milovanović
University of Belgrade
38 PUBLICATIONS **106** CITATIONS
SEE PROFILE

Milica Milojevic
University of Belgrade
12 PUBLICATIONS **38** CITATIONS
SEE PROFILE

Ana Zorić
University of Belgrade - Faculty of Architecture
9 PUBLICATIONS **65** CITATIONS
SEE PROFILE

sustainability

MDPI

Article

Developing Methodological Framework for Addressing Sustainability and Heritage in Architectural Higher Education—Insights from HERSUS Project

Aleksandra Đorđević, Aleksandra Milovanović *, Milica P. Milojević, Ana Zorić, Mladen Pešić, Jelena Ristić Trajković, Ana Nikezić and Vladan Djokić

Faculty of Architecture, University of Belgrade, 11000 Belgrade, Serbia; aleksandra.dj@arh.bg.ac.rs (A.Đ.); m.milojevic@arh.bg.ac.rs (M.P.M.); ana.zoric@arh.bg.ac.rs (A.Z.); mladen.pesic@arh.bg.ac.rs (M.P.); jelena.ristic@arh.bg.ac.rs (J.R.T.); ana.nikezic@arh.bg.ac.rs (A.N.); vdjokic@arh.bg.ac.rs (V.D.)
* Correspondence: alekmil@arh.bg.ac.rs

Abstract: This paper addresses the challenges of architectural higher education to cope with a state of continuous change within the relationship between heritage and sustainability. The initial assumption is that research activities based on design taxonomies—terms used in architectural discourse of heritage and sustainability—followed by fruitful analysis and discussion can contribute to the advancements in curricula design and development. Accordingly, the paper aims to develop a new methodological framework for addressing sustainability and heritage, enriching curricula design and assessment strategy. Data collection on identification and analysis of terms was carried out within the Erasmus+ Strategic Partnership titled Enhancing of Heritage Awareness and Sustainability of Built Environment in Architectural and Urban Design Higher Education (HERSUS). After the process of filtering, interpretation, and comparison of project findings, a three-fold comprehensive analysis was conducted: (a) learning outcome quantitative analysis, (b) cross-cutting analysis of spatial scales and course types, and (c) synthesis. The paper results in the methodological framework that reinforces different pedagogical approaches to heritage and sustainability derived as a result of the applied research process. The main conclusions are concerned with the applicability of the methodological framework, designed for the improvement of existing and development of new comprehensive courses and programme contents.

Keywords: sustainability; heritage; architectural education; Erasmus+ projects; methodology

Citation: Đorđević, A.; Milovanović, A.; Milojević, M.P.; Zorić, A.; Pešić, M.; Ristić Trajković, J.; Nikezić, A.; Djokić, V. Developing Methodological Framework for Addressing Sustainability and Heritage in Architectural Higher Education—Insights from HERSUS Project. *Sustainability* **2022**, *14*, 4597. https://doi.org/10.3390/su14084597

Academic Editor: Miguel Amado

Received: 2 March 2022
Accepted: 7 April 2022
Published: 12 April 2022

1. Introduction

The sphere of architectural higher education has continuous changes and challenges, including a lack of concern for sustainability, the growth of faceless urban sprawl and deregulation, the deterioration of historic fabric, and the loss of local traditions and identities. In this context, schools of architecture are faced with a new set of challenges emerging from the contemporary debate on architectural research, professional engagement, the broader cultural framework, as well as the national and international institutional environment [1]. Research on this thematic framework has a wide scope (from energy efficiency to landscape planning) and multi-scale approach (from single spatial unit to the region), thus demanding architectural education to be more strongly positioned in the context of a "knowledge-based society" with the intention that future professionals can think in a wide scope and act on multiple scales. This paper stresses the importance of critical thinking and highlights the complexity of developing an adequate methodological framework for addressing sustainability and heritage in architectural higher education. The introduction section is divided into three parts: (1) General Background—discussion on general issues and motivation behind the research, (2) Educational Framework: State of the Art—providing insights into

current research perspectives and gaps, and (3) Objectives and Paper Outline—defining the paper purpose and overall structure.

1.1. General Background

Sustainable architecture strives to integrate consideration of cultural, social, economic, environmental, and technical aspects of planning, design, and building to achieve the right balance between them and improve citizens' quality of life and well-being. In this framework, the European Association for Architectural Education (EAAE) recognises that "architectural education is at the service of societies, it is embedded within, and it recognizes the value of heritage, tradition, and contemporary culture" [2] (p. 1).

Over the last decade, a series of affirmative and research-stimulating declarations, policy positions, and strategies directed both towards practice and education were adopted. These documents recognise challenges and perspectives for enhancing issues of sustainability and heritage in the overall research framework of architectural and urban design. Starting from the Agenda 2030 [3] supported by the professional architectural community through the UIA (International Union of Architects) SDG Dhaka Declaration [4], current research practice requires not only the overcoming of the autonomous engagement of individual goals but the achievement of their united and cross-cutting action. From 17 goals defined as a basis for the sustainable transformation of the world, this research advocates the overlap and joint engagement of two goals [3,4]: (1) to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (SDG 4), and (2) to make cities and human settlements inclusive, safe, resilient, and sustainable (SDG 11). The potential for connecting these two goals is reflected in the three-fold intention to profile heritage-centred and sustainable-oriented future professionals (1) to strengthen the conditional relationship between practice and education, (2) to bridge the gap between them, and (3) to raise awareness of sustainability of the built environment in the higher education context. This viewpoint is also confirmed within the framework of the UNESCO/UIA Charter for Architectural Education [5], where architectural heritage education is stressed as an essential scope (1) for understanding sustainability, the social context, and sense of place in building design, and (2) for transforming the professional architectural mentality and creative design methods as a part of a wider cultural process.

Recognising the crucial contribution of a high-quality built environment for achieving a sustainable society, the European Ministers of Culture adopted the Davos Declaration [6] in January 2018, introducing the concept of "Baukultur". This concept promotes the idea of an improved, high-quality built environment aimed at improving the sense of place. Accordingly, Cultural Heritage is recognised as a crucial component of high-quality "Baukultur", stressing that "the way we use, maintain and protect our cultural heritage today will be crucial for the future development of a high-quality built environment" [6] (p. 3). Following this notion, creating innovative design strategies and their application in the design phase is the right time to take action towards circularity [7], which consists of a value-oriented hierarchy of actions and is based on rendering the relationship between the two entities—sustainability and heritage.

1.2. Educational Framework: State of the Art

Considering the new priorities of architecture schools in a state of uncertainty [8], it was recognised that environmental sustainability is a generator of new and renewed subject areas that should be introduced into research programmes and transferred to design practice. Current research initiatives that are geared around architectural education include, among others, the New European Bauhaus (NEB) [9], Sustainable Development Goals (SDGs) [3], and European Green Deal [10]. Core values of these initiatives, which can be considered the overarching thematic framework of contemporary architectural education, include "sustainability, aesthetics, and inclusion to harness the power of design, culture, and the 'arts'" [9]. NEB highlights the importance of high-quality adaptive reuse of built heritage within the proposal for future action. A culture-led and design-led approach is

recognised as an important strategy for sustainable cities and society in this framework. At the same time, cross-domain and multi-perspective knowledge exchange is necessary for achieving environmental sensitivity. Accordingly, this approach is in line with an indicative strategy of Education 2030 (Incheon Declaration and Framework for Action for the implementation of SDG4) that emphasises that need to acknowledge that culture has a key role in achieving sustainability, "taking into account local conditions and culture as well as building awareness of cultural expressions and heritage, and their diversity" [11] (p. 50).

Concerning associations dealing with education in architecture and urban design, it is possible to single out a series of events organised by the EAAE aimed at creating a ground for debate and directed towards creating proposals, ideas, and views on the future of architectural education and research. The construct of heritage and sustainability and their conditionality in the contemporary framework of architectural education and practice was at the core of this debate, including: climate change between sustainability and responsibility (2010) [12], conservation and transformation (2011) [13], conservation and regeneration of the modernist neighbourhoods (2013) [14], conservation and reconstruction of small historical centres (2015) [15], adaptive reuse of heritage (2017) [16], preserving the tangible and intangible values (2019) [17], and conservation and demolition (2020) [18]. The presented topics are primarily based on the consideration of different heritage design strategies and the potential of their application through the autonomous application of value-based, method-based, and instrumental research. In that sense, the above-mentioned studies introduced new views on heritage interpretation in architectural discourse. Nevertheless, their coherent research and need to connect all three research domains (value–method–instrumental) are still important challenges and assignments for academics.

While debating on the triad heritage–education–sustainability, the current research framework on designing an innovative pedagogy for sustainable development in higher education includes studies directed toward developing (1) an integrated design process such as value-based design [19,20] and user-centred design [21] towards enhancing social well-being, (2) supportive strategies for improving the knowledge base of stakeholders [22], and (3) new skills due to the synergy between the humanities and digital world [23] such as GIS [24], 3D approaches [25], and Augmented Reality [26]. These studies provide clear indications of the need for further enhancement of architectural heritage education by examining how innovative Tools can contribute to creating socially-oriented and user-centred Design Approaches in different "re" actions (regeneration, reuse, restoration, redevelop, reconstruction, etc.). In this regard, one of the leading challenges for researchers is the need to develop research that inter-relates leading concepts (Notions), design strategies (Actions and Approaches), and Tools for their implementation.

1.3. Objectives and Paper Outline

This study is underpinned by the domain theory, recognised as a ground for the constitution of the taxonomy of concepts in sustainability and heritage. It provides a basis for an ordering and interpretation of phenomena, and as such, according to Bax and Trum, offers a conceptual tool for a systematic, consistent, and complete description in the field of architecture [27]. Having in mind challenges emphasised within Educational Framework: State of the Art, where various concepts are agglomerated and perceived incoherently, this research outlines the potential of methodology that gives weight and importance to the terms used in the architectural discourse of heritage and sustainability.

Based on the identified state-of-the-art educational framework derived from the perspectives on declarations and policies, association standpoints, and current research, several research gaps were identified: (1) lack of representation of Cultural Heritage as a key role in achieving sustainability [11], (2) the need for creating innovative approaches that connect culture and design [9], (3) incoherent integration of three research domains—value, method, and instrumental [7], and (4) disconnection of leading concepts (Notions), design strategies (Actions and Approaches), and Tools. In addition to that, the gap is also perceived in the

insufficient connection between sustainability and heritage in the field of architectural education, mainly in (1) content-based issues—resulting from inconsistent application of existing terminology, and (2) format-based issues—insufficient use of existing types of courses and surpassed learning environment. In order to overcome these issues, the paper uses taxonomy for gaining wider insight into the content and coherence between phenomena (terms) and aims to develop a new methodological framework for addressing sustainability and heritage and hence enrich curricula design and assessment strategy.

By defining the group of terms perceived as engaging contents of learning (Notions, Heritage Types, Design Approaches, Design Actions, and Tools), the paper reconsiders the current educational framework (which includes, among other things, multiple scales, thematic scope, types of courses, and learning outcomes) contributing to the integration of three research domains: value, method, and instrumental. The specific objective of this paper is to analyse selected terms concerning (1) spatial scales and course types and (2) learning outcomes in order to conceptualise them as a supporting structure around which future curricula in architectural schools can be built, and hence respond to content- and format-based issues. Following these objectives, two research questions arise: (1) what is the relationship between the spatial scales and learning types within specific terms and groups of terms, that is, whether it is possible to identify specific gaps and satiation, and (2) what is the representation of expected learning outcomes in the analysed domain of heritage and sustainability concerning high-quality standards of higher education?

The first part of the paper presents the research context. It provides insight into the Erasmus+ Strategic Partnership—Enhancing of Heritage Awareness and Sustainability of Built Environment in Architectural and Urban Design Higher Education (HERSUS). The second part of the paper presents the Materials and Methods applied in this research. Data collection on term identification and analysis was carried out within HERSUS project activities and intellectual outputs, while the process of filtering, interpretation, and comparison of project findings followed by three-fold comprehensive analysis was conducted for the purpose of this paper ((1) learning outcome quantitative analysis, (2) cross-cutting analysis of spatial scales and course types, and (3) synthesis). The third part of the paper presents the Results and Discussion divided into two parts: (1) analysis that follows identified group of terms, and (2) synthesis toward developing a methodological framework. The Conclusion summarises the findings and highlights essential aspects for creating a methodological framework for addressing sustainability and heritage in architectural higher education.

2. Research Context: HERSUS Strategic Partnership

Building on the idea of contributing both to the sustainable architecture and sustainable treatment of heritage, the Erasmus+ project Enhancing of Heritage Awareness and Sustainability of Built Environment in Architectural and Urban Design Higher Education (HERSUS) was launched in 2020. It is being implemented within the Strategic Partnerships for higher education action. Having in mind the strategic nature of the action and aforementioned challenges of contemporary higher education in architecture, the need for strategic thinking was recognised, and a consortium was formed in a manner to provide multi-contextual (various socio-economic characteristics), multi-cultural, and multi-scale approaches to heritage, uniting architectural schools that deal with scales from Landscape Scale to Construction Detail. Accordingly, HERSUS brings together five Higher Education Institutions (HEIs) from five different European countries: (1) the University of Belgrade, Faculty of Architecture—UBFA, as a Lead organisation (Serbia), (2) Iuav University of Venice—Iuav (Italy), (3) the University of Cyprus, Department of Architecture—UCY (Cyprus), (4) the Aristotle University of Thessaloniki, School of Architecture—AUTH (Greece), and (5) the University of Seville, UNESCO Chair on Built Urban Heritage CREhAR in the digital era—USE (Spain).

Following the line of reasoning of the most important declarations and charters in architectural education [2,5] and heritage [28], the goals of the HERSUS project are conceptualised to (1) analyse critical topics for the modernisation and development of higher

education in the field of architectural and urban design across Europe, specifically with the focus on the social and educational value of European Cultural Heritage, (2) develop new courses and programmes for a new profile of an architect/urban designer trained in the broad architectural domain, who possesses technical, technological, socio-humanistic, and artistic skills, (3) strengthen the teaching and pedagogical competences of academic staff, aimed at building a new profile of an architectural educator capable of accepting responsibility for the improvement of education and training of the future architects to enable them to meet the expectations of 21st century societies worldwide for sustainable human settlements in every cultural milieu, and hence (4) contribute to the stable and sustainable education framework complementary to the globally established goals in the field of architectural and urban design education [29].

The specificity of the HERSUS project lies in the fact that there is a conditionality between the six intellectual outputs (IO). Accordingly, intellectual outputs are both conceptualised as inputs for each other but also as an integral result of the project that is gradually evolving in its complexity with the common goal of establishing a framework for improving higher education in architecture and urban design, specifically in the field of heritage and sustainability (Figure 1). The first intellectual output (IO1), led by UCY, presents the "Best practices on educating sustainability and heritage", divided into three parts: (1) case studies of educational courses from participating HEIs, (2) case studies of built projects in participating countries, and (3) critical review of national policies and regulations [30]. The second intellectual output (IO2), led by AUTH and developed in parallel with IO1, is "Questionnaire for the State of the Art" to understand the standpoints and views of international "experts" and "students" in establishing high-quality standards regarding teaching in the field of sustainability of the built heritage [31,32]. The third intellectual output (IO3), "Statements on Teaching through Design for Sustainability of the Built Environment and Heritage Awareness", led by UBFA, aims at reaching a consensus among the HERSUS consortium on concepts and fields of action relevant to sustainability and heritage [33]. The fourth HERSUS intellectual output (IO4), led by Iuav, is the "Sharing Platform", designed as an open repository of educational resources [34]. The fifth intellectual output (IO5), led by UBFA, is the "Book of courses", which will include new, competence-based courses, while the final, the sixth intellectual output (IO6), led by USE, is the "International handbook for students on Research and Design for the Sustainability of Heritage" that will be developed in the final phase of the project.

The development of intellectual outputs is lined up with five learning, teaching, and training activities: Seminar for Teachers: Teaching Through Design for Sustainability of the Built Environment and Heritage Awareness (LTT1) [35], student workshops (LTT2, LTT3, LTT4), and Training for Teachers: Design Studio-based Methods and Techniques (LTT5).

Keeping in mind that the realisation started in 2020, the project delivers intellectual outputs and strives to implement teaching, training, and learning activities in cooperation with the private, public, and civil sectors. Following the project goals, the focus of this paper is on the critical analysis of the results of the third intellectual output (IO3). As presented in Figure 2, the development of IO3 was significantly determined by the following results: IO1—input regarding new approaches, new Design Actions, contemporary Tools, highlighting cross-cultural policy gaps and strengths; LTT1—input in understanding new challenges, opening up substantial discussion on Notions and meanings, demystification of various types of heritage; and IO2—insight into student and expert points of view regarding gaps and perspectives in the field of higher education related to sustainability, heritage, and inter-relation between sustainability and heritage.

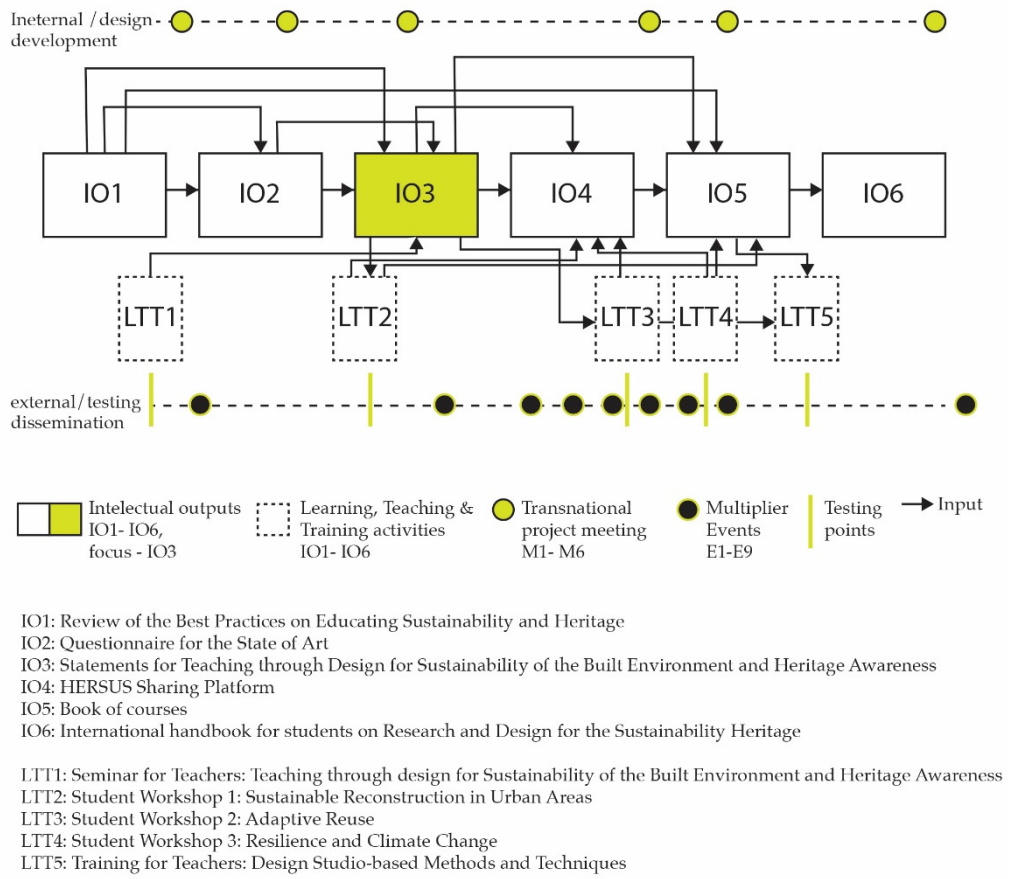


Figure 1. Diagram of HERSUS activities: interdependencies, inputs, and position of IO3 as the outcome in focus.

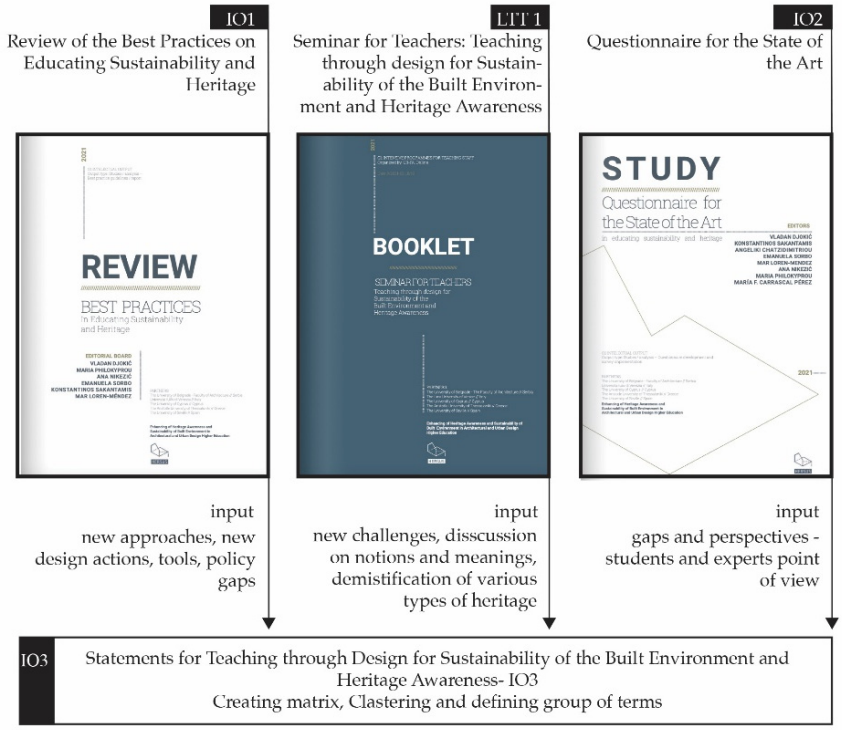


Figure 2. HERSUS project inter-relation between first three intellectual outputs and LTT activity.

3. Method and Materials

This section is structured in four parts: (1) Research Conceptualisation, (2) Matrix of Term Development, (3) Term Analysis, and (4) Comprehensive Analysis of Terms.

3.1. Research Conceptualisation

The research is positioned at the intersection of two scientific fields of design research [36]—phenomenology and epistemology. The domain of design taxonomies is studied within the phenomenology framework—terms relevant to the relationship between design and sustainability of heritage are examined. Parallel to this, the domain of design pedagogy is studied within an epistemology framework to recognise the principles and practices of architectural education in the field of heritage and sustainability, hence establishing an agenda for future action in architectural schools.

The research is based on "'vademecum", a system of terms relevant to the study of the thematic framework of heritage and sustainability in architectural and urban design. The research starts from the premise that it is first necessary to develop a matrix of terms (taxonomy), then analyse each term, and finally make a cross-cutting analysis to provide ground for discussing content, methods, guidelines, and future structure of the curriculum in architectural higher education (pedagogy).

The research was conducted in three related and mutually conditioned phases so that the first two phases are focused on data collection and term analysis (IO3 design and development), while the third phase is analytical in nature, focused on cross-cutting analysis on a comprehensive level (IO3 systematisation) (Figure 3). The overview of data source, collection, and analysis is provided within Table 1. The following subsections explain the research process and the approach of each phase.

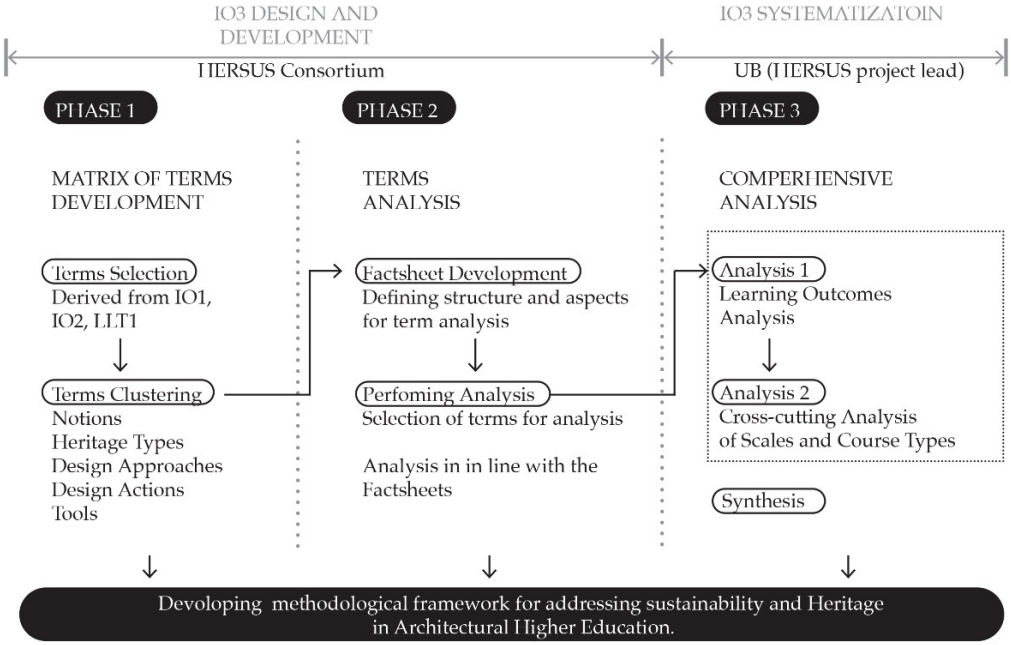


Figure 3. Diagram of Research Strategy.

Table 1. Data source, collection, and analysis.

Research Phase	Research Activity	Data Type	Source/Connections	Research Performed by	Method	Outputs
Phase 1	Developing matrix of terms • Term selection • Term clustering	Spreadsheet (Table 2)	Input from: IO1, IO2, LTT1 Input for: IO3, IO4	HERSUS consortium	Collaborative iterations (adding, omitting, renaming, regrouping, reordering)	75 terms clustered in 5 groups of terms
Phase 2	Terms analysis • Factsheet development • Performing analysis	Factsheet	Input from: Phase 1 Input for: IO5	Individual researchers from HERSUS External experts	Critical qualitative research	75 completed Factsheets
Phase 3	• Analysis 1: learning outcome analysis	Spreadsheets	Input from: Phase 2 Input for: Synthesis	UB-FA HERSUS research group/ authors of the paper	Quantitative analysis	Coverage of learning outcomes for 5 groups of terms + One synthesis coverage spreadsheet
	• Analysis 2: Cross-cutting analysis of spatial scales and course types	Diagrams			Data visualisation (diagramming)	Coverage of learning contents for 5 groups of terms
	• Synthesis	Spreadsheet; Diagram	Input from: Analysis 1 and Analysis 2 Input for: Further research and action		Data synthesis	Methodological framework

Table 2. Matrix of Terms.

Notions	Heritage Types	Design Approaches	Design Actions	Tools
• Cultural and Collective Memory • Urban Narratives • Resilience • Urban Patterns • Heritage genealogy • Cultural Studies, Cultural Diversity • Cultural Identity • Cultural Enhancement • Cultural Heritage	• Modern Heritage • Industrial Heritage • Vernacular Heritage • Performative and Affective Heritage • Tangible and Intangible Heritage • Cultural Landscape • Urban Heritage • Monumental Heritage • Emerging Heritage • Documentary Heritage • Archaeological Heritage • Heritage Sites • Natural Heritage • Military Heritage	• Heritage Reprograming • Construction-Centred Design • Environmentally-Responsive Design • Energy-Conscious Design • Climate-Sensitive Design • Whole-Lifecycle Design • Carbon-Neutral Design • Passive/Active Sustainable Design • Community Building and Representation • Renewable Energy Integration • Historical Urban Landscape—HUL • Design for All in Cultural Heritage • Thermal Comfort Design • Visual Comfort Design • Green Blue Infrastructure • Acoustic Comfort Design • Multi-scale Design Approach	• Preventive Conservation • Integral Heritage Protection • Restoration • Redevelopment • Adaptive Reuse • Conservation • Consolidation • Temporary Planning and Meanwhile Spaces • Refurbishment/Rehabilitation • Heritage Management • Nature-Based Solutions • Public Advocacy for Social Participation • Circular Economy • Developing Cultural Routes and Itineraries • Microclimate Improvement	• Image Rectification • 3D printing • As-Built/As-Found Recording • Space Syntax • Morphogenesis Study • Mapping, Documenting, Cataloguing • Use of GIS Technology • Historic Building Information Modelling—HBIM • Collaborative Cartography • Collaborative workshop—CHARRETTE • Artistic Approaches (Photography, Video, Performance) • Heritage Value Matrix • Thermal/Energy Simulation • Lighting Simulation • (Post)-occupancy evaluation • Petrography • Conservation Status Evaluation • Archaeometry • Digitalisation of Heritage

3.2. Matrix of Term Development

The first research phase aimed to create a matrix of terms developed from the inputs from HERSUS IO and LTT activities. The terms were derived from (1) IO1: Review—Best Practices in Educating Sustainability and Heritage [30], specifically from explanations of built projects, pedagogical models, and policies in a field of Cultural Heritage, (2) IO2: Questionnaire for the State of the Art [32], particularly from analysis of "expert" and "student" questionnaires, and (3) LTT1 activity—Seminar for Teachers: Teaching Through Design for Sustainability of the Built Environment and Heritage Awareness, specifically from keynote lectures and round table discussions [33]. After creating the initial matrix of terms, their clustering was carried out in 5 relevant groups, Notions/Ideas, Heritage Types, Design Approaches/Tactics, Design Actions/Strategies, and Tools, that have undergone several collaborative iterations of group renaming and term regrouping and reordering, adding new and omitting existing terms. In the first sample of terms, 66 terms were proposed, while the final sample was extended to 75 terms—9 Notions, 14 Heritage Types, 17 Design Approaches, 15 Design Actions, and 20 Tools (Table 2).

3.3. Term Analysis

The second research phase was aimed at analysis of terms. The first step in this phase was to create the Factsheet structure related to the analysis. The Factsheet was structured in the following sections:

- General Definition/Explanation of term;
- List of references relevant to the term;

- Built project examples relevant to analysed term;
- Content (WHAT?)—defining relevant content for learning and teaching on a specific term;
- Methods (HOW?)—identifying relevant methods for learning and teaching on a specific term;
- Goals (WHY?)—establishing learning goals in line with a specific term;
- Course type—choosing course type/types which could engage specific terms;
- Scale—identifying scale/scales which is/are relevant for learning on a specific term;
- Learning outcomes—describing expected learning outcomes for students/competencies which they could obtain through learning on a specific term;
- Teachers' competencies—explaining necessary competencies of teachers who could be engaged in the teaching process of a specific term.

The second step in this phase involved the selection of terms for analysis following the structure of Factsheets by 61 researchers from the HERSUS consortium, along with invited experts. According to their professional activity and expertise, researchers chose one to two terms for critical qualitative research analysis to obtain the most relevant insight into the analysis of all terms within an architectural discourse of heritage and sustainability.

3.4. Comprehensive Analysis of Terms

The third research phase is aimed at comprehensive analysis of terms of five engaged learning contents (group of terms). It was conducted in two analysis tracks: (1) learning outcome analysis and (2) cross-cutting analysis of spatial scales and course types.

In this research, learning outcomes are perceived as an important element for quality assurance in the process of curricula design and development. The analysis of learning outcomes follows 11 general criteria (GC), each with 3 sub-criteria, defined by the Royal Institute of British Architects (RIBA) and used for qualification prescription and programme validation [37] (Appendix A). Acknowledgement of the relevance of RIBA criteria is confirmed by the Education Commission of UIA (International Union of Architects) by applying them in UNESCO-UIA Study Program Validation, which aims to set an international standard for excellence in architectural education [38]. Accordingly, this analysis engages a quantitative method for identifying (1) the percentage of learning outcomes that are covered by a specific term (table rows, 100% means that specific term, by the perception of the researcher, covers all 33 learning outcomes), and (2) the percentage of terms that cover a specific learning outcome within one group of terms (table columns, 100% means that specific criteria is perceived to be expected in teaching each of the terms). The goal of the analysis is to (1) recognise which learning outcomes can be acquired through the implementation of a particular term within the group of Notions, Heritage Types, Design Approaches, Design Actions, and Tools, and to (2) identify the highest percentage (up to 3 highest values marked in green) and lowest percentage (up to 3 lowest values marked in red) of learning outcomes.

Cross-cutting analysis of spatial scales and course types engages the diagramming method in order to (1) map the coverage of a particular term within the group of Notions, Heritage Types, Design Approaches, Design Actions, and Tools in relation to the matrix of spatial scales and course types, and to (2) provide insight to the gaps and potentials for future curricula development based on identified coverage. This analysis is based on two entities that are considered as a relevant matrix for architectural curriculum design as follows: (1) understanding the spatial scale which is engaged within the curricula—relies on the tendency of multi-scale research and design from detail scale to Landscape Scale in order to understand complex cause-and-effect relationships on different spatial scales, and (2) understanding the nature and learning environment of the different types of courses—relies on the need to engage different formats and learning environments that apply to specific learning contents. Input for analysis are data from term analyses related to marking course type that could engage specific terms and identify the scale which is relevant for learning a specific term. The basic framework for diagramming is developed on two axes: (1) the vertical axis (courses)—Design Studio (DS), Intensive

Workshop (IW), Theory Course (TC), Seminar (short comprehensive) (SSC), Laboratory Work (LW), Research Thesis (RT), Field Work (FW), Internship Practical Training (IPT), and Other (O); and (2) the horizontal axis (spatial scales)—Construction Detailing and Interior Design Scale (XS), Architecture: Buildings Scale (S), Urban Design Scale (M), Urban and Regional Planning Scale (L), and Landscape Scale (XL). Concerning the framework defined by the axes, two types of diagrams were created, the mapping diagram and the coverage diagram, used as two perspectives for the interpretation of results. The mapping diagram enables the variety within each group of terms to be foreseen, specifically the relation of each term to both axes (scale and course type). This diagram is the basis for generating a coverage diagram that offers the possibility of decoding coverage ("+" that identifies the highest coverage, and "–" that identifies the lowest coverage).

The discussion framework was developed by comparing the table and these two diagrams and organised to follow five groups of terms. Following this step, the summary table of learning outcomes was produced and used to generate a ground programme structure based on well-balanced learning outcomes.

In the last step of the third phase of the research, an endeavour was made to formulate the applied research procedure as a methodological framework for addressing sustainability and heritage in architectural higher education. This step was performed by data synthesis to bring together data from a set of inter-related studies and activities (Phase 1, Phase 2, and Analysis 1 and 2 from Phase 3) and directed towards drawing conclusions in the form of an algorithm. The methodological framework was designed as a set of action steps (what) followed by a body of methods (how) and research actors (who).

4. Results and Discussion

This section is structured according to the five groups of term classes (learning contents). It presents the results of both analysis tracks by discussing them through four steps: (1) brief introduction of the term group concerning architectural discourse of heritage and sustainability, (2) explanation of learning outcomes based on quantitative analysis, (3) recognising gaps and perspectives based on mapping and coverage diagrams, and (4) discussion about recognised gaps and perspectives within the group of terms concerning architectural education. After explaining the analysis, each term group is discussed in terms of future action.

4.1. Notions

Notions that are creations of discursive practices of heritage and sustainability are present in the education of architects and have diverse meanings. In architectural discourse, the Notions that derive from heritage discourse are dominant, while terms such as Resilience and Diversity have been embraced from the discourse of sustainability. Selected terms such as Cultural and Collective Memory, Cultural Identity, Cultural Enhancement, Cultural Heritage, and Urban Narratives indicate the tendency of architects to talk about heritage and sustainability simultaneously through a broader notion of culture. Following this line of reasoning, the individual Notion analysis results and their representation in different forms of teaching were interpreted.

Commonly, the understanding of Notions/Ideas, and concepts is primarily acquired in courses that are mainly theoretical and are realised in the form of lectures, ex cathedra, or interactive (Theory Course (TC), Seminar (short comprehensive) (SSC), Research Thesis (RT)). The two main questions that arise are (1) which Notions provide what kind of learning outcomes and at what spatial level are they studied, and (2) are there Notions that are studied in other forms of teaching (types of courses) in addition to the listed types of theoretical courses?

The first perspective of learning outcomes (table rows) detects Resilience (82%) as the most extensively used notion that covers the broadest range of knowledge (Figure 4). This term as a concept became attractive for practitioners and academics only recently, when it evolved from the disciplines of materials science and environmental studies. Consequently,

detected comprehensive coverage corresponds, on the one hand, to its liberal use and, on the other hand, to the challenge to explore a wide range of its applications. On the contrary, Urban Narratives (18%), Urban Patterns (18%), and Cultural Identity (12%) are Notions that have relevance to a smaller number of outcomes and meet a relatively narrow number of specific GC.

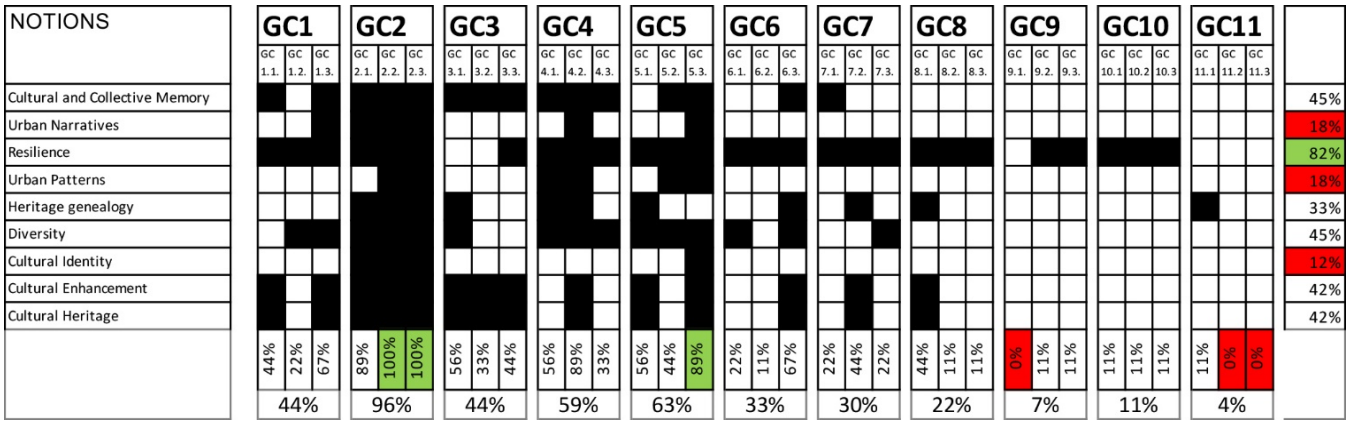
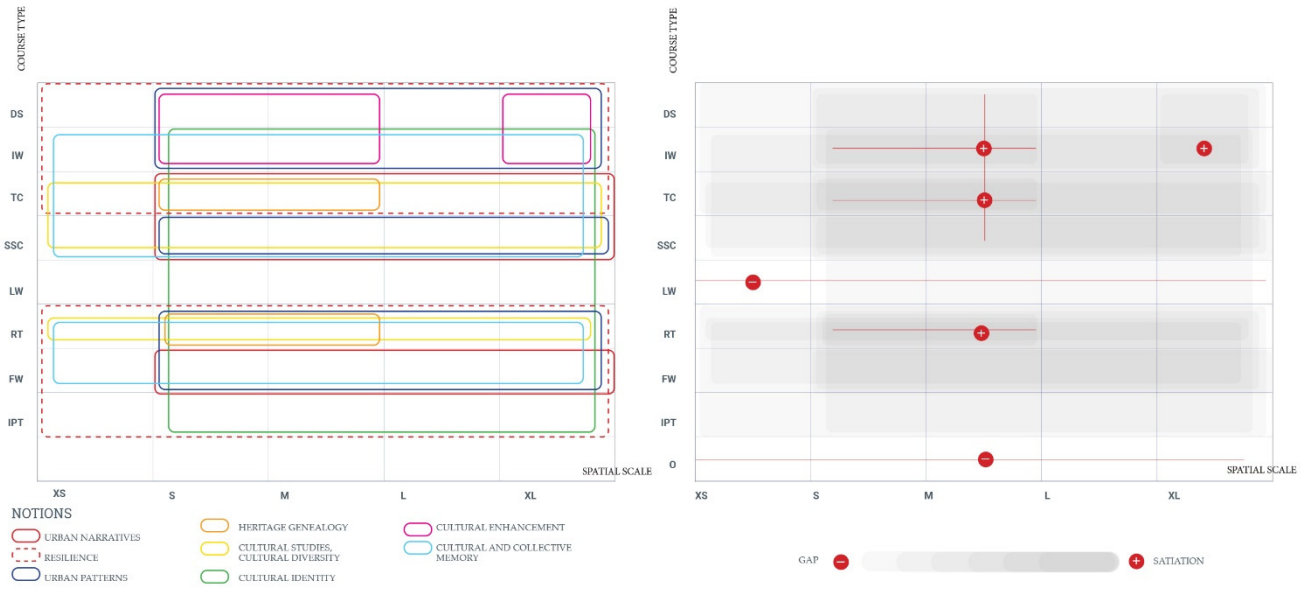


Figure 4. RIBA general criteria mapping concerning individual terms within Notions group of terms (index: black–expected GC; green–up to 3 highest values of GC coverage, red–up to 3 lowest values of GC coverage).

Looking from the perspective of individual GC (table columns), the total coverage (100%) of learning outcomes concerning Notions refers to the influence of history and theory on the spatial, social, and technological aspects of architecture (GC2.2) as well as the application of relevant theoretical concepts to studio design projects, demonstrating a reflective and critical approach (GC2.3) and the way in which buildings fit into their local context (GC5.3). On the contrary, it is evident that minimum coverage of general criteria (0%) appears when it comes to providing knowledge on principles associated with designing optimum visual, thermal, and acoustic environments (GC9.1), the professional inter-relationships of individuals and organisations involved in procuring and delivering architectural projects, and how these are defined through contractual and organisational structures (GC11.2), and the basic management theories and business principles related to running both an "architect's" practice and architectural projects, recognising current and emerging trends in the construction industry (GC11.3). This indicates a critical gap between education and regulation, thus raising questions about introducing additional thematic units and other types of appropriate courses exploring the recognition of Notions in institutional frameworks and vice versa.

When looking at the Notions coverage diagram (Figure 5), it becomes clear that most Notions are studied on an Urban Design Scale (M). Furthermore, it was noticed that all types of courses are represented at each scale level, except Laboratory Work (LW). Concerning Laboratory Work (LW), it was additionally noticed that the lowest level of representation of Notions appears within this course type. On the contrary, both Theory Course (TC) and Research Thesis (RT) are predominantly recognised as learning course types through which knowledge on selected Notions can be acquired and expanded.



(**a**) (**b**)

Figure 5. Cross-cutting analysis of the relationship between course type (vertical axis) and spatial scale (horizontal axis) concerning Notions: (**a**) mapping diagram, (**b**) coverage diagram.

When considering the multi-scale approach, it is noteworthy to mention that Seminar (short comprehensive) (SSC) is the type of course that provides the necessary knowledge in each spatial scale within all analysed terms (except Resilience and Culture Enhancement).

Intensive Workshop (IW) is the course type relevant to most of the analysed Notions identified on the scale of the Urban Design (M) and Landscape Scale (XL). Resilience, Cultural Studies/Cultural Diversity, and Cultural and Collective Memory are terms that are explored mostly at the spatial scale of Construction Detailing and Interior Design Scale (XS). Based on this observation, the identification and interpretation of analysed Notions at the level of detail could be further elaborated. For future activities, it is necessary to critically consider the possibilities of exploring terms of Urban Narratives, Urban Patterns, Heritage Genealogy, Cultural Identity, Culture Enhancement on a more detailed scale.

Basic understanding and adoption of Notions acquired in theoretical courses can be further expanded through the deconstruction of the meaning of Notions or application in other spatial levels. Consequently, Notions can be explored (through organised discussions) in studio design environments and workshops and through recognition and application in all spatial levels. The term Heritage Genealogy is underrepresented in the spatial levels of the Construction Detailing and Interior Design Scale (S), Urban and Regional Planning Scale (L), and Landscape Scale (XL), which opens new perspectives for identifying and understanding this term. The mapping diagram highlights Laboratory Work (LW) as a neglected form of teaching that indicates the need to introduce contemporary tools in this area of education of architects. It is also essential to develop other forms of courses that are transdisciplinary, or those that establish the relationship between different fields, e.g., the philosophy of language–architecture; anthropology–architecture; the study of material culture–architecture, to enable specific profiling of experts in the field of heritage and sustainability. Additionally, there is a need to enrich the teaching process with activities that enable the positioning of the analysed Notions concerning the regulative framework and institutional practices, for which the engagement of experts is crucial. Mutual exchange of experience and knowledge is necessary for this type of knowledge. It is necessary to consider other forms of teaching based on action research, such as Intensive Workshops of experts, teachers, and students.

4.2. Heritage Types

Heritage Types, by their denomination, implies that specific and general classification or typology of heritage could be established. Heritage classification is based on its prospective benefits, interests, or values. Depending on tangible characteristics and intangible attributes, heritage can appear in varied types and be followed by associated terms aligned with the complex, contested, and multivalent nature of the term itself. The conceptual evolution of its different values, meanings, and forms is aligned with the development of understanding of heritage and insight into its relevance and value to society in a wide range of time. Depending on the elements under consideration and in order to explore distinctions and similarities within prescriptive definitions, fourteen terms were analysed—Modern Heritage, Industrial Heritage, Vernacular Heritage, Performative and Affective Heritage, Tangible and Intangible Heritage, Cultural Landscape, Urban Heritage, Monumental Heritage, Emerging Heritage, Documentary Heritage, Archaeological Heritage, Heritage Sites, Natural Heritage, and Military Heritage.

While looking from the first perspective of learning outcome analysis (table rows), it could be identified that Archaeological Heritage (76%) and Heritage Sites (79%) cover the broadest range of learning outcomes while Vernacular Heritage (21%), Cultural Landscape (21%), and Documentary Heritage (0%) are at the opposite side of this spectrum, covering the least GC (Figure 6). Regarding comparing individual Heritage Types, the most extreme case is Documentary Heritage, which is not associated with any learning objective, and with Heritage Sites that address the highest percentage of learning outcomes. This contrast in covering GC could be explained by general recognition and tradition of the term of Heritage Sites and novel acknowledgement of Documentary Heritage in the family of Heritage Types.

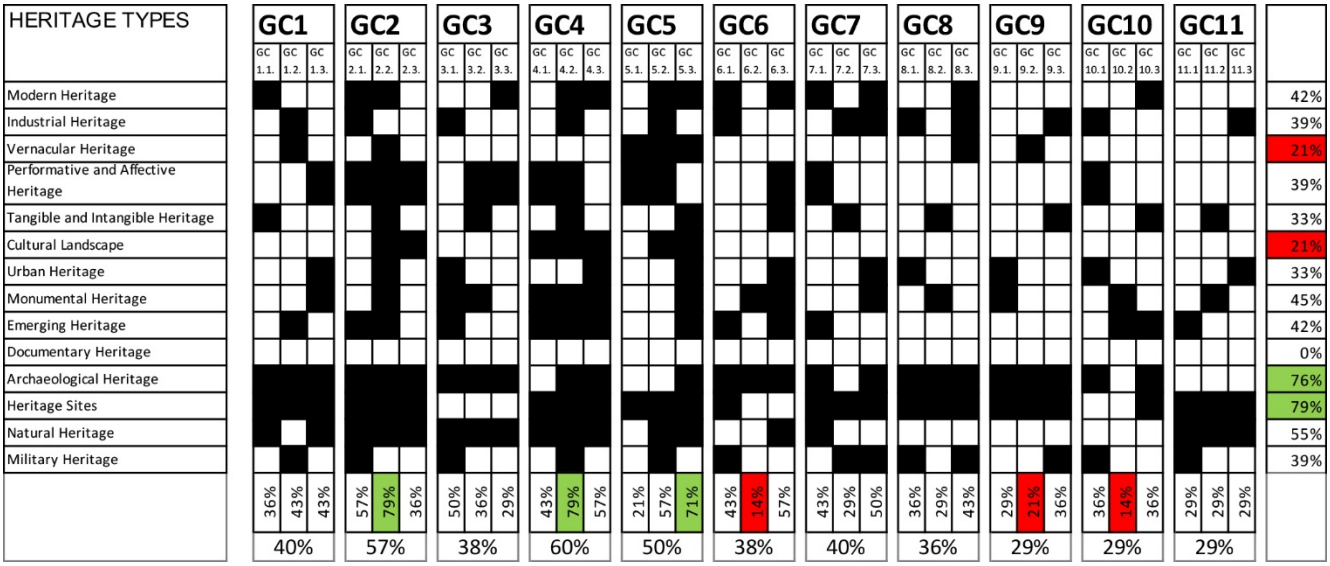
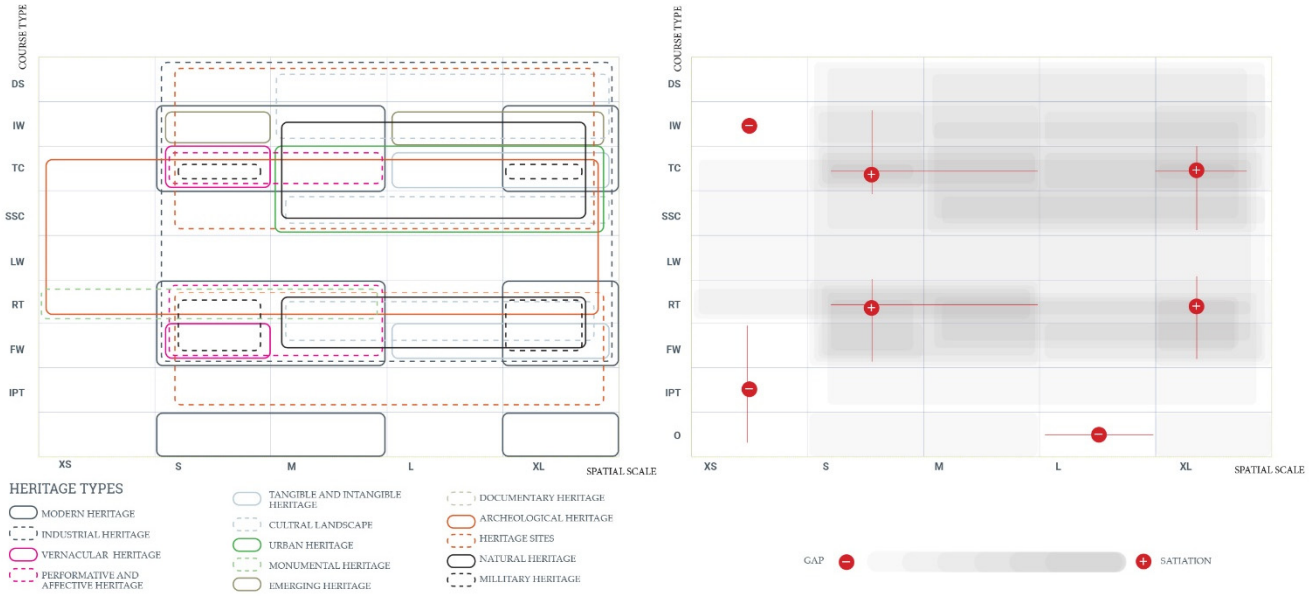


Figure 6. RIBA general criteria mapping concerning individual terms within Heritage Type group of terms. (index: black–expected GC; green–up to 3 highest values of GC coverage, red–up to 3 lowest values of GC coverage).

Examining the second perspective of learning outcome analysis (table columns) and concerning specific subcategories of each GC (student ability, knowledge, understanding and skills), the highest coverage (79%) refers to the influence of history and theory on the spatial, social, and technological aspects of architecture (GC2.2) and the influence of the design and development of cities, past and present, on the contemporary built environment (GC4.2). The third group (71%) is aligned with the way in which buildings fits into their local context (GC5.3).

At the same time, the lowest coverage (14%) is related to the role of the architect within the design team and construction industry, recognising the importance of current methods and trends in the construction of the built environment (GC6.2) and of student skills to understand the cost control mechanism, which operates during the development of the project (GC10.2) following (21%) general criteria that should enable knowledge of systems for environmental comfort realised within relevant precepts of sustainable design (GC9.2).

Parallel to the previous discussion when examining the heritage type mapping diagram (Figure 7) that shows course types through five scales in question, it is foreseen that Heritage Types are not recognised as a subject that should be covered within Design Studio (DS), Intensive Workshop (IW), Field Work (FW), and Internship Practical Training (IPT) while dealing with Construction Detailing and Interior Design Scale (XS). Most Heritage Types are focused on Architecture: Buildings Scale (S) and Landscape Scale (XL), and with Theory Course (TC) and Research Thesis (RT) as the most suitable types of courses. This could mean that Heritage Types should be handled through Theory Course and Research Thesis as the most suitable course types for transferring knowledge. This statement aligns with the general information and broad knowledge that should be addressed regarding this group of terms. In addition, Archaeological Heritage is the most homogenous one, ranging to all scales while covering four course types—Theory Course (TC), Seminar (short comprehensive) (SSC), Laboratory work (LW), and Research Thesis (RT)—while Military Heritage is the most dispersed type, covering specific scales and course types. At the same time, the highest overall coverage is in the central part of the diagram, encompassing all scales through four course types ranging between Theory Course (TC) and Research Thesis (RT).



(**a**) (**b**)

Figure 7. Cross-cutting analysis of the relationship between course type (vertical axis) and spatial scale (horizontal axis) concerning Heritage Types: (**a**) mapping diagram, (**b**) coverage diagram.

4.3. Design Approaches

Design Approach as a term is used to cover all analytical and problem-based approaches in the design process applied to treat and preserve a particular category of heritage. While focusing on individual aspects in the field of heritage and sustainability, the HERSUS project identifies several different approaches aimed at (1) preserving and emphasising inherited socio-cultural, spatial, and ecological values (Community Building and Representation, Historic Urban Landscape (HUL), Design For All In Cultural Heritage, Multi-scale Design Approach), (2) increasing ecological performance of buildings/places (Environmentally Responsive/Energy-Conscious/Climate-Sensitive/Whole-Lifecycle/Carbon-

Neutral/Passive/Active Sustainable Design, Thermal/Visual/Acoustic Comfort Design, and Green Blue Infrastructure), and (3) investigating architectural programmes capable of generating a sustainable use of heritage (Heritage Reprograming).

The first perspective (table rows) related to mapping of GC enables an overview of coverage on the term and shows that Acoustic Comfort Design (94%) and Construction-Centred Design (61%) stand out as the most comprehensive terms. Consequently, in theory, these terms cover a much more comprehensive range of knowledge than usually considered (Figure 8). On the contrary, Climate-Sensitive Design (21%), Thermal Comfort Design (21%), and Visual Comfort Design (18%) are considered to cover the least number of GC, and hence have the fewest number of learning outcomes.

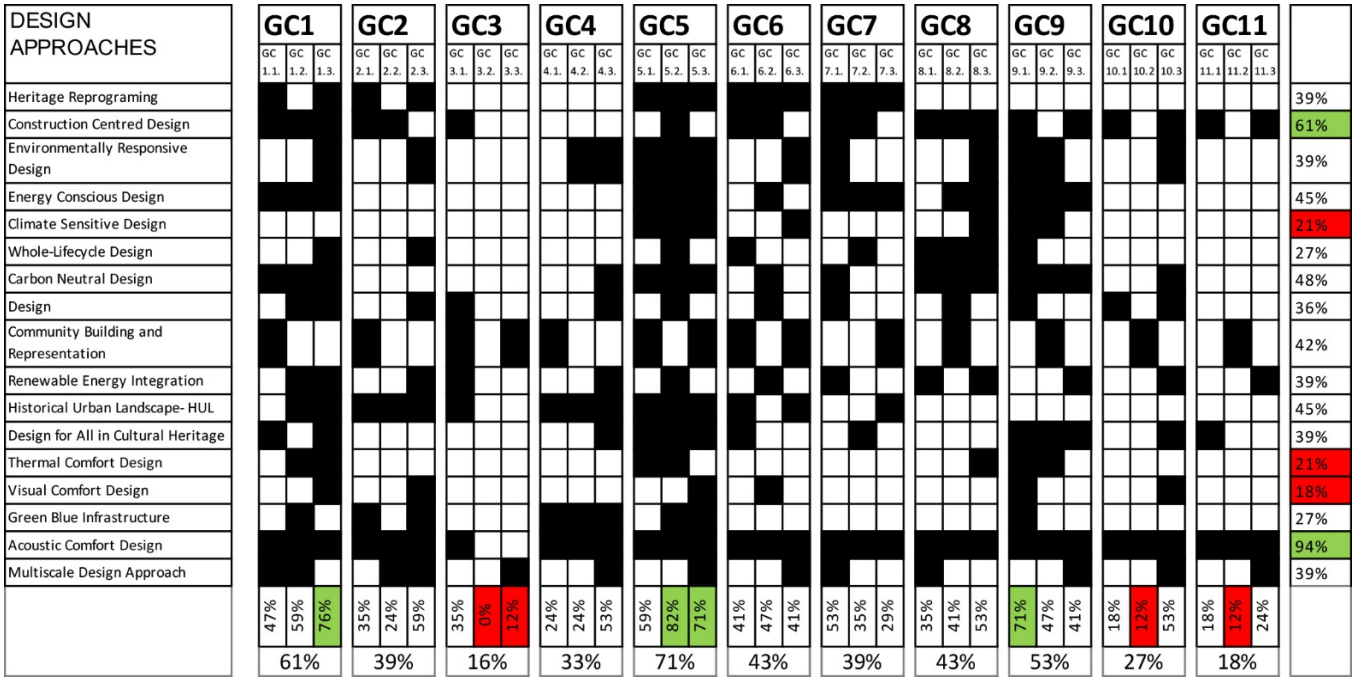


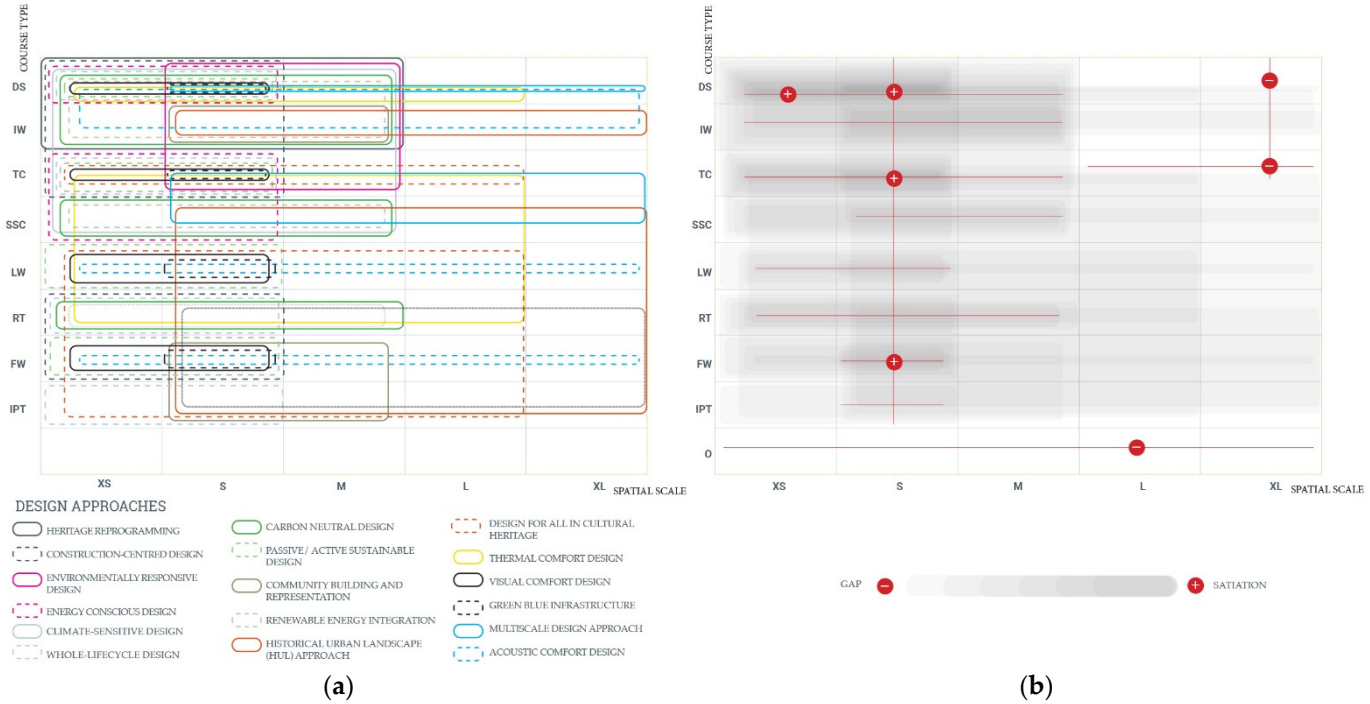
Figure 8. RIBA general criteria mapping concerning individual terms within Design Approaches group of terms. (index: black–expected GC; green–up to 3 highest values of GC coverage, red–up to 3 lowest values of GC coverage).

When it comes to the second perspective (table columns), the highest coverage of learning outcomes refers to the understanding of: how to develop a conceptual and critical approach to architectural design that integrates and satisfies the aesthetic aspects of a building and the technical requirements of its construction and the needs of the user (GC1.3: 76%), the impact of buildings on the environment and the premises of a sustainable project (GC5.2, 82%), and the way objects correspond to their local contexts (GC5.3: 71%). Additionally, a wide range of outcomes refer to the ability to provide adequate knowledge of physical problems and technologies and the function of buildings, precisely regarding principles associated with designing optimum visual, thermal, and acoustic environments (GC9.1: 71%).

The lowest degree of coverage of learning outcomes appears in the field of knowledge of fine arts as a decisive factor on the quality of architectural design, particularly in the creative application of the fine arts and their relevance and impact on architecture (GC3.2: 0%), and the creative application of such work to Design Studio projects, in terms of their conceptualisation and representation (GC3.3: 12%). The second deficiency appears in the level of understanding of the cost control mechanisms which operate during the development of a project (GC10.2: 12%), the professional inter-relationships of individuals

and organisations involved in procuring and delivering architectural projects, and how these are defined through contractual and organisational structures (GC11.2: 12%).

Looking at the coverage diagram (Figure 9), the highest frequency of Design Approaches is noticed, primarily on the Architecture: Buildings Scale (S), emphasising the importance of learning types of Design Studio (DS), Theory Course (TC), and Field Work (FW) as equally important learning environments for mastering this type of knowledge. On the Construction Detailing and Interior Design Scale (XS), the most important learning type is also Design Studio (DS), followed by Theory Course (TC) and Research Thesis (RT). According to the research results, the level of Landscape Scale (XL) is the least covered scale by this term class. However, to some extent, it is certainly covered by approaches such as Heritage Reprogramming, Green Blue Infrastructure, Historical Urban Landscape (HUL), and Multi-scale Design Approach. Specifically, other forms of teaching are not present in learning, which emphasises the potential to expand the teaching methodology to acquire knowledge from these categories adequately.



(**a**) (**b**)

Figure 9. Cross-cutting analysis of the relationship between course type (vertical axis) and spatial scale (horizontal axis) concerning design approaches: (**a**) mapping diagram, (**b**) coverage diagram.

It is evident that the design approaches class term is most valuable for understanding the relationship between people and buildings and between buildings and their environment, and the need to relate buildings and the spaces between them to human needs and scale. It is recognisable that all forms of teaching are present and equally distributed within this class term, depending on the specificities of each approach. Given the current focus on Construction Detailing and Interior Design Scale (XS), Architecture: Buildings Scale (S), and Urban Design Scale (M), the conclusion is drawn toward the importance of expanding the application of existing approaches at the Urban and Regional Planning Scale (L) and Landscape Scale (XL), but also to the design and development of new types of courses.

4.4. Design Actions

Design action, as a term, provides an overarching name for all processes of performing purposeful activities with the precise aim and values that are set. Accordingly, in the domain of heritage, different Design Actions appeared consistently over time. However, even the most traditional ones (Conservation, Restoration, Consolidation, etc.) did not lose their

significance over time. In recent years, new tendencies are arising with growing attention on (1) socio-economic aspect of sustainability (Public Advocacy for Social Participation, Circular Economy, Developing Cultural Routes and Itineraries), (2) ecological aspects of sustainability (Nature-Based Solutions, Microclimate Improvement) and (3) increasing the role of governance and management of heritage in times of uncertainty (Preventive Conservation, Integral Heritage Protection, Temporary Planning and Meanwhile Spaces, etc.).

The first perspective of learning outcome analysis (table rows) reveals that Integral Heritage Protection (67%) and Circular Economy (88%) stand out as the most comprehensive terms and cover the broadest range of knowledge, which corresponds to their multi-scale and interdisciplinary nature (Figure 10). On the contrary, actions related to Conservation (27%) and Nature-Based Solutions (21%) are focused on a smaller number of outcomes and meet a rather narrow number of specific GC.

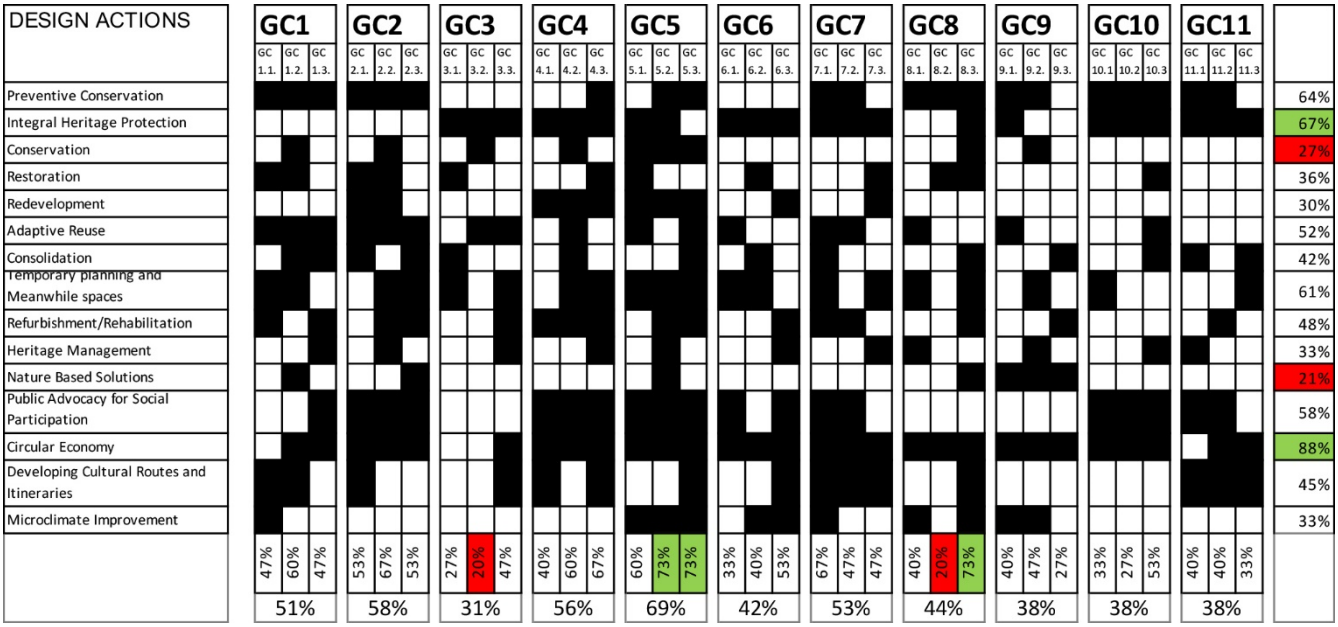


Figure 10. RIBA general criteria mapping concerning individual terms within Design Actions group of terms. (index: black–expected GC; green–up to 3 highest values of GC coverage, red–up to 3 lowest values of GC coverage).

Looking from the perspective of individual GC (table columns), the highest coverage (73%) of learning outcomes refers to the understanding of the impact of buildings on the environment, and the precepts of sustainable design (GC5.2), the way in which buildings fit into their local context. (GC5.2), but also the importance of Design Actions for understanding the physical properties and characteristics of building materials, components, and systems, and the environmental impact of specification choices (GC8.3). On the other hand, it is possible to observe that the lowest level of coverage of general criteria (20%) appears when it comes to providing knowledge on the creative application of the fine arts and their relevance and impact on architecture (GC3.2). The second equal deficiency appears in the level of strategies for building construction and the ability to integrate the knowledge of structural principles and construction techniques (GC8.2).

When looking at the Design Actions coverage diagram, it is possible to conclude that most Design Actions are focused on the Architecture: Buildings Scale (S) and the Urban Design Scale (M), with Design Studio (DS) as a predominantly recognised learning course type for acquiring knowledge (Figure 11). It is noteworthy to mention that, due to the complexity of the topic, equal importance to learning in the Design Studio environment is given to Field Work (FW) and Research Thesis (RT), which in the Landscape Scale (XL) become the most desirable type of course. Understandably, the Urban and Regional

Planning Scale (L) is the least covered one within Design Actions, but it is worth mentioning that there are specific actions such as heritage management, Nature-Based Solutions, or Integral Heritage Protection that could be promoted on this scale due to their ability to provide substantive elements for decision making in urban planning, and hence devote as much attention to planning results as to the planning process. Furthermore, it was noticed that the lowest level of representation of Design Actions appears within the course type of Laboratory Work (LW).

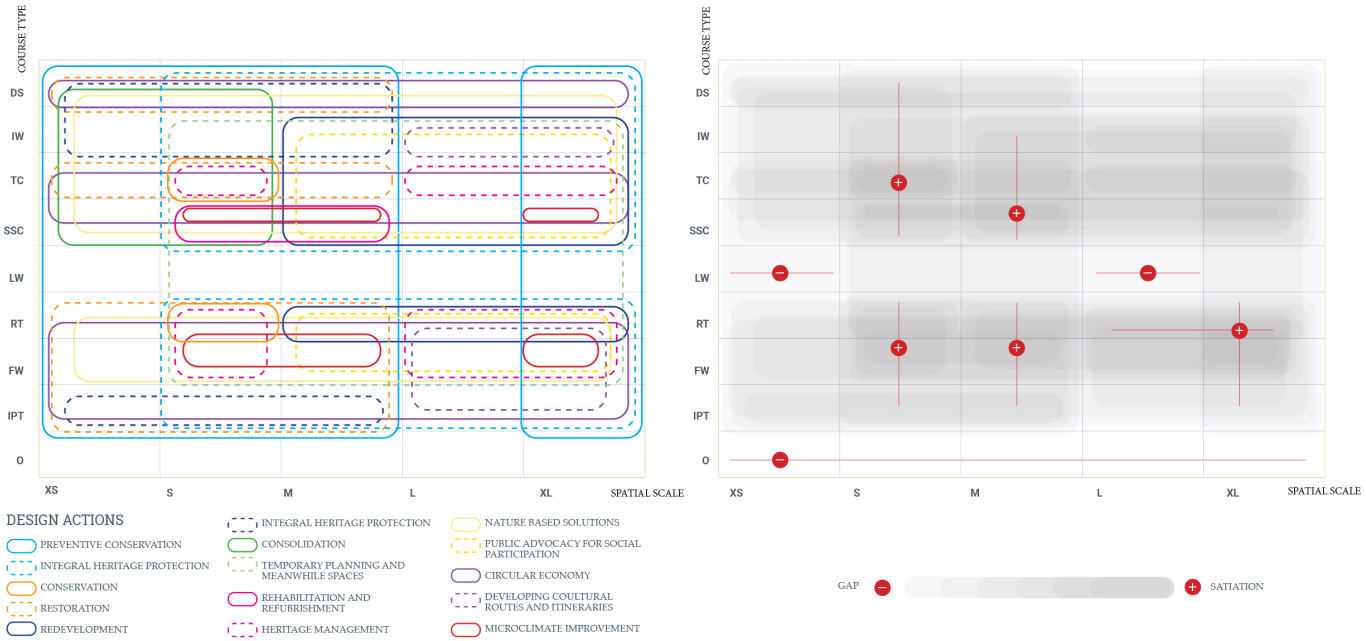


Figure 11. Cross-cutting analysis of the relationship between course type (vertical axis) and spatial scale (horizontal axis) concerning Design Actions: (**a**) mapping diagram, (**b**) coverage diagram.

Identifying the highest and lowest coverage rate of general learning outcomes in the domain of Design Actions and close insight to the individual criteria provides ground to derive several observations concerning how sustainability and heritage should be addressed in architectural higher education. Firstly, the insufficient connection between theoretical and practical subjects was identified, especially regarding the relation of art and history to the Design Studio process. The second point tackles the problem of disbalance between the representation of contemporary and traditional structural principles and construction techniques, while a way to overcome this problem can be found in appropriate tool selection, which is explained in more detail below. Thirdly, insufficient development of actions at the Urban and Regional Planning Scale (L) and lack of representation of Laboratory (LW) and Field Work (FW) opens the possibility for the development of new innovative and even alternative actions and new forms of teaching to appear in the future (e.g., Temporary Planning and Meanwhile Spaces).

4.5. Tools

The design Tools group of terms implies a driving and operational element of a design process applied systemically to achieve a design goal and solve a design problem. Since the founding of the design methods movement, design Tools have evolved from perceptual (concrete) to conceptual (abstract), from static in nature (the practice of representation) to dynamic (the practice of simulation), thus contributing to increasingly complex operations both in the phase of idea development, as well as in the phase of Post-Occupancy Evaluation. Although very often considered exclusively as a technical and procedural entity of design, Tools have become both social instruments in the design process (collaborative Tools) and a digital innovation in design (3D and simulation Tools), thus significantly contributing to

the contemporary practice of architectural heritage research encouraging an entirely new view of its analysis, valorisation, and redesign.

At the first perspective of analysis (table rows), it can be recognised that Tools based on representation practices such as Digitization of Heritage (15%) and Collaborative Cartography (9%) meet the minimum number of GC focusing on generating data and material for further research (Figure 12). Nevertheless, these Tools significantly contribute to the analysis and presentation of the original characteristics of the architectural heritage and represent preconditional Tools at the initial stage of the design process. On the other hand, Tools based on simulation and evaluation practices such as Lighting Simulation (73%) and Post-Occupancy Evaluation (55%) have the highest level of GC fulfilment.

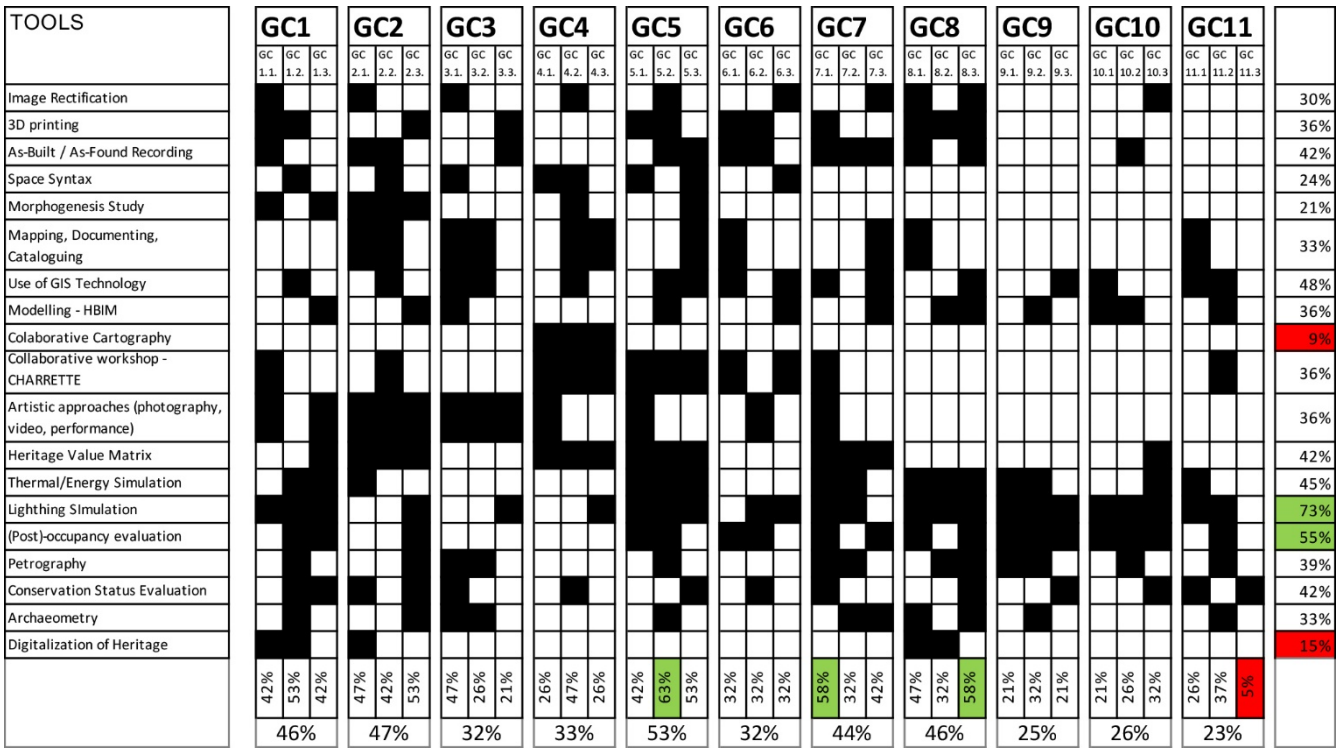
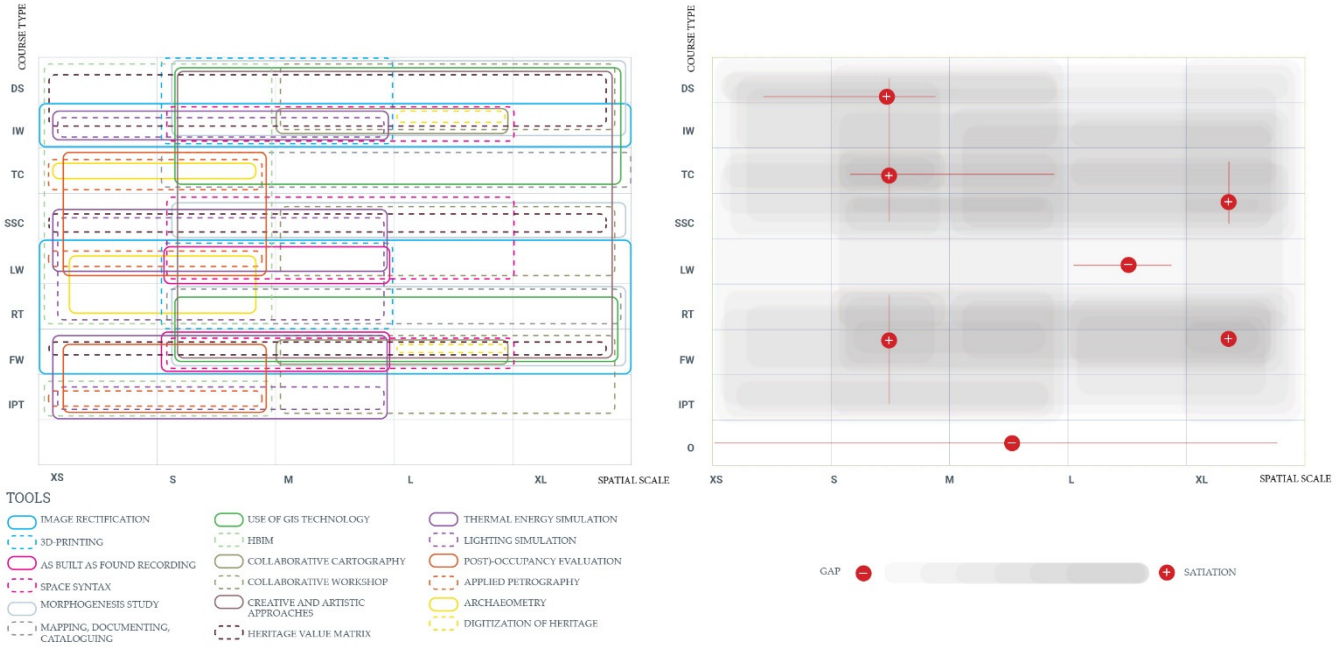


Figure 12. RIBA general criteria mapping concerning individual terms within Tools group of terms. (index: black–expected GC; green–up to 3 highest values of GC coverage, red–up to 3 lowest values of GC coverage).

At the second perspective of analysis (table columns), quantitative indicators show the highest achievement level of the following GC, which provide an argumentative framework for understanding what the role of Tools is and how Tools contribute to sustainable design: (1) understanding of the impact of a building on the environment and the perceptions of environmental design (GC5.2, 63%), (2) critical review of precedents relevant to the function, organisation, and technological strategy of design proposals (GC7.1, 58%), and (3) understanding the environmental impact on building design (GC8.3, 58%). On the other hand, the recognised Tools in the current state of the learning do not enable a high level of competencies (5%) in the field of management theories and business principles related to architectural practice (GC11.3).

Through decoding information from the Tools coverage diagram (Figure 13), it is recognised that this group of learning content covers all spatial levels from Construction Detailing and Interior Design Scale (XS) to Landscape Scale (XL). However, a higher level of representation and engagement of Tools is recognised at (1) Architecture: Buildings Scale (S) within Design Studio (DS), Theory Course (TC), and Field Work (FW), and (2) Landscape Scale (XL) within Seminar (short comprehensive) (SSC) and Field Work. On the contrary,

the lowest level of representation and engagement of Tools is recognised within the course type of Laboratory Work (LW). Additionally, Field Work (W) has shown the most consistent presence at all spatial levels, thus confirming the significance of on-site and in situ research by design in architectural heritage education.



(**a**) (**b**)

Figure 13. Cross-cutting analysis of the relationship between course type (vertical axis) and spatial scale (horizontal axis) concerning Tools: (**a**) mapping diagram, (**b**) coverage diagram.

Based on learning outcome indicators, it is important to point out that when creating new curricula, the goal is not to satisfy all GC within the engagement of a particular tool as learning content, but that the search for an adequate connection of several Tools based on their complementarity and spatial scale is of primary importance. Additionally, examining the possibility of applying Tools or specific techniques from other scientific and professional fields such as management in architectural heritage is recognised as one of the possible research fields in the future. Furthermore, the identification of the coverage extremes within a cross-cutting analysis of spatial scales and course types can be recognised as an essential field for enhancement in the process of creating future curricula. Having in mind that Laboratory Work is primarily focused on simulation and experimentation and that learning outcomes pointed to the capacity of Tools based on simulation practice in acquiring environmental design competencies, enhancing these types of Tools in the context of Laboratory Work (LW) can significantly contribute to the relationship between sustainability and heritage.

4.6. Summary

Given the necessity to consider the programme as a whole and to meet all the proposed learning outcomes in order to achieve appropriate competencies after graduation, it is imperative to carefully balance between appropriate forms of teaching (course types) on one side, and relevant Notions, Heritage Types, Design Approaches, Design Actions, and Tools on the other side. The RIBA Procedures for the Validation of Architectural Programs define that it is necessary to provide courses where at least 50% of all assessed work is undertaken as Design Studio projects. In that sense, it is necessary to dedicate particular attention to this course type, especially considering the identified insufficient connection between

theoretical and practical subjects, and generally the importance of applying theoretically acquired knowledge in practice.

Based on learning outcomes analysis (Figure 14), it is essential to point out that when creating a new study program, the goal is not to satisfy all GC within the engagement of a particular group of terms as learning content, but that the search for an adequate connection of several groups of terms based on their complementarity and spatial scale is of primary importance. Hence, there is a need to consider balanced coverage of learning outcomes when setting up a new program.

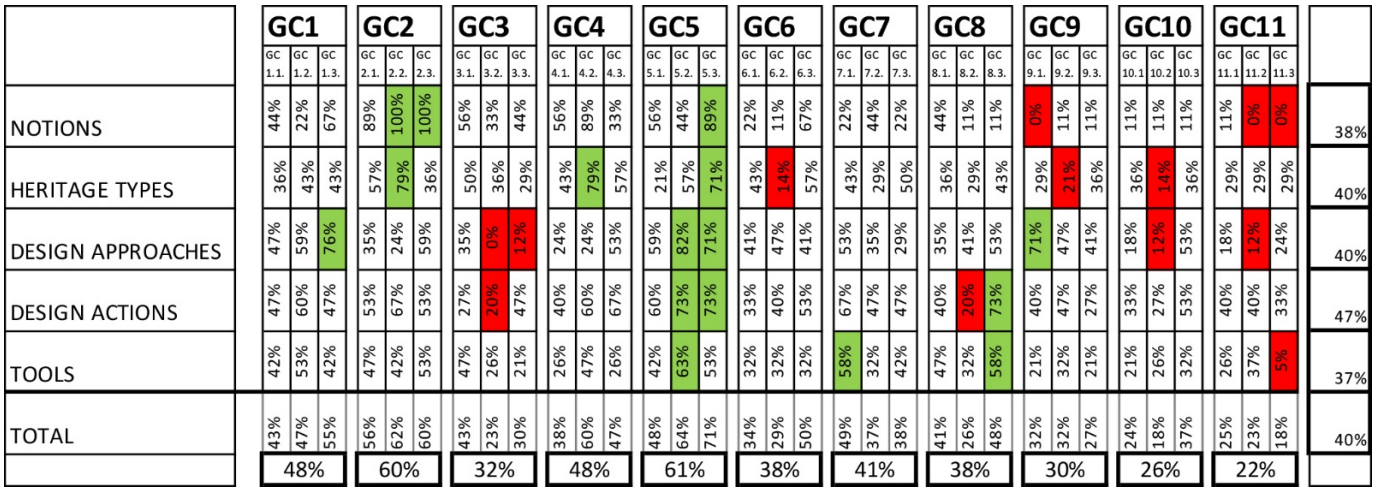


Figure 14. RIBA general criteria mapping concerning the group of terms. (index: green–the highest values of GC coverage, red–the lowest values of GC coverage).

Individual results and specificities of each term category represent initial and essential inputs for developing IO5—Book of courses. Recognised potentials within individual categories and recognised barriers and gaps are of particular importance not only from the aspect of the formulation of individual courses but also from the aspects and the possibilities of their linking, overlapping, and position in the structure of the study program. Following the results of the research, the IO5 structure was set to follow 30% of fundamentals (covering Notions and Heritage Types), 30% of Design Studio (covering Heritage Types, Design Actions, Design Approaches), 15% of specialisation (dominantly focused on Tools and professional internship), and 25% of Research Thesis, which should be the comprehensive course integrating various scales, learning types, and covering the broadest range of learning outcomes.

4.7. Towards a Methodological Framework

The individual analysis conducted in Sections 4.1–4.6 opens up new possibilities for structuring study programmes confirmed by fruitful discussions within each group of terms. For this reason, the paper seeks to conclude by formulating a methodological framework based on in-depth terminological analyses, balanced outcomes, and diverse types of learning.

The methodological framework is structured in 10 steps (Figure 15): (1) providing input for learning content (state of the art: perspectives of declarations and policies, association stand points, relevant research, best case analysis in teaching and practice, critical analysis of planning and regulatory framework, questionnaires with experts and students, Seminars and round tables); (2) defining taxonomy—collecting terms (collaborative and iterative work); (3) creating matrix/clustering and defining groups of terms (through collaborative and iterative work); (4) analysis of individual terms (analysis of definition, reference selection, content, methods, goals, scales, learning outcomes, and teaching competences through critical qualitative research) by individual experts and researchers; (5) developing

statements for teaching by individual experts and researchers; (6) mapping and analysis—comprehensive analysis of learning outcomes for quality assurance (using specific set of criteria (e.g., RIBA)) and scale and learning types in order to ensure coverage of various scales and types of learning, conducted by the research group; (7) developing draft master programme and content for the Book of courses in parallel; (8) further development of curricula among expert groups; (9) master course implementation/testing; and (10) course evaluation.

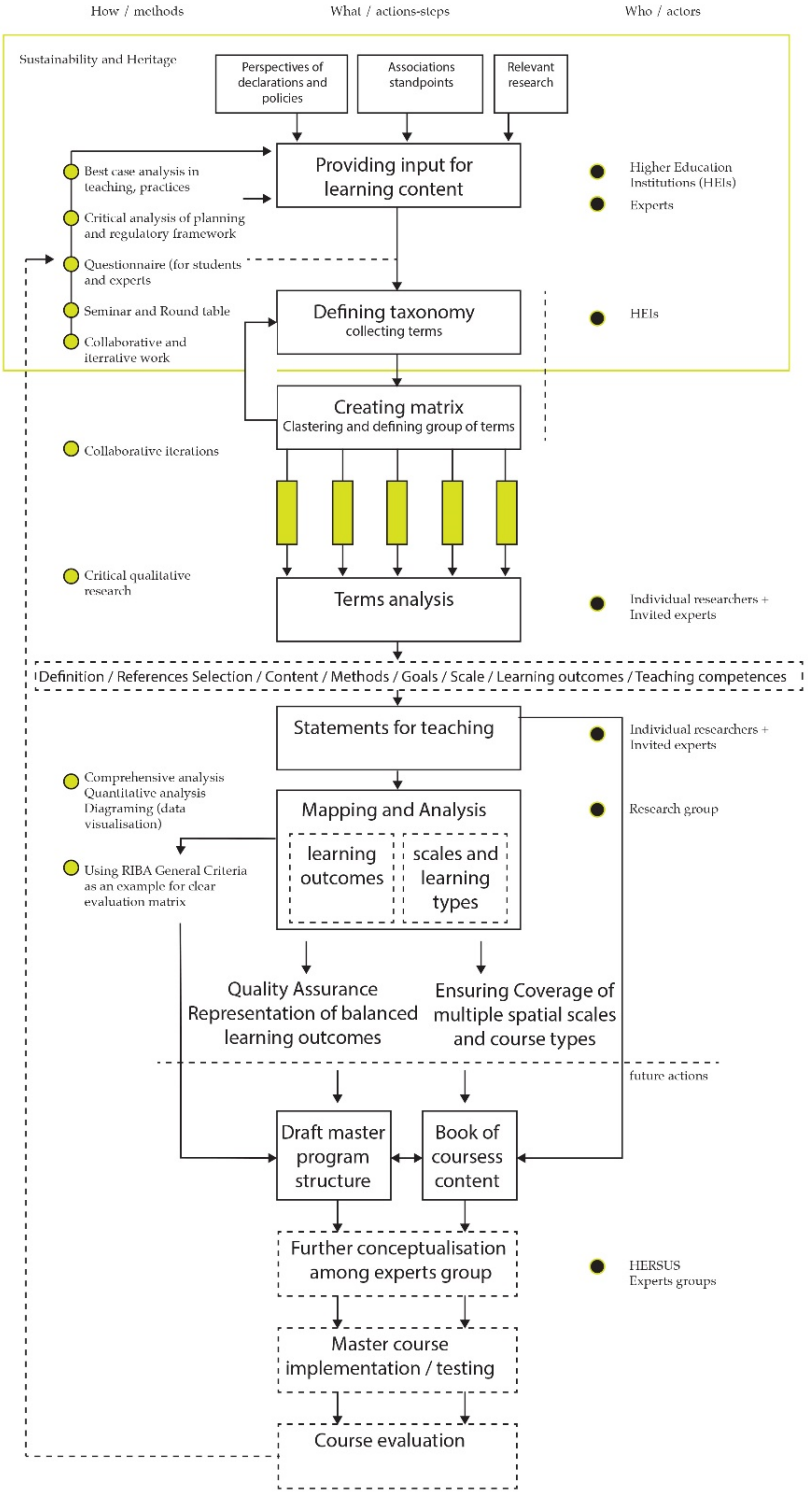


Figure 15. Methodological framework diagram.

The applicability of the created methodological framework is perceived in (1) conceptualisation of new study programmes, (2) the evaluation and reconsideration of existing study programmes, and (3) development of common "vademecum" for existing modules or study programmes.

5. Conclusions

The concluding remarks were developed according to the initial research questions outlined at the beginning of this paper: (1) what is the relationship between the spatial scales and learning types within specific terms and groups of terms, that is, whether it is possible to identify specific gaps and saturations, and (2) what is the representation of expected learning outcomes in the analysed domain of heritage and sustainability concerning high-quality standards of higher education?

The answer to the first question was found in the application of data visualisation (diagramming) followed by a comprehensive analysis that allowed identification of the gaps and satiations between spatial scales and types of educational courses. Having in mind that different contents of learning (group of terms) cover different spatial scales and can be taught within various course types, research indicates the need for a balanced and appropriate combination of terms in order to (1) achieve a multi-scale approach and (2) provide a stimulative and flexible learning environment.

The second question was answered through the qualitative analysis and endeavour to identify the coverage of learning outcomes for five groups of terms. Whilst the analysed general criteria may offer a basis for curriculum design, in order to understand, explain, and predict the impact and consequences of rapid changes of the environment on the global scale, both built and unbuilt, it is essential to develop distinctive interpretations of the practical and theoretical skills needed by professionals occupying increasingly diverse roles and working in a global economy. Mapping of learning outcomes indicates that the highest coverage of general criteria (representing more than 60%) are concerned with (1) acquiring knowledge of the histories and theories of architecture and related arts, technologies, and human sciences (GC2), and (2) the understanding between people and buildings, and between buildings and their environments, and the need to relate buildings and spaces between them to human needs and scale (GC5). This coverage speaks in favour of adequately selected terms which is also in line with the initial assumption that research activities based on design taxonomies—terms used in architectural discourse of heritage and sustainability—can contribute to the advancements in curricula design and development.

Regarding heritage awareness and sustainability in architectural higher education, the discussion also indicated the limitation of the offered course types regarding the possibility of meeting some outcomes (GC9–11), which also indicates the importance of searching for new course types in order to establish the relationship between different fields, to enable specific profiling of experts in the field of heritage and sustainability. This starting point also indicates the importance of including professional practice in the educational process, as an important segment of education, especially when it comes to outcomes from the last two groups (GC10, the necessary design skills to meet building users' requirements within the constraints imposed by cost factors and building regulations; GC11, adequate knowledge of the industries, organisations, regulations, and procedures involved in translating design concepts into buildings and integrating plans into overall planning).

According to the UNESCO/UIA Charter for Architectural Education, the architects should feel responsible for improving the education and training of future architects to meet the expectations of XXI century societies worldwide for sustainable human settlements in every Cultural Heritage. Greater diversity in professional practice is needed and, consequently, in architectural education and training, unlike the previous approach to educating architects as a « generalist » [5].

The limitations of the research are primarily reflected in: (1) the determined list of terms derived as a result of HERSUS project activities, and as such is not final since it can

certainly be expanded and condensed, but is perceived as relevant for the architectural discourse of heritage and sustainability and for the further IOs within the project, (2) the fact that individual researchers who participated in the research through different phases mainly come from the discipline of architecture and urban design, since all schools in the consortium are from the field of architecture; nevertheless, students, participants and associated partners interested in HERSUS and involved in particular activities such as LTT1 are from tangent disciplinary frameworks, (3) the fact that research is limited to a specific geographical area (southern geographical line of Europe), and (4) that mapping of scales/course types and learning outcomes depended on the expert view.

In this context, this research intended to develop a flexible and open-ended methodological framework, adequate for application in different research and educational contexts and different competencies and learning outcomes. This methodological framework reinforces multidisciplinary, interdisciplinary, and transdisciplinary issues and different pedagogical approaches to heritage and sustainability while reconsidering and testing complex relations in current conditions (ecological, socio-political, economic, etc.). In that order, a developed methodological framework is valuable for both teachers/trainers/tutors and students. Such a framework implies flexibility in the educational provision and the emergence of multiple models for learning in architecture and urban design. The purpose of the framework is to stimulate the improvement of existing and development of new comprehensive courses and programme contents and explore new possibilities for taxonomy-based curricula design. It is worth mentioning that the following steps of the HERSUS project are related to the development of the Book of courses (IO5), and as such present the first step in methodological framework applicability. Afterward, there is a stated aspiration for establishing new master programs, testifying the HERSUS project sustainability aspects. It is worth mentioning that this process will certainly impose new challenges regarding international cooperation and harmonisation of different regulatory frameworks, while taking into account both the aspirations and competencies of the teaching staff and the learning outcomes. After the testing period, the need for constant evaluation by the students is necessary for checking the fulfilment of the expected learning outcomes.

In order to provide a relevant methodological framework for addressing sustainability and heritage in architectural higher education, this paper highlights and reveals essential aspects and relations for the future development of the comprehensive study programme curriculum and content. The presented diagrams and relations indicate the barriers and opportunities in shifting values and creating rapid change in curricula and delivery. In addition to the values of heritage awareness and sustainability, this paper and the HERSUS project highlight and discuss issues referring to creativity and innovation values in architectural higher education. These values are significant from the aspect of achieving diverse, engaging, comprehensive, and interactive study programmes, each clearly distinguished from others by specific academic objectives and specific identity of individual courses and qualifications, but also from the aspect of balance between the representation of contemporary and traditional Design Approaches. In line with the UNESCO/UIA Charter for Architectural Education, it is essential to recognise the emergence of genuine experimentations and unconventional didactic practices resulting from better knowledge, greater awareness, and more advanced analytical tools.

Author Contributions: Conceptualization, A.N., M.P.M., J.R.T., A.M., A.Z., A.Đ. and M.P.; methodology, A.M.; investigation, M.P., A.Đ., M.P.M., A.M. and A.Z.; writing—original draft preparation, A.Đ., A.M., M.P.M., A.Z. and M.P.; writing—review and editing, M.P.M., A.N., J.R.T. and V.D.; visualization, A.Đ. and A.M.; supervision, V.D. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Ministry of Education, Science, and Technological Development of the Republic of Serbia, grant number 451-03-68/2020-14/200090, and as a part of the HERSUS project, developed in cooperation with the University of Belgrade, Faculty of Architecture as a Lead organisation, Iuav Universita di Venezia, the University of Cyprus, the Aristotle University of Thessaloniki, and the University of Seville, UNESCO Chair on Built Urban Heritage CREhAR in

the digital era, co-funded by the Erasmus+ Programme of the European Union (hersus.org). The creation of these resources was co-funded under grant no. 2020-1-RS01-KA203-065407 (funding period 2020–2023).

Institutional Review Board Statement: Questionnaires that were used in the prior phases of the HERSUS project were conducted with clear clarification on the study rationale, full respect of the participant anonymity, and in accordance with the Code of Conduct for Scientific Research (21 February 2018, National Council for Scientific and Technological Development, Serbia) and the Code of Professional Ethics at the University of Belgrade (10 July 2016, Gazette of the University of Belgrade, no. 193).

Informed Consent Statement: Not applicable.

Data Availability Statement: The datasets regarding individual term analysis are available on request from the corresponding author.

Acknowledgments: The authors would like to thank all the Consortium members for their contributions in HERSUS project activities, and specifically in development of the IO3 and their individual dedicated work on research and individual term analysis.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results. This paper reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Appendix A

The full list and explanation of RIBA general criteria is provided within Appendix A.

GC1	**Ability to create architectural designs that satisfy both aesthetic and technical requirements. The student could have the ability to:**	**GC 1.1.**	prepare and present building design projects of diverse scale, complexity, and type in a variety of contexts, using a range of media, and in response to a brief;
		GC 1.2.	understand the constructional and structural systems, the environmental strategies and the regulatory requirements that apply to the design and construction of a comprehensive design
		GC 1.3.	develop a conceptual and critical approach to architectural design that integrates and satisfies the aesthetic aspects of a building and the technical requirements of its construction and the needs of
GC2	**Adequate knowledge of the histories and theories of architecture and the related arts, technologies and human sciences. The student will have knowledge of:**	**GC 2.1.**	the cultural, social and intellectual histories, theories and technologies that influence the design of buildings;
		GC 2.2.	the influence of history and theory on the spatial, social, and technological aspects of architecture
		GC 2.3.	the application of appropriate theoretical concepts to studio design projects, demonstrating a reflective and critical approach.
GC3	**Knowledge of the fine arts as an influence on the quality of architectural design. The student will have knowledge of:**	**GC 3.1.**	how the theories, practices and technologies of the arts influence architectural design;
		GC 3.2.	the creative application of the fine arts and their relevance and impact on architecture;
		GC 3.3.	the creative application of such work to studio design projects, in terms of their conceptualisation and representation.
GC4	**Adequate knowledge of urban design, planning and the skills involved in the planning process. The student will have knowledge of:**	**GC 4.1.**	theories of urban design and the planning of communities;
		GC 4.2.	the influence of the design and development of cities, past and present on the contemporary built environment;
		GC 4.3.	current planning policy and development control legislation, including social, environmental and economic aspects, and the relevance of these to design development.
GC5	**Understanding of the relationship between people and buildings, and between buildings and their environment, and the need to relate buildings and the spaces between them to human needs and scale. The student will have an understanding of:**	**GC 5.1.**	the needs and aspirations of building users;
		GC 5.2.	the impact of buildings on the environment, and the precepts of sustainable design;
		GC 5.3.	the way in which buildings fit into their local context.
GC6	**Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors. The student will have an understanding of:**	**GC 6.1.**	the nature of professionalism and the duties and responsibilities of architects to clients, building users, constructors, co-professionals and the wider society;
		GC 6.2.	the role of the architect within the design team and construction industry, recognising the importance of current methods and trends in the construction of the built environment;
		GC 6.3.	the potential impact of building projects on existing and proposed communities.
GC7	**Understanding of the methods of investigation and preparation of the brief for a design project. The student will have an understanding of:**	**GC 7.1.**	the need to critically review precedents relevant to the function, organisation and technological strategy of design proposals;
		GC 7.2.	the need to appraise and prepare building briefs of diverse scales and types, to define client and user requirements and their appropriateness to site and context;
		GC 7.3.	the contributions of architects and co-professionals to the formulation of the brief, and the methods of investigation used in its preparation
GC8	**Understanding of the structural design, constructional and engineering problems associated with building design. The student will have an understanding of:**	**GC 8.1.**	the investigation, critical appraisal and selection of alternative structural, constructional and material systems relevant to architectural design;
		GC 8.2.	strategies for building construction, and ability to integrate knowledge of structural principles and construction techniques;
		GC 8.3.	the physical properties and characteristics of building materials, components and systems, and the environmental impact of specification choices.
GC9	**Adequate knowledge of physical problems and technologies and the function of buildings so as to provide them with internal conditions of comfort and protection against the climate. The student will have knowledge of:**	**GC 9.1.**	principles associated with designing optimum visual, thermal and acoustic environments;
		GC 9.2.	systems for environmental comfort realised within relevant precepts of sustainable design;
		GC 9.3.	strategies for building services, and ability to integrate these in a design project.
GC10	**The necessary design skills to meet building users' requirements within the constraints posed by cost factors and building regulations. The student will have the skills to:**	**GC 10.1**	critically examine the financial factors implied in varying building types, constructional systems, and specification
		GC 10.2	understand the cost control mechanisms which operate during the development of a project;
		GC 10.3	prepare designs that will meet building users' requirements and comply with legislation, appropriate performance standards and health and safety requirements.
GC11	**Adequate knowledge of the industries, organisations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning. The student will have knowledge of:**	**GC 11.1**	the fundamental legal, professional and statutory responsibilities of the architect, and the organisations, regulations and procedures involved in the negotiation and approval of architectural
		GC 11.2	the professional inter-relationships of individuals and organisations involved in procuring and delivering architectural projects, and how these are defined through contractual and organisational
		GC 11.3	the basic management theories and business principles related to running both an architects' practice and architectural projects, recognising current and emerging trends in the construction

References

1. Architects' Council of Europe (ACE). Statement from the Architects' Council of Europe—Designing Buildings for Circular Economy. ACE: Helsinki, Finland, 2019.
2. European Association for Architectural Education. *Principles and Practices of Architectural Education: A Position Paper of the EAAE Education Academy*; EAAE: Porto, Portugal, 2018.
3. UN General Assembly. *Transforming Our World: The 2030 Agenda for Sustainable Development*; United Nations: New York, NY, USA, 2015.
4. UIA Commission on the UN Sustainable Development Goals. *UIA SDG Dhaka Declaration*; International Union of Architects: Dhaka, Bangladesh, 2018.
5. UNESCO-UIA Validation Council for Architectural Education. *Charter UNESCO/UIA for Architectural Education*; International Union of Architects: Paris, France, 2017.
6. European Ministers of Culture. *Davos Declaration: Towards a HIGH-quality 'Baukultur' for Europe*; Federal Department of Home Affairs, Federal Office of Culture: Davos, Switzerland, 2018.
7. Spiridonidis, C.; Voyatzaki, M. Introduction. In *Learning for the Future: New Priorities of Schools of Architecture in the Era of Uncertainty*; EAAE Transaction on Architectural Education no. 54; EAAE & ENHSA: Thessaloniki, Greece, 2011; pp. 12–16.
8. Von Meiss, P. Reflections and Deflections on Chania 2010. In *Learning for the Future: New Priorities of Schools of Architecture in the Era of Uncertainty*; EAAE Transaction on Architectural Education no. 54; EAAE & ENHSA: Thessaloniki, Greece, 2011; pp. 23–27.
9. The NEB High-Level Round Table. New European Bauhaus Concept Paper. Available online: https://europa.eu/new-european-bauhaus/system/files/2021-07/2021-06-30_New_European_Bauhaus_Concept_Paper_HLRT_FINAL.pdf#:~:text=The%20goal%20of%20the%20New,of%20the%20European%20Green%20Deal (accessed on 14 January 2022).
10. European Commission. European Green Deal. Available online: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed on 14 January 2022).
11. UNESCO. *SDG4-Education 2030, Incheon Declaration (ID) and Framework for Action. For the Implementation of Sustainable Development Goal 4, Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for All*; ED-2016/WS/28; UNESCO: Incheon, South Korea, 2015.
12. Harder, E. *Writings in Architectural Education—Climate Change: Sustainability/Responsibility*; EAAE Transaction on Architectural Education no. 47; EAAE & The Royal Danish Academy of Fine Arts: Copenhagen, Denmark, 2010.
13. Kealy, L.; Musso, S.F. *Conservation/Transformation*; EAAE Transaction on Architectural Education no. 52; EAAE: Leuven, Belgium, 2011.
14. Crişan, R.; Franco, G.; Kealy, L.; Musso, S.F. *Conservation/Regeneration: The Modernist Neighbourhood*; EAAE: Leuven, Belgium, 2013.
15. Crisan, R.; Fiorani, D.; Kealy, L.; Musso, S.F. *Conservation—Reconstruction: Small Historic Centres Conservation in the Midst of Change*; EAAE Transaction on Architectural Education no. 64; EAAE: Hasselt, Belgium, 2015.
16. Fiorani, D.; Kealy, L.; Musso, S.F. *Conservation Adaptation: Keeping Alive the Spirit of the Place Adaptive Reuse of Heritage with Symbolic Value*; EAAE: Hasselt, Belgium, 2017.
17. Fiorani, D.; Franco, G.; Kealy, L.; Musso, S.F.; Calvo-Salve, M.A. *Conservation Consumption: Preserving the Tangible tnd Intangible Values*; EAAE: Hasselt, Belgium, 2019.
18. Crișan, R.; Fiorani, D.; Franco, G.; Kealy, L.; Musso, S.F.; Vorlík, P. *Conservation—Demolition*; Transactions on Architectural Education no. 67; Faculty of Architecture CTU: Prague, Czech Republic, 2020.
19. Clarke, N.; Kuipers, M.; Stroux, S. Embedding built heritage values in architectural design education. *Int. J. Technol. Des. Educ.* **2020**, *30*, 867–883. [CrossRef]
20. Ristić Trajković, J.; Milovanović, A.; Nikezić, A. Reprogramming Modernist Heritage: Enhancing Social Well-being by Value-Based Programming Approach in Architectural Design. *Sustainability* **2021**, *13*, 11111. [CrossRef]
21. Lucchi, E.; Delera, A.C. Enhancing the Historic Public Social Housing through a User-Centered Design-Driven Approach. *Buildings* **2020**, *10*, 159. [CrossRef]
22. Wismayer, A.; Hayles, C.S.; McCullen, N. The Role of Education in the Sustainable Regeneration of Built Heritage: A Case Study of Malta. *Sustainability* **2019**, *11*, 2563. [CrossRef]
23. Benedetti, B.; Abbondandolo, I.; Gaiani, M. The Origins of the Postgraduate Programs on Cultural Heritage Knowledge, Management, Conservation, and Communication in Italy: A Vision of the Past as Engine for the Next Future. *Heritage* **2021**, *4*, 2691–2720. [CrossRef]
24. Santos, B.; Gonçalves, J.; Martins, A.M.; Pérez-Cano, M.T.; Mosquera-Adell, E.; Dimelli, D.; Lagarias, A.; Almeida, P.G. GIS in Architectural Teaching and Research: Planning and Heritage. *Educ. Sci.* **2021**, *11*, 307. [CrossRef]
25. Partarakis, N.; Zabulis, X.; Patsiouras, N.; Chatjiantoniou, A.; Zidianakis, E.; Mantinaki, E.; Kaplanidi, D.; Ringas, C.; Tasiopoulou, E.; Dubois, A.; et al. Multi-Scale Presentation of Spatial Context for Cultural Heritage Applications. *Electronics* **2022**, *11*, 195. [CrossRef]
26. Ibañez-Etxeberria, A.; Gómez-Carrasco, C.J.; Fontal, O.; García-Ceballos, S. Virtual Environments and Augmented Reality Applied to Heritage Education. An Evaluative Study. *Appl. Sci.* **2020**, *10*, 2352. [CrossRef]
27. Trum, H.M.G.J.; Bax, M.F.T. The taxonomy of concepts in architecture: Some applications and developments. *Open House Int.* **1996**, *21*, 4–14.

28. 'Architects' Council of Europe. Leeuwarden Declaration—Adaptive Re-Use of the Built Heritage: Preserving and Enhancing the Values of Our Built Heritage for Future Generations 2018. Available online: https://www.ace-cae.eu/uploads/tx_jidocumentsview/LEEUWARDEN_STATEMENT_FINAL_EN-NEW.pdf/ (accessed on 9 January 2022).
29. Erasmus + Strategic Partnerships for Higher Education HERSUS. Available online: https://hersus.org/ (accessed on 4 February 2022).
30. Djokić, V.; Philokyprou, M.; Nikezić, A.; Sorbo, E.; Sakantamis, K.; Loren-Méndez, M. *REVIEW: Best Practices in Educating Sustainability and Heritage*; University of Belgrade—Faculty of Architecture: Belgrade, Serbia, 2021; Available online: https://hersus.org/io1-review-best-practices-in-educating-sustainability-and-heritage/ (accessed on 11 February 2022).
31. Sakantamis, K.; Chatzidimitriou, A.; Kotsopoulos, S.; Doussi, M.; Paka, A.; Axarli, K. The role of education on the enhancement of heritage awareness and sustainability of the built environment; learning from experts and students. In Proceedings of the IOP Conference Series: Earth and Environmental Science, 2nd International Conference on Environmental Design, Athens, Greece (Virtual), 23–24 October 2021; Volume 899.
32. Djokić, V.; Sakantamis, K.; Chatzidimitriou, A.; Sorbo, E.; Loren-Méndez, M.; Nikezić, A.; Philokyprou, M.; Carrascal-Pérez, M. *STUDY: Questionnaire for the State of the Art in Educating Sustainability and Heritage*; University of Belgrade—Faculty of Architecture: Belgrade, Serbia, 2021. Available online: https://hersus.org/io2-questionnaire-for-the-state-of-art/ (accessed on 11 February 2022).
33. Djokić, V.; Nikezić, A.; Loren-Méndez, M.; Sakantamis, K.; Philokyprou, M.; Sorbo, E.; Péral-López, J. *STATEMENTS: Teaching through Design for Sustainability of the Bult Environment and Heritage Awareness*; University of Belgrade—Faculty of Architecture: Belgrade, Serbia, 2021. Available online: https://hersus.org/statements-for-teaching-through-design-for-sustainability-of-the-built-environment-and-heritage-awareness/ (accessed on 11 February 2022).
34. HERSUS Sharing Platform. Available online: https://hersus-sharingplatform.org/ (accessed on 4 February 2022).
35. Djokić, V.; Nikezić, A. *BOOKLET: Seminar for Teachers—Teaching through Design for Sustainability of the Built Environment and Heritage Awareness*; University of Belgrade—Faculty of Architecture: Belgrade, Serbia, 2021. Available online: https://hersus.org/booklet-seminar-for-teachers-teaching-through-design-for-sustainability-of-the-built-environment-and-heritage-awareness/ (accessed on 11 February 2022).
36. Cross, N. Design Research: A Disciplined Conversation. *Des. Issues* **1999**, *16*, 5–10. [CrossRef]
37. Royal Institute of British Architects (RIBA). *RIBA Procedures for Validation and Validation Criteria for UK and International Courses and Examinations in Architecture*; RIBA Education Department: London, UK, 2011. Available online: https://riba-prd-assets.azureedge.net/-/media/Files/2011ValidationProcedures-SECONDREVISION2MAY2014.pdf?rev=018873e53517439ea932050c892290d6&hash=EE8681B04226524768C850A98E1D9A52 (accessed on 13 February 2022).
38. UNESCO-UIA Validation Council for Architectural Education. *UNESCO-UIA Validation System Procedures Manual for Study Programmes and Systems*; International Union of Architects: Paris, France, 2017. Available online: https://www.uia-architectes.org/wp-content/uploads/2022/02/UNESCO-UIA-Validation-System-Manual_2017_english.pdf (accessed on 13 February 2022).