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Sustainable Urban Futures: A Transnational Teaching Mobility Experience at EPOKA University, Tirana

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Abstract

This paper presents a teaching mobility developed within the framework of the European project TNE-DESK—Developing Shared Knowledge in Innovative Materials and Digital Transformation for Sustainable Economy and Green Transition (CUP H91I24000380007), funded by Italy's National Recovery and Resilience Plan (PNRR), M4C1, Inv. 3.4. The mobility was hosted by Epoka University, Tirana, Albania, in November–December 2025 and was related to Work Package 7—Green Transition of the teaching module Sustainable Urban Futures (EQF 7). The programme integrated climate literacy, place-based learning, and applied environmental design into architectural education through lectures, workshops, and collaborative design activities. Climate-sensitive practices, including sun-path and wind analysis, passive strategies, and outdoor-space retrofitting, were contextualized within Tirana's rapidly changing urban environment. The experience highlights the pedagogical potential of short-term teaching mobility for supporting ecological awareness, green skills, and comparative learning across Mediterranean and Balkan contexts. It also contributes to the broader discussion on transnational education as a means of embedding sustainability and ecological transition within higher-education curricula.

Keywords: transnational education; climate literacy; sustainable architecture; place-based pedagogy; green skills; academic mobility; ecological transition

1. Introduction

The global climate emergency has emerged as one of today's most critical concerns, having significant repercussions for the built environment. According to the Intergovernmental Panel on Climate Change's Sixth Assessment Report, to keep global warming below 1.5 °C, substantial reforms across all sectors, particularly in building design and construction, would be required. The built environment accounts for 37% of global CO_2 emissions and is a key area for action [1,2].

The Euro-Mediterranean and Balkan regions are facing extreme manifestations of this crisis: extended heat waves, flash floods, water scarcity, and the destruction of urban ecosystems [3,4]. Unregulated urbanization, insecure infrastructures, and socio-spatial inequalities all contribute to increased vulnerability to climate hazards and weaken environmental and social resilience [5,6]. Architectural education plays a crucial role in preparing future professionals to work in complex ecological and cultural systems, in addition to technical skills [7,8].

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Traditional architectural education has frequently been arranged around disciplinary boundaries or has emphasized the formal, aesthetic, and compositional components of design. While these approaches have helped to advance discipline knowledge, they are becoming increasingly ineffective in tackling several challenges regarding environmental, social, and technological issues that characterize current architectural practice. In this context, sustainability should be considered an overarching educational principle capable of informing learning objectives, instructional techniques, and design processes, rather than a separate topic within the curriculum, according to which future architects should be prepared through educational approaches that combine climate literacy, environmental responsibility, and an awareness of socio-technical systems. This allows students to identify global sustainability goals and transform them into context-sensitive design solutions [9].

This shift in architecture education aligns with contemporary European frameworks—such as the European Green Deal [10,11], the Renovation Wave Strategy [12], and the GreenComp framework [13]—which identify the built environment and sustainability competencies as critical pillars for the ecological transition [14]. Collectively, these policies highlight the necessity to redesign architectural and urban design courses to make sustainability an inherent cultural, ethical, and professional element that goes well beyond regulatory or technical needs, moving away from traditional, siloed approaches where environmental topics were confined to separate technical subjects like building physics or services [15].

Despite this growing body of scholarship, research on transnational education and research on sustainability-oriented pedagogy in architecture have largely developed in parallel rather than in dialogue with one another: studies on TNE mobility tend to focus on institutional outcomes such as credit recognition, partnership building, and exchange volumes, while studies on sustainability pedagogy are mostly developed within semester-long, single-institution curricula. Comparatively little is known about how short, intensive transnational mobility formats can be structured to deliver climate-literacy and green-skills outcomes within a compressed timeframe, and about the specific pedagogical design choices such compression requires. This paper addresses this gap by presenting and critically examining a five-day teaching mobility explicitly designed to integrate climate-responsive design education within a transnational framework, offering methodological insight into how such short-format experiences can be structured, sequenced, and assessed.

Research Aim and Questions

Specifically, this study investigates how short-term transnational teaching mobilities can be systematically structured to foster climate literacy and context-responsive design in architectural education, addressing the central research question: How can a five-day place-based workshop integrate environmental data analysis with architectural design in a rapidly developing Balkan capital like Tirana?

In this context, transnational education (TNE) offers a useful platform for creating and evaluating novel methods to architectural education. International mobility projects expose students and academic staff to a variety of environmental, social, and cultural settings, fostering critical comparison and collaborative knowledge production across contexts. Working in real-world urban environments allows participants to analyze local vulnerabilities, experiment with context-responsive design solutions, and consider how global sustainability goals may be translated into place-specific interventions [16]. Instead of simply imparting knowledge, these educational activities encourage experiential and collaborative learning, as well as intercultural learning processes, which build the competencies needed to meet the complex difficulties of the ecological transition [17].

The TNE-DESK project—Developing Shared Knowledge in Innovative Materials and Digital Transformation for Sustainable Economy and Green Transition—was funded by the Italian National Recovery and Resilience Plan (PNRR) and provides a strategic framework for achieving these innovative goals [18,19]. By connecting sustainability to digital innovation and material experimentation, the project urges universities to review and reconsider different teaching approaches and foster green and digital skills as a core facet of higher education [20]. The teaching mobility at EPOKA University in Tirana offers the opportunity to investigate how transnational education might contribute to the renewal of architectural pedagogy, and Tirana, one of the Balkan region's fastest-growing capitals, provides a particularly relevant scenario in which rapid urban expansion, environmental concerns, and sustainability goals coexist (Figure 1). Integrating teaching activities in such a dynamic urban setting provided opportunities to develop and test educational techniques based on climate-responsive design while also encouraging intercultural discourse, collaborative learning, and institutional cooperation. At the same time, direct engagement with local environmental and socio-spatial contexts prompted students to consider how global sustainability principles may be translated into context-specific design responses: from this perspective, academic mobility goes beyond its traditional role as a mechanism for international exchange and becomes a pedagogical tool for strengthening the knowledge, competencies and critical awareness required to address the interconnected challenges of climate change, energy transition and social equity [21,22].



Figure 1. EPOKA University, Tirana (photo by Santina Di Salvo).

2. Methodological and Operational Framework

To address the research questions outlined above, the methodological framework of the mobility was structured as an operational procedure designed to test place-based and

active learning in architectural education. The teaching mobility took place at EPOKA University in Tirana from 26 November to 6 December 2025, as part of the European project TNE-DESK—Developing Shared Knowledge in Innovative Materials and Digital Transformation for Sustainable Economy and Green Transition. The activities were arranged in conjunction with the Department of Architecture, with Visiting Professor Santina Di Salvo and coordinated by Associate Prof. Dr. Edmond Manahasa, Head of the Department, and Professors Egin Zeka and Valerio Perna, who served as the institutional coordinator and academic counterpart throughout the program's implementation. The mobility was developed as part of Work Package 7—Green Transition and is geared at postgraduate students pursuing Master's degrees (EQF Level 7) in architecture and urban design. This educational level was judged particularly suited for merging advanced disciplinary abilities with sustainability related knowledge and green skills, as specified in the European GreenComp framework [13,14]. Because participants had already learned the fundamentals of architectural design, the program focused on improving their ability to address ecological transition using systemic and transdisciplinary approaches [16]. According to the Teaching Mobility Agreement, the educational program was called Sustainable Urban Futures, reflecting its emphasis on climate adaptation, urban decarbonization, and socio-ecological resilience within modern cities [10,12,23,24]. The activities were organized as a five-day intensive curriculum that included lectures, design workshops, and collaborative presentations: this integrated structure was designed to connect theoretical knowledge with hands-on experience, encouraging students to create, discuss, and refine design suggestions while gradually establishing a shared understanding of climate-responsive urban plans.

From an operational standpoint, the workshop involved a cohort of 36 fourth-year Master's students in architecture, conducted entirely in English and divided into 3 multidisciplinary working groups. Over the 5-day period, the program delivered a structured instructional load comprising 10 h of core workshop sessions (2 h daily), alongside supervised desk critiques and field-survey activities. This setup generated a substantial empirical corpus consisting of 5 comprehensive design portfolios. Specifically, the student outputs included detailed manual sun-path and shadow-casting overlays on base building plans, campus-scale microclimatic mapping layers tracing prevailing wind directions and urban heat island vectors, and multi-layered retrofit boards illustrating passive cooling interventions, lightweight shading structures, and green infrastructure layouts evaluated across intermediate reviews and the final public jury.

Beyond its pedagogical goals, the mobility fostered intellectual collaboration between the University of Palermo, Italy and EPOKA University in Tirana, Albania. The proposal also provided an opportunity to strengthen institutional cooperation between two universities functioning in the larger Mediterranean and Balkan regions, fostering long term scientific and pedagogical collaboration [22]. The selection of Tirana added value to the program because the city is currently undergoing fast urban growth coupled by severe environmental and infrastructural issues, making it an excellent framework for researching sustainable urban development, in this way the city became an open learning environment where theoretical ideas of ecological transition could be tested through direct interaction with local urban settings.

The operational organization of the mobility was founded on three complementary ideas. First, the program was intended to ensure complete compatibility with the objectives of the TNE-DESK project while complying with the conditions stipulated by the National Recovery and Resilience Plan (PNRR) for the internationalization of higher education [18,25]. Second, the instructional activities expanded on the knowledge gathered during the pilot mobility held at the Izmir Institute of Technology (IZTECH) in June 2025. While the conceptual framework built upon that pilot, the pedagogical structure at EPOKA

University introduced several distinct operational refinements. Whereas the IZTECH experience primarily focused on broad climate and architectural design responses within a Mediterranean campus setting, the Tirana mobility adapted these tools to address the specific socio-spatial conditions of a rapidly growing Balkan capital characterized by informal urban expansion and infrastructural deficits. Furthermore, while the Izmir pilot relied heavily on preliminary digital microclimatic checks, the EPOKA edition intentionally shifted towards a hybrid methodology combining analogue sun-path and wind-flow diagrams with collaborative physical retrofit exercises. This comparative evolution allowed us to test the scalability of the TNE-DESK framework across different urban densities, demonstrating that place-based learning must be dynamically calibrated to local environmental vulnerabilities and resource constraints rather than applied as a standardized template [9]. Third, the programme utilized a place-based learning perspective by choosing Tirana as the core field of inquiry. This allowed students to interact directly with the city's environmental conditions and urban dynamics, investigating local climate-related concerns and exploring design approaches based on the context's unique qualities [6,26].

Overall, these components formed an integrated mobility model that combined European policy objectives, inter-institutional collaboration and place-based learning. Beyond assisting with the implementation of the teaching programme, this framework created favorable conditions for future collaboration between the University of Palermo and EPOKA University through the development of joint educational initiatives, shared teaching modules, and longer-term academic partnerships. Student learning was assessed using a variety of complementary evaluation methods integrated into the daily programming, that included the instructor's constant observation during design reviews and desk critiques, qualitative evaluation of the visual materials generated throughout the workshop and presented on Day 4, and organized peer-feedback sessions held during the final presentations on Day 5. The evaluation technique was established in accordance with the learning outcomes defined in the Teaching Mobility Agreement and mirrored the three fundamental pillars of the GreenComp framework, knowledge, skills, and attitudes related to sustainability, which served as the module's educational objectives [13].

These three evidence sources were treated as complementary rather than interchangeable: desk-critique observations tracked the development of each group's reasoning across the five days, the visual outputs produced at each stage provided a tangible record against which the specific learning outcomes listed in Table 1 could be checked, and the Day 5 peer-feedback sessions offered a cross-group perspective on the clarity and consistency of the proposals. For each day, the instructing team reviewed the outputs against the corresponding learning outcomes (LO1–LO15) using a shared, non-numerical assessment rubric addressing environmental reasoning, design integration, and communication clarity; this rubric was applied consistently by the same instructing team across all student groups, so that the criteria used to judge whether a given outcome had been achieved did not vary between groups. An outcome was considered achieved when it was corroborated by at least two of the three evidence sources (observation, output, and peer/instructor feedback), rather than relying on any single source in isolation.

2.1. Training Program: Five-Day Workshop

The teaching activities carried out at EPOKA University were developed as a progressive and immersive learning program focused on sustainability and climate responsive design: the teaching methodology combined theoretical knowledge with practical design exercises, enabling students to apply the concepts acquired through collaborative and experimental activities (Table 1). The program built upon the educational experience developed during a previous TNE-DESK project at Izmir Institute of Technology in Türkiye,

which focused on climate and architectural design, however, the content, activities, and teaching methodology were substantially redesigned to respond to the environmental, urban, and socio-spatial characteristics of Tirana, and this contextual adaptation made it possible to address specific local challenges while maintaining consistency with the overall learning objectives of the mobility program [24].

Table 1. Scheme elaborated by the Authors, showing the five-day instructional programme implemented during the mobility period. Weekends and non-teaching days were dedicated to coordination activities, institutional meetings, and programme review with the host department.

Day	Focus	Learning Activities (2-h Session)	Teaching Resources	Assessed Evidence & Learning Outcomes
1	Climate-Responsive Design Principles	Analysis and discussion of architectural precedents from different climatic regions to explore the relationship between environmental conditions, building morphology, and passive design strategies. Collective reflection concluded the session.	Architectural precedent panels; photographic documentation; A3 drawing sheets; markers; wall display	Assessed via seminar discussion logs and collective reflection notes. LO1 Interpret the relationship between climate and architectural form. LO2 Identify passive environmental strategies, including solar protection, compactness, natural ventilation, and thermal mass. LO3 Transform qualitative environmental observations into preliminary design principles.
2	Solar Exposure and Shading Strategies	Investigation of solar behaviour through manual sun-path analysis, shadow simulations, and comparative testing of orientation, façade openings, and external shading systems.	Base plans; tracing paper; solar diagrams; rulers; drawing pencils	Assessed via desk-critique notes and comparative orientation assessments. LO4 Apply principles of solar geometry to architectural design. LO5 Evaluate orientation and shading solutions in relation to daylight and thermal comfort. LO6 Develop graphical representations supporting solar design decisions.
3	Natural Ventilation and Green Infrastructure	Examination of prevailing winds and urban airflow patterns through mapping exercises, followed by the integration of vegetation as a climate-responsive design component.	Campus and neighbourhood maps; airflow diagrams; reference cards on nature-based solutions	Assessed via mapping exercises and microclimatic evaluation reports. LO7 Analyse natural ventilation potential within urban spaces. LO8 Employ vegetation as a strategy for cooling, protection, and environmental mitigation. LO9 Represent interactions between wind behaviour and green infrastructure through environmental diagrams.
4	Retrofitting Outdoor Public Spaces	Collaborative design workshop focused on the environmental upgrading of existing courtyards and semi-public spaces through passive and low-impact interventions. Ongoing desk reviews supported project development.	Collaborative drawing boards; tracing overlays; simple modelling materials; assessment rubrics	Assessed via ongoing desk reviews and interim evaluation rubrics. LO10 Translate environmental analyses into retrofit proposals. LO11 Integrate climatic performance, social use, and technical feasibility within design solutions. LO12 Clearly communicate the environmental rationale underpinning each proposal.

Table 1. *Cont.*

Day	Focus	Learning Activities (2-h Session)	Teaching Resources	Assessed Evidence & Learning Outcomes
5	Project Review and Reflection	Presentation of final proposals followed by peer discussion and instructor feedback addressing both environmental performance and communication effectiveness.	Presentation boards; display panels; peer-review templates; evaluation forms	Assessed via final jury evaluations and structured peer-review forms. LO13 Present climate-responsive design proposals effectively. LO14 Justify design decisions through graphical and analytical evidence. LO15 Critically evaluate project strengths and limitations based on collaborative feedback.

The training program was therefore structured as a progressive learning sequence, introducing design concepts and challenges with increasing levels of complexity, allowing students to gradually consolidate their knowledge before addressing more advanced sustainable design strategies and practical solutions [16]. The program consisted of an intensive five-day workshop, with two-hour sessions each day, guiding students from the acquisition of theoretical knowledge to the development of context-sensitive design proposals in which, rather than presenting climate-responsive design as a collection of technological solutions, the course encouraged students to integrate the analysis of key environmental factors, such as solar radiation, natural ventilation, vegetation, and microclimate, from the earliest stages of the design process, transforming them into design criteria capable of informing architectural and urban decision-making.

The five-day sequence followed a deliberate scaffolding logic, moving from broad diagnostic literacy toward increasingly synthetic and applied design tasks, so that each day's learning outcomes (Table 1) built cumulatively on those of the previous day rather than functioning as self-contained modules. The programme opened with climate-sensitive design principles (Day 1) to establish a shared conceptual vocabulary and historical grounding before any quantitative or site-specific analysis was introduced. Solar exposure and environmental control (Day 2) followed because solar geometry is the most legible and analytically tractable climatic variable for manual, analogue investigation, offering students an accessible entry point into performance-based reasoning. Natural ventilation and nature-based strategies (Day 3) then introduced a more systemic reading of climate, requiring students to relate airflow, vegetation, and urban morphology at the neighbourhood scale rather than the building scale alone. Only once these analytical competencies had been consolidated did the programme move to climate-responsive retrofit design (Day 4), which required students to integrate solar, ventilation, and vegetation-based reasoning into a single, context-specific design proposal; Day 5 was reserved for presentation, peer feedback, and critical reflection, allowing the outcomes of each preceding stage to be synthesised and communicated. This progression was intended to mirror the movement from analysis to synthesis that underpins Kolb's experiential learning cycle, discussed in Section 3.

2.2. Day 1: Climate-Sensitive Design

The first day focused on the interaction between climate and architecture and, rather than presenting sustainability through theoretical principles alone, students were asked to investigate a variety of architectural predecessors from different climate locations. They compared vernacular and contemporary examples to see how building morphology, construction materials, and spatial organization have altered throughout time in response to changing environmental conditions. Passive design methods, such as compact building

forms, solar protection systems, natural ventilation, and thermal mass, were highlighted as long-standing architectural responses rather than new technical advances [27]. This introductory session emphasized that many of the concepts connected with modern sustainable design had deep historical roots and encouraged students to acknowledge environmental design as an integral part of architectural culture.

2.3. Day 2: Solar Exposure and Environmental Control

The second day focused on the relationship between solar radiation and building performance and, using simplified plans, transparent overlays, and sun-path diagrams, students explored how solar conditions change throughout the day and across different seasons, examining their influence on architectural design. The choice of analogue tools, instead of digital simulations, encouraged a more intuitive understanding of shadow patterns, solar penetration, and façade exposure and, by testing different building orientations, window layouts, and external shading devices, students were able to appreciate how relatively small design decisions can significantly affect indoor comfort and energy performance. The exercises also strengthened their ability to interpret environmental information through drawings and diagrams, reinforcing the idea that solar analysis should be considered an integral part of the design process rather than a secondary technical verification.

2.4. Day 3: Ventilation and Nature-Based Strategies

The third day focused on natural ventilation and the role of vegetation as a complementary resource for improving environmental quality in metropolitan areas: using maps of the university campus and its surrounding areas, students identified the prevailing wind directions and analyzed the influence of urban morphology on airflow patterns. Through sketches and airflow diagrams, they examined the climatic function of courtyards, open spaces, and circulation routes, establishing connections between urban form and local microclimates Vegetation was investigated from a broader environmental perspective, considering its role in providing shading, promoting evaporative cooling, controlling airborne particulate matter, and improving outdoor thermal comfort. Trees and green infrastructure were therefore considered not merely as landscape elements but as active environmental systems capable of mitigating the urban heat island effect, absorbing CO_2 and other atmospheric pollutants, producing oxygen, enhancing biodiversity, supporting sustainable stormwater management, improving the urban microclimate, and reducing the concentration of fine particulate matter, thereby contributing to higher environmental quality and more livable public spaces. Through direct observation and environmental interpretation, students became familiar with the fundamental principles of bioclimatic design and their application to architectural and urban design [24,28].

2.5. Day 4: Climate-Responsive Retrofit Design

The transition from environmental analysis, which considered the challenges affecting the several neighborhoods under consideration, to design application took place on the fourth day. During the discussion, the significance of retrofit as an effective approach to improving urban resilience through context-sensitive design solutions was highlighted. In small groups, students identified existing open spaces, such as courtyards, campus areas, and semi-public urban environments, and developed design proposals that not only improved their environmental performance but also enhanced social usability and inclusivity, taking into account the needs of different citizen groups based on age, occupation, and cultural background. The projects looked into a range of passive design interventions, including increasing the number of trees, lightweight shade structures, water-based cooling methods, and enhancing outdoor spaces through urban furniture and public amenities, with the aim of favoring natural ventilation and users' thermal comfort. Students were

encouraged to work within a number of constraints established by the instructor while taking advantage of the opportunities offered by the existing urban fabric, rather than designing entirely new environments. This approach promoted adaptive architecture, progressive transformation, and the efficient use of resources.

2.6. Day 5: Presentation and Discussion

The final session focused on the presentation and collective discussion of the different design proposals developed over the five-day workshop. Student groups presented their projects to the jury through technical drawings, diagrams, presentation boards, and renderings, using visual communication as the primary means of illustrating the environmental strategies they had investigated and selected (Figure 2). The review process combined structured peer discussion with feedback from the teaching staff, including the visiting professor. This approach encouraged reflection on teamwork while also enabling a comparative evaluation of the students' proposals. The assessment considered both the consistency of the proposed actions, as demonstrated through the design outputs, and the clarity with which environmental concepts were communicated. This concluding phase highlighted the importance of communication, critical thinking, and collective interdisciplinary dialogue as fundamental competencies for future architects engaged in a conscious and sustainability-oriented design practice [15].



Figure 2. Final presentation and discussion of the students' climate-responsive design proposals.

3. Pedagogical Approach

The mobility's educational structure was created to go beyond conventional lecture-based methods and provide a learning environment where students could actively create, assess, and share information. Active learning, situated and place-based learning, and visual and collaborative methods—all of which support the development of climate-literate and context-aware designers—were its three complementary and mutually reinforcing pillars.

Among those, active learning can be considered one of the cornerstones of the educational program. Students were not passively exposed to the main concepts in a linear and/or transmissive way, but rather were actively engaged in observation, problem solving, and critical thinking and reflection. All the activities, such as sun paths tracing on

building plans; the mapping of the main winds on campus, and the sketching of retrofit solutions for outdoor spaces challenged the class to directly understand and manipulate pieces of information to generate their own interpretations and diagrams. The main aim of this approach was to enhance the retention and understanding, while transforming the abstract concepts behind solar orientation, ventilation, and shading into concrete design materials and operations. Therefore, active learning was not intended only as a technical proficiency but rather as intellectual autonomy, developing in the students the ability to make independent judgements when exposed to complex climatic data [29].

This method is based on Kolb's experiential learning theory, which views learning as a cyclical process that depends on active experimentation, abstract conceptualization, reflective observation, and real experience [29]. This cycle, which has great potential for design education, can be summed up as follows: students interact with real-world climate data (concrete experience); they then consider its spatial implications and effects (reflective observation); they then generalize some passive design principles (abstract conceptualization); and finally, they apply these principles through retrofit proposals (active experimentation).

The second pillar of the proposed pedagogical model was situated and place-based learning. Instead of using an abstract geographical location, the city of Tirana was used a real-case example to anchor the program exercises in a specific climatic and urban conditions. At this stage, the class studied and evaluated the surrounding environment to extract and model climate data and to start discussing possible design inspirations: the main purpose was to bridge the gap between a traditional academic framework and the students' direct experience. Through this immersion, the class had the possibility to understand the effect that climate factors such as sun exposure, lack of vegetation, and sufficient ventilation can have on the urban fabric.

Moreover, all the results were also compared with neighboring Balkan Countries and similar areas in the Mediterranean region. In this way, they had the possibility to create meaningful links between the Albanian situation and more generalized regional challenges such as urban development and climate vulnerability [17].

The result of this consisted in a more nuanced and critical design sensibility, where sustainability was seen not anymore as a performative feature of technological systems but as a holistic and ingrained relational activity.

Finally, the third fundamental component of the program were visual and collaborative models. Through all the teaching phase, students were motivated to produce drawings, diagrams, sketches, and physical models as a primary way to materialize knowledge and ideas. All the importance given to visual representations served for several purposes.

Firstly, it helped the students to shape their design ideas quickly and clear while, at the same, fostering a design process where teachers' feedback could directly be implemented in an iterative way. Secondly, students could actively engage in group discussions using media that could easily overcome any possible linguistic or disciplinary barrier.

Thirdly, the collaborative environment promoted group-problem solving and the growth of interpersonal skills at the core of professional development. Students learnt the importance of simulating real-world design processes based on collaboration, communication, and visual clarity.

All these three discussed steps were used together to create a pedagogical ecosystem where information was the result of a collective process, based on a local context, and shared through meaningful items and artefacts.

As a result, the integration of contextual immersion, visual-collaborative practice, and active participation created a transformative learning environment that promoted

multicultural communication, ecological awareness, and systemic thinking in addition to improving technical abilities.

In Figure 3, the pedagogical framework implemented during the process is reported and visualized. The whole program followed a sequential logic where the final outcomes were the production of a series of intermediate steps in which each one was informed by the previous.

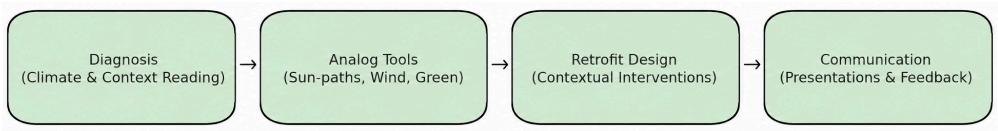


Figure 3. Pedagogical progression: from climate and context diagnosis, through analogue tools, to retrofit strategies and final communication.

Taken individually, active learning, place-based learning, and visual-collaborative practice are well established within experiential, situated, and studio-based traditions of architectural education. What distinguishes the configuration proposed here is not the individual pillars themselves, but their deliberate coupling within a compressed, transnational mobility format: whereas studio-based pedagogies typically unfold across a semester within a single institutional context, and place-based approaches are usually developed by faculty with sustained, long-term familiarity with the site, this programme required students and instructors to construct contextual knowledge of Tirana's climate and urban conditions from direct, first-hand observation within a five-day window, immediately translating that knowledge into design action. The novelty of the three-pillar configuration therefore lies in its function as a scaffolded, time-compressed method for building situated climate literacy in an unfamiliar transnational context, rather than in the pillars being conceptually new in themselves.

The same logic extends to Kolb's experiential learning cycle underpinning the sequence (Section 2.1): it is not experiential learning as such, but its scaffolded compression into a five-day transnational format, that constitutes the paper's methodological contribution.

4. Observed Outcomes and Pedagogical Reflections

The outcomes discussed in this section derive from teaching observations, desk critiques, student design outputs, peer discussion, and final presentations. They should therefore be interpreted as pedagogical observations emerging from the workshop rather than as quantitatively measured changes in individual student competence. To address the overarching research aims, these outcomes are critically analyzed below across five core dimensions.

Within this qualitative frame, the claims discussed below vary in the directness of their evidentiary basis: the observations relating to climate literacy, collaborative dynamics, and contextual sensitivity (Sections 4.1–4.3) are grounded most directly in the design outputs, desk-critique record, and site-specific evidence described in Section 2 and above, whereas the broader claims concerning intercultural exchange and institutional cooperation (Sections 4.4 and 4.5) rely more heavily on the instructing team's interpretation of classroom discussion, peer-feedback sessions, and institutional correspondence, and should accordingly be read as pedagogical interpretations rather than as independently verified outcomes. A more systematic qualitative evaluation, for instance combining coded observation protocols with structured post-programme interviews or a mixed-method survey administered to participants, would allow these interpretive claims to be corroborated more rigorously in future iterations of the programme and is identified as a priority for subsequent mobilities within the TNE-DESK framework (Section 5).

Throughout the subsections that follow, this distinction is reflected consistently in the language used: verbs such as "indicated", "suggested", or "appeared to support" signal claims grounded in the qualitative evidence just described, while stronger claims of direct development or improvement are avoided in the absence of pre/post, longitudinal, or quantitative assessment.

4.1. Strengthening Climate Literacy

Through the structured progression of the program—as documented through the comparative analysis of student design portfolios, hand-drawn sun-path diagrams mapping seasonal solar incidence, and microclimatic mapping layers tracking campus wind flows—the students' outputs indicated an increasing ability to connect climatic analysis with design decisions. They were not only exposed to raw environmental data, but they were also motivated and trained to critically interpret data for the purpose of a design process. The causal relationships between climate phenomena and possible spatial configuration were understood through progressive steps such as sun paths simulation, wind flows drawing, and the assessment of vegetation as a microclimatic resource. By promoting procedural and conditional understanding, knowing not only what techniques exist but also when and how to apply them in response to certain environmental conditions, this operational approach went beyond declarative knowledge [13,30]. According to Chayaamor-Heil et al. [9], this kind of literacy is becoming more widely acknowledged as a fundamental professional advantage in the field of architecture. It connects technical performance with ecological responsibility and facilitates the shift toward design cultures that place a higher priority on adaptation, resilience, and energy efficiency. Furthermore, the idea of climate literacy from a multidimensional perspective perfectly aligns with the ESD for 2030 (UNESCO's Education for Sustainable Development for 2030) roadmap, where among the needed competencies for sustainability-oriented education in HEIs [31] anticipatory thinking and collaboration actions are listed. Therefore, their implementation during the EPOKA University mobility demonstrates the possibility that these ESD-aligned outcomes can be also transferred into short-format workshops during transregional activities.

4.2. Fostering Green Skills

The development of green skills, which transcend disciplinary boundaries to incorporate cognitive, relational, and ethical dimensions, appeared to be supported by the instructional emphasis on teamwork and collaborative problem-solving. As recorded through continuous observation during desk critiques and interactive peer-feedback notes, students explored systems thinking by working together to negotiate design choices and assess how architectural form, climate, and human comfort interact within a cohesive framework. Since each group had to justify and ground its solutions through climatic observations and performance-oriented arguments, the iterative process based on proposing, visualizing, and idea refining—systematically tracked across the workshop's intermediate review boards—was used precisely to foster this sort of evidence-based reasoning. Furthermore, this process also aligns with the need of contemporary professional environments, where sustainable innovation is intended as a form of interdisciplinary cooperation enhancing the ability to use collective intelligence to deal with uncertainty [14]. Fundamental as well was the ability required of the students to articulate and defend environmentally grounded decisions—supported by diagrams and sketches—to properly engage stakeholders and to transform sustainability goals from abstract categories to transferable design outcomes [16].

4.3. Contextual Sensitivity

A unique testing ground to explore contextual sensitivity in design was offered by the urban context of the city of Tirana, which presented interesting dynamics of accelerated development, infrastructural deficits, and socio-economic/spatial inequalities [32,33].

In contrast to highly regulated settings where technology solutions are frequently standardized, Tirana forced students to convert global strategies into practical, low-tech interventions due to situations of unpredictability and unequal resources. By tracing how individual groups translated local microclimatic constraints into spatial layouts—as evidenced in their hand-drawn mapping layers and final retrofit boards detailing courtyard cooling strategies and low-tech shading devices (Figure 4)—the evidence suggests that the workshop fostered an understanding of ecological design not as a set of abstract principles, but as a situated practice that must consider elements such as local climate, material availability, and cultural factors [26].

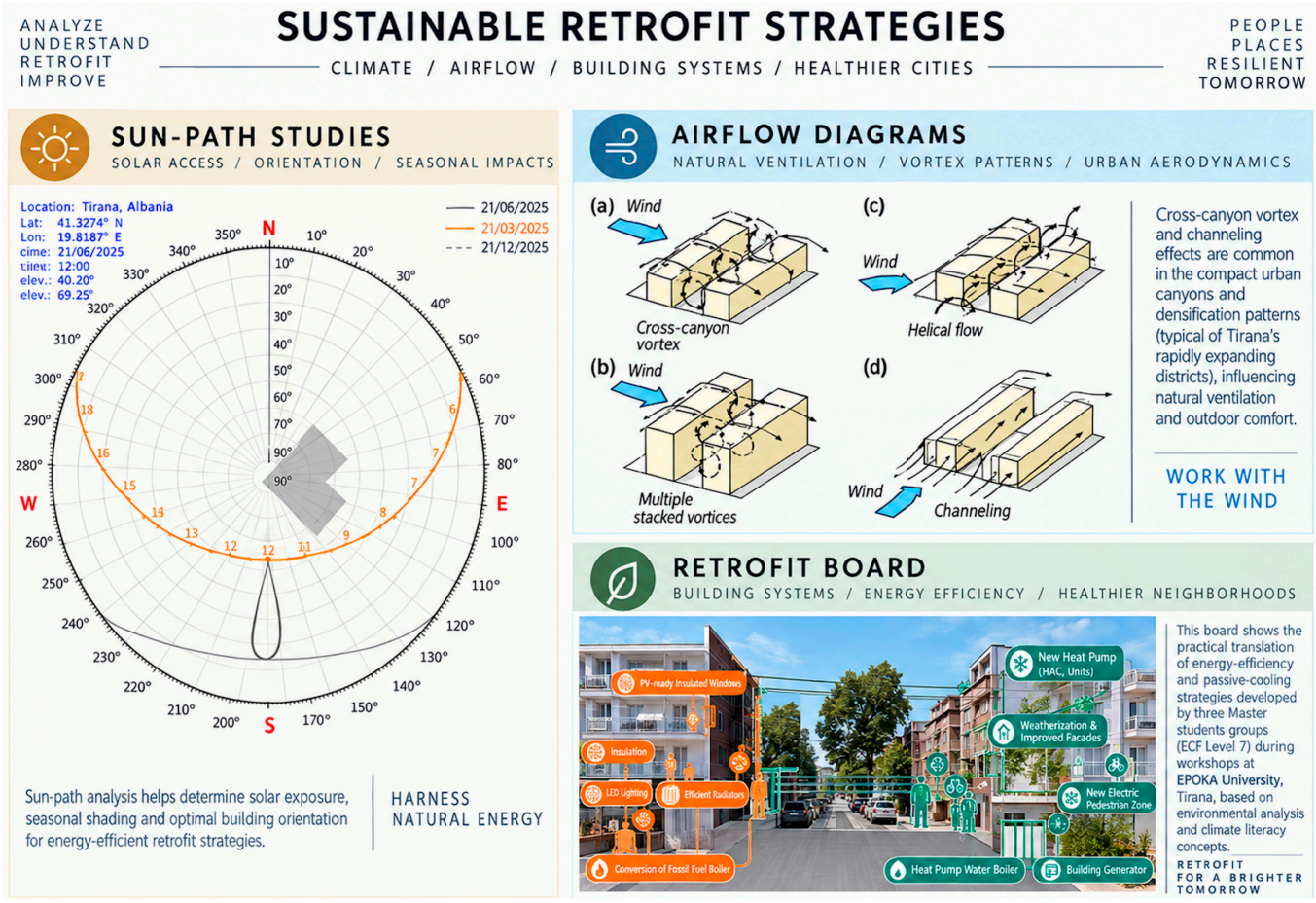


Figure 4. Student-generated analytical and design workflow developed during the EPOKA University teaching mobility in Tirana: (**a**) sun-path and shadow analysis; (**b**) airflow mapping in compact urban morphologies; (**c**) retrofit strategies integrating low-tech cooling and green infrastructure; (**d**) wind-flow channeling between elongated building blocks.

Such a perspective is coherent with recent trends that promote the value of adaptive, small-scale, and socially responsible interventions as vectors of resilience in contexts suffering from inequalities and rapid uncontrolled urbanization [6].

4.4. Intercultural Exchange

The Italian and Albanian academic communities participated in comparative reflection thanks to the mobility, which created significant potential for intercultural learning. As documented through joint seminar discussions and cross-cultural critique sessions, this conversation brought to light common regional vulnerabilities, such as heat stress, infrastructure stress, and informal urban expansion, as well as the various ways in which different institutional and cultural frameworks deal with these issues. Both students and faculty became aware of the plurality of possible directions that ecological transition can disclose while challenging the notion of a single normative model to be universally applied [22]. In this perspective, intercultural exchange was also a means to nurture reflexivity since all the participants were motivated to rethink and reassess their original assumptions, pedagogical habits, and design practices concerning alternative possible directions. According to research on international higher education, these kinds of experiences can foster ecological cosmopolitanism, a way of thinking that places local action within international flows of responsibility and knowledge [34].

4.5. Institutional Cooperation

The mobility strengthened TNE's strategic position as a conduit for sustained academic collaboration at the institutional level. Beyond only offering a short course, the partnership between the University of Palermo and EPOKA University generated impetus for co-taught modules, joint curricula, and increased student mobility opportunities, as formally recorded in institutional meeting minutes and preliminary academic agreements. These findings support the goals of the PNRR-funded TNE-DESK program, which views academic mobility as a systemic tool for revitalizing higher education via sustainability and digital innovation rather than just a bilateral exchange [18,25]. Moreover, by integrating mobility into European frameworks—including the Green Deal and the Renovation Wave—The program demonstrated the latent potential of universities to act as agents of policy translation, successfully transforming abstract regulatory goals into concrete pedagogical and design outcomes [10,12,24]. The importance of networked cooperation, where local educational initiatives contribute to larger regional and continental aims of ecological transformation, is highlighted by the strengthening of institutional links in this context.

5. Conclusions

Through a condensed, practice-focused style rooted in international collaboration, this teaching mobility outlines an adaptable and scalable methodological framework for incorporating sustainability into architectural education. Rather than relying on a rigid instructional sequence, the initiative's value lies in its methodological contribution: a calibrated set of activities that translates environmental data into design reasoning, pairs analogue inquiry with collective critique, and grounds decision-making within specific urban conditions. As demonstrated by the comparative evolution between the initial Izmir pilot and the Tirana edition, this framework's transferability relies precisely on its capacity to be dynamically calibrated to distinct urban densities and regional vulnerabilities, rather than applied as a standardized template. In practical terms, this calibration also depends on institutional conditions that go beyond adapting to local density or context: a shared framework agreement between partner universities, a receiving department able to host a compressed, intensive module for postgraduate students, and an urban setting that offers sufficiently legible climatic and morphological contrasts to sustain the analytical exercises described in Section 2. Where these conditions are not met, the specific instructional sequence presented here would need to be adapted rather than replicated as such. This qualified view of transferability is maintained consistently across the manuscript: the Ab-

stract frames the experience as highlighting the pedagogical potential of short-term mobility rather than asserting a proven or generalisable effect, Section 4.5 grounds the institutional-cooperation claims in documented meeting minutes and preliminary agreements rather than presenting them as already-realised outcomes, and the conditions specified above are intended to apply wherever transferability or replicability is invoked elsewhere in the text. Three consequences can be highlighted in terms of curriculum design. Firstly, the pedagogical process shifts from simple awareness to proactivity, thanks to the fact that climate change concepts are evaluated progressively, from diagnostic observation to retrofit. Secondly, concrete data and outcomes—structured in performance-linked assessments (such as solar control logic, ventilation schemes, and microclimate proposals)—should be preferred over the theoretical rhetoric behind sustainability. Thirdly, activities that are place-situated—but at the same time adaptable from a material point of view—are to be preferred since they can accommodate local limitations while embedding clear assessment criteria. From an institutional perspective, the EPOKA mobility confirmed that short mobility initiatives are able to generate concrete design outcomes (studio briefs, visual boards, condensed rubrics) that can stimulate long-lasting alignment between different institutions and facilitate more effective, coordinated cross-border projects that share similar practices of co-teaching, ECTS recognition, and joint project applications. These reflections should be read against the specific limitations of the present study. The findings reported here derive from a single, short-duration mobility experience involving one cohort of postgraduate students at one receiving institution; no longitudinal data were collected to verify whether the climate literacy, green skills, or design competencies observed during the workshop are retained or applied in students' subsequent academic or professional practice. Consequently, the outcomes discussed in Section 4 should be understood as findings demonstrated within the bounded timeframe of the mobility itself, while the broader claims regarding curricular transferability, institutional replicability, and long-term competency development remain prospective implications that this single case cannot, on its own, confirm. Future iterations of the programme, ideally involving multiple cohorts and follow-up data collection after students return to their home institutions, would be needed to substantiate these longer-term claims. Nevertheless, aside from the positive points of this experience, its limits and next steps are equally clear. There is a need for an expanded stakeholder network (municipal units, campus facilities, neighbourhood associations) for the students to test the feasibility of their ideas outside of the studio environment; for the implementation of on-site analyses to better evaluate the students' design intentions; and for a tracking of the student cohorts to better direct future studio learning outcomes towards professional choices. Moreover, the social aspect of environmental performance could be sharpened by incorporating equity requirements, such as inclusive access to shaded public spaces and thermal comfort for disadvantaged users. The EPOKA mobility experience shows that it is possible to convert aspirations for more ecological design strategies into teachable and transmittable competencies thanks to a structured series of pedagogical steps. In this perspective, initiatives like the TNE-DESK are more than mere content developers; they contribute to improving learning conditions so that the topic of sustainability can become a proper pillar for design education in different geographical contexts, proposing a fruitful combination of place-based inquiry with a clear evaluative framework within institutional interoperability.

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Informed Consent Statement: Informed consent for participation was obtained from all subjects involved in the study.

Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and ethical considerations related to educational participant data.

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