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Teaching Urban Health: Research-Based Learning for Sustainable Urban Planning, Design and Governance

Partners: UCY, UNIFI, BHL, TUB, CHALMERS

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Executive summary

This is a pre-print version of the paper presented at the EDULEARN 2026 Conference, Palma, Spain, 29 June – 01 July 2026. The paper was presented virtually, and the video presentation will be made available through the U-CARE YouTube channel after the conference. The paper will be published in the EDULEARN26 Proceedings (ISSN: 2340-1117) via the [IATED Digital Library](#).



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Abstract

This paper presents the educational outcomes of three pilot courses on urban health and restorative design implemented at the University of Florence, the University of Cyprus, and Chalmers University of Technology between March 2025 and January 2026, as part of an Erasmus+ Cooperation Partnership in Higher Education. The aim of the U-CARE project (*Urban CARE to battle climate change impacts on urban ecosystems and health across different European climate zones*) was to establish new learning modules in the participating Higher Education Institutions (HEIs) based on the UrbanCare framework, a pre-existing methodological approach for structuring evidence-based urban health spatial projects. The framework guided a 3-step methodology: 1. Urban health research; 2. Neighbourhood diagnostics; 3. Decision-making workshops. All courses shared the framework's four key themes central to addressing climate change-driven urban degradation and its associated health impacts in urban environments: urban heat, walkability, stormwater runoff, and biotope loss. The educational objectives were to integrate research-based learning, the use of smart tools (an analytical data viewer developed for the purposes of the project) and participatory practices to foster the transdisciplinary skills required for the future generation of urban planners, environmental designers and public authorities' managers to tackle pressing climate threats and public health challenges.

The three courses follow a sequential learning process, starting with more practical modules that introduce research data collection and analysis, and environmental impact assessment, moving on to planning and design of 3 pilot cases using human-centred approaches, and culminating in service and infrastructure management. The syllabi, learning activities, and assessment criteria were collaboratively developed and included lectures, international seminars, fieldwork, participatory workshops, student group work and presentations, individual work, and short quizzes. Educators from the partner institutions provided teaching components for the different courses, and original learning materials – available as Open Educational Resources (OER) – on a topic currently underrepresented in European HEIs. The courses were targeted at postgraduate students – either a master's degree, a 5th-year integrated architecture degree or a PhD. A total of 58 students attended the courses across the three institutions and evaluated them with regards to the skills and knowledge acquired – including participatory and labour-market skills, the clarity of the lectures' objectives, and the learning resources.

Providing hybrid participation in the courses to students from partner institutions other than the one hosting the specific pilot proved impossible due to institutional regulations and misaligned academic timeframes across countries – a common challenge for higher education in the EU. Asynchronous access to teaching resources was to some extent provided through the OER. Overall, the outcomes of the students' evaluations were positive, with between 66.6% and 100% of students reporting that they had acquired the skills targeted by the courses.

Keywords: Urban health, research-based learning, sustainability education, transdisciplinary skills.

1. Introduction

Climate change is reshaping European cities through rising temperatures, more intense rainfall events, biodiversity loss, and widening environmental inequalities. These dynamics generate direct and indirect public health impacts, including heat stress, reduced walkability, mental health pressures, flooding risks, and exposure to degraded public environments. Despite these urgent challenges, urban health remains only occasionally or partially embedded in architecture, planning and public management curricula. Architectural education institutions are not required to include health in their scope [1], and few universities offer training programmes that equip students with the interdisciplinary skills needed to understand and improve urban health [2]. In particular, it was highlighted that the few available urban health programmes focus on a narrow range of methodologies, lack training in mixed methods and participatory action research, do not expose students to governance issues or field-based learning opportunities, or delve into comparative analysis of cities [2].

The Erasmus+ U-CARE project was established to address these gaps by applying the UrbanCare framework, a preexisting urban health spatial methodology that connects environmental and health research, stakeholder engagement for problem solving, and spatial designs through participatory skills and digital innovation. The objective of the project was to develop transferable learning modules that equip future professionals with the competencies needed to plan, design, and manage healthier, more climate-resilient cities. A curricula survey conducted among partner institutions identified fragmented treatment of urban health topics, limited use of data-driven methods, insufficient fieldwork opportunities, and weak links between academic learning and real-world governance contexts [3]. These findings are consistent with broader policy debates on the need to align higher education with sustainability transitions, digital competence, and future green market needs [4].

The survey also showed that each institution faced different curricular constraints and opportunities. At the University of Florence (UNIFI), the most feasible route was a stand-alone thematic seminar. At the University of Cyprus (UCY), embedding content into an existing postgraduate course enabled accreditation efficiency. At Chalmers University of Technology (Chalmers), integration into an existing management course allowed urban health themes to be tested within real estate, service, and facilities management education. Consequently, the pilot courses were intentionally designed as flexible modules rather than as a single rigid syllabus. Shared learning outcomes and themes were maintained, while delivery formats, credit structures, case studies, and disciplinary emphasis were adapted locally.

The main rationale for the design of the pilot courses centred on the pedagogical approach needed to develop skills for addressing complex, place-based, and cross-sectoral problems, such as urban health. Therefore, the pilots combined research-based learning, case-study analysis, collaborative projects, stakeholder workshops, and digital tools that enabled students to interpret evidence and translate it into design, planning, or management proposals. This design responded directly to the curricula survey findings that students needed stronger analytical, participatory, and applied problem-solving skills.

Each of the three courses, delivered in 2025-2026 by UNIFI, UCY, and Chalmers, adapted the common U-CARE framework to local expertise and institutional contexts while sharing core learning outcomes. This paper evaluates the design, implementation, and outcomes of these pilots, and reflects on their implications for curriculum innovation in sustainability-related disciplines.

2. Literature context of the pilots

2.1 Urban health education

Urban health is an interdisciplinary field that links public health and epidemiology with planning, urban design, geography, sociology, public management, and other related disciplines [5]. The built environment shapes physical activity, exposure to heat and pollution, access to green space, social interaction, and vulnerability to environmental risks [6]. However, university curricula often address these dimensions separately. Architecture and planning programmes may cover sustainability, ecology, or environmental design, while public health programmes may focus on population outcomes without engagement with urban planning and design processes.

Recent international guidance calls for stronger integration of health into urban planning education [7]. Scholars have clearly argued that addressing urban health requires integrating systems thinking, spatial analysis, climate adaptation, equity, and participatory governance [8,9]. The pedagogical challenge is therefore not simply to add new content, but to restructure learning around cross-cutting urban challenges.

2.2 Research-based learning in higher education

Research-based learning places inquiry, evidence gathering, reflection, and knowledge production at the centre of the student experience. Rather than passively receiving knowledge, students engage with practical questions, methods, and uncertain outcomes. Healey and Jenkins argue that links between research and teaching are especially valuable when students actively participate in inquiry processes rather than simply consuming research outputs [10]. Brew similarly emphasises that research and teaching should be understood as mutually reinforcing activities in higher education [11]. Inquiry-led and problem-based pedagogies are therefore particularly relevant to planning and design disciplines, where complex socio-environmental problems require analytical reasoning, synthesis across multiple forms of evidence, and the ability to formulate situated responses. Evidence from broader higher education research supports this emphasis on active learning approaches, which increase student performance in science, engineering, and mathematics compared with traditional lecturing [12]. While urban planning and design education has its own studio-based traditions, the U-CARE pilots extend active learning by connecting design work with empirical urban health research, environmental data, and participatory decision making.

2.3 Participatory and digital skills in contemporary education

Graduates are increasingly expected to combine disciplinary knowledge with collaboration, communication, and digital competence. Digital competence is not limited to software operation; it includes the capacity to locate, interpret, create, and communicate information through digital tools, as well as the critical evaluation of digital resources [13]. In planning and design education, these skills are increasingly important because urban decisions should rely on spatial data and environmental indicators, which require visualisation to enable interpretation.



Participatory skills are equally important. Sustainability challenges involve multiple actors with different forms of expertise, authority, and lived experience. Planning theory has long emphasised communicative and collaborative approaches to decision-making [14], while more recent work stresses co-creation and stakeholder engagement as necessary conditions for sustainable urban transitions, since complex urban challenges require collaborative governance, shared learning, and coordinated action across sectors [15,16]. For students, this means learning not only to produce technically sound proposals but also to communicate evidence, facilitate dialogue, and understand the institutional settings in which decisions are made.



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3. Methodology

All three pilot courses were based on the UrbanCare framework, developed through research, teaching, and applied urban projects over several years [17]. UrbanCare is an indicator-based urban health framework that analyses spatial inequity through four interconnected urban degradation mechanisms: walkability constraints, surface runoff, urban heat, and biotope loss across multiple scales [18]. These mechanisms affect ecosystem services and disproportionately impact vulnerable and slower-paced groups. The framework operates through three phases: Spatial Inequity Research (SIR), which establishes baseline conditions; Sustainable Pedestrian Planning (SPP), which translates evidence into strategies through stakeholder engagement; and Integrated Pedestrian Design (IPD), which develops spatial interventions at pedestrian scale. Across these phases, environmental indicators support research, planning, and spatial design decisions either in a HEI or professional studio context [19]. Digital tools support all stages of the framework through a Data Viewer providing a 360° pedestrian-based interface allowing students to explore environmental conditions, urban health indicators, and case-study surveys through immersive urban scenes and pedestrian loops. In parallel, the Data Viewer supports the organization and transferability of project data across the three phases. While the methodological structure remained consistent, data inputs and indicators were adapted to local climatic and institutional contexts.

The implementation of the U-CARE pilot courses translated the UrbanCare framework into a higher education context through thematic and pedagogical adaptation. The four urban degradation mechanisms structuring the framework, walkability constraints, urban heat, surface runoff, and biotope loss, were operationalized as teaching themes to guide course content, fieldwork, and design tasks. While the methodological structure of UrbanCare remained constant, its application was adapted to the disciplinary focus, institutional setting, and pedagogical format of each participating university. Table 1 summarises how these themes were adapted across the pilot courses.

Table 1. Adaptation of U-CARE shared themes to local institutions' disciplinary emphasis

	Pilot 1 University of Florence	Pilot 2 University of Cyprus	Pilot 3 Chalmers University of Technology
Walkability	How walkable environments contribute to reducing carbon emissions	The role of walkability in reducing accidents, contagious and non-contagious diseases, and promoting active lifestyles	Integrating active travel: how walkable environments influence health
Urban Heat	Addressing urban heat as part of climate-resilient strategies	Mitigating heat-related health issues	Shading to save energy: the urban heat island effect and its impact on the health of vulnerable groups

Stormwater Runoff	Stormwater management as part of climate-resilient strategies	Reducing waterborne diseases and safeguarding drinking water supplies	Unsealing as a water-sensitive strategy: health risks associated with unmanaged stormwater, drought and flooding
Biotope Loss	Balancing climate mitigation strategies with biodiversity conservation	The connection between biodiversity, mental health and ecosystem services	How the loss of natural habitats affects health

Pilot 1 at UNIFI was implemented from March to June 2025 as a thematic seminar focused on environmental and health impact assessments, urban climate analysis, and climate-resilient design proposals. Pilot 2 at the UCY was delivered from September to December 2025 as an 8-ECTS postgraduate course titled Healthy Urban Design and Planning for Mediterranean Cities, focusing on the challenges of semi-arid urban climates. Pilot 3 at Chalmers was integrated into an existing course on service management for construction and facilities from November 2025 to January 2026, focusing on value creation, facilities management, and climate-responsive real estate strategies. In each course, the local case study (the Isolotto neighbourhood in Florence, Makarios Hospital area in Nicosia and Sahlgrenska Hospital area in Gothenburg) analysed by the research team was also used as the case study for students to develop proposals.

The syllabi were collaboratively developed by the consortium and combined lectures by international experts, fieldwork and site visits, quizzes and short exercises, literature discussions, group projects, participatory workshops, final presentations, and written assignments. Students also used project-developed digital resources, including the U-CARE platform and immersive data viewers for the selected case studies. The pilots were assessed using a mixed-methods approach that combined participation and completion rates, grades and assignment performance, post-course questionnaires (self-reported acquisition of targeted skills), and tutor observations. A total of 58 students participated across the three institutions. Learning materials were collated on an open-access online platform, and students in pilots 2 and 3 had access to the sessions from the previous pilots.

4. Results

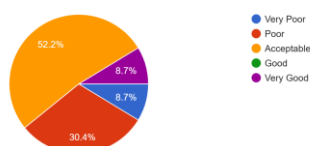
The pilot courses demonstrated that urban health can be effectively integrated into different disciplinary settings: architecture and urban design, urban planning and policy, and facility management and service design. This flexibility is significant because urban health challenges require cross-sector responses rather than discipline-specific solutions. Students were exposed to systems thinking, linking environmental indicators with design decisions, governance processes, and user outcomes.

4.1 Skills acquisition

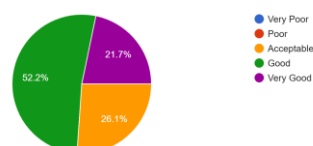
The evaluation of the pilot courses adopted a mixed-methods approach combining participation data, completion rates, grades, student questionnaires, and tutor reflections. Beyond measuring course completion (100% in all cases) and grades (100% within the top 35% of the institutions' grading scales), the framework sought to assess whether the modules developed relevant competencies for urban health and sustainable development.

Across the three pilots, student self-evaluations were highly positive. Students' understanding of urban health increased significantly following the course (figure 1). Between 66.6% and 100% of respondents reported achieving the targeted learning outcomes substantially or fully. The most positively rated competencies included understanding the links between urban form and health, interpreting environmental data, teamwork and collaborative problem-solving, presenting evidence-based proposals, and awareness of the labour-market relevance of sustainability skills. Students also reported strong satisfaction with the learning materials and course design.

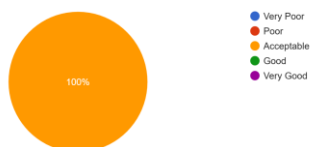
How would you assess your understanding of urban health (its principles and fundamentals), BEFORE participating in U-CARE course?
23 responses



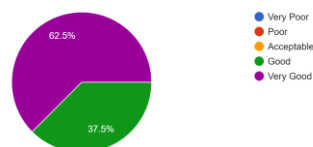
How would you assess your understanding of urban health (its principles and fundamentals), AFTER participating in U-CARE course?
23 responses



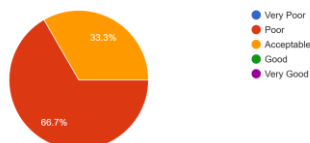
How would you assess your understanding of urban health (its principles and fundamentals), BEFORE participating in U-CARE course?
8 responses



How would you assess your understanding of urban health (its principles and fundamentals), AFTER participating in U-CARE course?
8 responses



How would you assess your understanding of urban health (its principles and fundamentals), BEFORE the course Service Management for Construction and Facilities?
3 responses



How would you assess your understanding of urban health (its principles and fundamentals), AFTER the course Service Management for Construction and Facilities??
3 responses

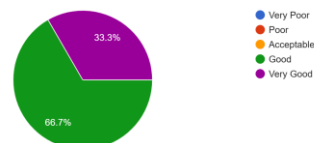


Figure 1. Students' self-evaluation of their understanding of urban health before and after the course (UNIFI - top; UCY - middle; Chalmers - bottom).

Tutor reports provided important qualitative evidence for learners' development. At UNIFI, they observed a visible increase in students' capacity to critically analyse urban spaces, apply structured indicators, and develop socially responsive design proposals. During the U-Care seminars, students progressively learned to understand spatial inequity, urban heat, stormwater runoff, and biodiversity loss not as isolated themes, but as interconnected urban health challenges. Moreover, the participatory co-design workshops with citizens (figure 2) were considered especially impactful, helping the participants translate community needs and environmental evidence into design responses.



Figure 2. Students working with citizens (left) and using the U-CARE Data Viewer (right) at the co-design workshop in Florence.

At UCY, tutors reported a notable increase in students' ability to articulate informed critiques and proposals concerning the relationship between health and urban design. Students demonstrated stronger critical engagement with academic literature through presentations and discussions, while field visits and stakeholder role-play workshops helped them move from abstract concepts to practical understanding. By the end of the course, tutors noted that students had overcome initial misconceptions and were able to engage with the topic at much greater depth.

At Chalmers, the pilot focused on management, value creation, and climate-responsive real-estate processes. Although disciplinary emphasis differed, the qualitative evaluation indicates that students developed stronger analytical and systems thinking skills enabling them to link sustainability, business drivers, and urban climate adaptation.

These results suggest that the combination of lectures, applied case studies, and practical assignments supported both conceptual understanding and transferable competencies. The pilots were effective

not only in transmitting knowledge but in building confidence, interdisciplinary reasoning, evidence-based decision-making, and professional competencies. Particularly valuable were those learning activities that moved beyond lectures: fieldwork, participatory workshops, collaborative assignments, and digital analytical tools.

4.2 Role of digital tools and delivery constraints

The digital layer of the U-CARE pilots was not limited to hosting lecture materials; it served as an applied learning environment connecting theory, field evidence, and design decision-making. The U-CARE platform and associated Data Viewers supported asynchronous learning, access to case-study resources, and data visualisation. The Data Viewers were developed to provide open access to validated case-study outputs, comparative urban health evidence, and learning resources across Florence, Nicosia and Gothenburg. They allowed users to move from neighbourhood-scale conditions to street-level scenes, providing evidence about three mitigation targets: urban heat, stormwater runoff, and biotope loss (figure 3). Regarding walkability, the Viewers offered surveys enabling users to score the quality of specific urban locations (respite areas, pedestrian crossings, entrances to key services, public transport stops) and reflect on their own experience of place. In educational terms, this transformed abstract sustainability concepts into measurable and discussable urban conditions.



Figure 3. Example of the interface of the Data Viewer (Nicosia - Loop 1). Landing page for loop (top left); aerial view of loop showing locations of assessed urban scenes (top right); stormwater runoff assessment of location 5 (bottom left); biotope loss assessment of location 5 (bottom right).

Pedagogically, the viewer supported three important learning outcomes. First, it strengthened spatial literacy, enabling students to relate environmental indicators to specific urban locations (crossings, bus stops, shaded areas, entrances, etc.). Second, it improved evidence-based reasoning, since proposals were justified through observed thermal exposure, sealed surfaces, missing shade, or discontinuous footpaths rather than intuition alone. Third, it supported participatory learning, because a shared visual evidence base facilitated discussion during workshops, role-play exercises, and group design reviews. Students could debate priorities and interventions while referring to



common datasets and scenes, and particularly valued the opportunity to connect abstract concepts such as heat exposure or pedestrian comfort to specific locations. The platform also improved scalability and replicability, since the same analytical logic was applied across multiple cities while still allowing local adaptation.

Nevertheless, the pilots also exposed significant delivery constraints. Full cross-enrolment between universities proved impossible due to incompatible academic calendars, differing credit systems, and institutional regulations governing access for external students. External participation rules varied considerably across partner universities: some institutions allowed only limited access, others prohibited external participants altogether. Hybrid teaching had practical limitations. Tutors at UCY reported that while online components widened access to international lecturers and collaborators, students found it easier to follow and participate when activities were fully in person. Technical issues occasionally affected hybrid sessions, suggesting that digital access alone does not guarantee engagement.

Overall, the findings suggest that digital tools are most effective when used not as substitutes for teaching but as bridges between research, place-based learning, and collaborative decision-making. At the same time, institutional interoperability remains a critical precondition for scaling cross-border digital education in Europe



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5. Conclusions

The U-CARE pilots highlight lessons for effectively integrating urban health education across disciplines and indicate the need for higher education reform in the EU to enable collaborative approaches that equip students with the skills to address complex problems.

Urban health proved to be an effective integrative theme because it connects climate adaptation, environmental and spatial justice, health and wellbeing. These links enable the integration of design, planning, engineering, public health, and management perspectives into a coherent learning framework. Research-based learning strengthened relevance: engaging with real case studies and stakeholders improved motivation and exposed students to the complexity of real decision-making contexts. The use of digital tools further supported them in translating abstract data into spatial understanding. Finally, institutional innovation is as necessary as pedagogy. Even when teaching models are successful, scaling joint European learning modules requires greater interoperability among universities in calendars, credit recognition, and participation rules. The pilots demonstrate the value of combining local contextualisation with a shared international framework that can be transferred across institutions.

Across three universities and 58 students, the courses generated positive learning outcomes, strong student satisfaction, and evidence of transferable skills development. The experience suggests that curricula in architecture, planning and management can effectively place urban health at the core of sustainability education through flexible, research-based, and practice-oriented learning modules. To scale such initiatives across Europe, universities and policymakers should address structural barriers to cross-border participation, credit recognition, and reliable digital delivery systems.

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