

Towards Rethinking Sustainable Development in Architectural and Urban Planning Education

A Comparative Study of Literature Reviews and the Tunisian Context

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Abstract

The growing global focus on dealing with contemporary challenges by incorporating sustainability in the built environment is a worldwide concern. This situation becomes more urgent when it comes to rethinking Architectural and Urban Planning Education in Tunisia, which highlights existing gaps. The research methodology involves first analyzing international initiatives and case studies at different scales of architectural education. Then, this literature review is followed by (online) interviews with educators from renowned academic institutions around the world to explore in depth their innovative experiences in promoting sustainability issues. Through this approach, we don't only identify the knowledge and methods emphasized in these leading programs but also compare how they align with or have to be adapted to address Tunisia's specific socio-cultural and environmental context. The findings contribute to the ongoing discourse on sustainability education and seek to provide recommendations and insights for the adaptability of these programs in the local context.

Keywords: Sustainability; Education; Architecture; Urban Planning; Context.

1. Introduction

The Commission of the European Communities has defined Sustainable Development as a strategy aimed at ensuring the continuity over time of economic and social development while respecting the environment and ensuring that it meets the needs of the present without compromising the ability of future generations to meet their own needs (CMED, 1989). Several notable imperfections, at the origin of misunderstandings or even confusion, can be noted concerning the definition of the concept of Sustainable Development which remains intrinsically elusive.

The definition of "Sustainable Development" emphasizes that it is a process. The road to the goal, of sustainable living, is long, but the process of getting there is itself a goal. It can be qualified as complex, and it is not "a simple process" but a process of change.

Teaching this paradigm allows for an understanding of the contemporary world in its complexity, considering the interactions that exist among the environment, society, economy, and culture. This complexity presents challenges when it comes to integration in a pedagogical context and transformation into a pragmatic approach.

In an attempt to respond to such a problem, several pedagogical experiments have been carried out worldwide, introducing new teaching methods and approaches to successfully integrate sustainability issues into academic curricula and programs. Many universities are committed to improving understanding and developing skills needed to face the challenges of sustainable development so students can act and develop solutions to environmental, social, and economic problems. The role of higher education as a means of introducing new generations of building practitioners to the principles and practices of this paradigm is becoming highly significant, although this faces several pedagogical barriers (Altomonte et al., 2012).

Despite the situation's urgency, Tunisia's architecture and Urban planning field have witnessed a lack of engagement with Sustainability and environmental consciousness. There has been relatively limited involvement of architectural education and professional organizations in the local context (Amen & Nia, 2020; Aziz Amen, 2022; Gün, 2023; Odunlade & Abegunde, 2023).

Addressing this gap, the paper aims to contribute to the discourse on sustainable development in architectural and urban planning education by conducting a comparative analysis of international literature reviews and the Tunisian context. Through a systematic review of existing initiatives and case studies in architectural education worldwide, followed by interviews with educators from leading academic institutions, we seek to identify key knowledge, skills needed, and methodologies emphasized in sustainable architectural education. Furthermore, we aim to assess the alignment of these international programs with Tunisia's unique socio-cultural and environmental landscape.

The findings are intended to generate recommendations, and insights and to guide instructors, where possible, to formulate their methods and contextualize them in the light of these challenges.

2. Material and Methods

This study employs a mixed-methods approach to investigate sustainable development in architectural and urban planning education, with a focus on the Tunisian context. In the first place, a comprehensive literature review involves systematically reviewing international literature on sustainable architectural and urban planning education. We will

explore case studies from renowned academic journals and conferences, focusing on initiatives and best practices in integrating sustainability into architectural curricula. This literature review aims to identify key themes, knowledge areas, and methodologies emphasized in sustainable architectural education worldwide.

Following the literature review, qualitative interviews are conducted with educators from leading academic institutions around the world. These interviews will be conducted online to gather insights into innovative approaches and experiences in promoting sustainability issues in architectural education. Through open-ended questions, we will explore participants' perspectives on opportunities and challenges faced in integrating sustainability into architectural and urban planning education.

Then, the data collected are analyzed thematically. Key themes and patterns related to sustainable architectural education will be identified and synthesized. The comparative analysis will focus on assessing the alignment of international best practices with the socio-cultural and environmental context of Tunisia.

3. Case of the Local Pedagogical Context: The National School of Architecture and Urbanism (ENAU) in Tunisia

Architectural education in Tunisia saw the light with the birth of the School of Fine Arts (EBAT) (1923-1930), later evolving into the Technological Institute of Art, Architecture, and Urbanism of Tunis (ITAAUT) (1967-1993), and ultimately becoming the National School of Architecture and Urbanism (ENAU) since 1994.

Back in history, the architectural scene in Tunisia was dominated by foreign architects or those trained abroad, a number significantly smaller than the country's demands. Even the design of government buildings was exclusively entrusted to these architects trained in the West, including graduates of the École des Beaux-Arts in Paris (ENSBA). It wasn't until 1974 that a law organizing the architectural profession in independent Tunisia was enacted with the creation of the Architecture and Urban Planning section at (ITAAUT), leading to the graduation of the first Tunisian architects trained in Tunisia. This department was established alongside Fine Arts inheriting the legacy of the old preparatory cycle for the Beaux-Arts in Paris (Table 1).

This historical analysis provides insights into how regulatory frameworks and the Accrediting Board for Architects in Tunisia have been influenced by the European context of architectural education explicitly the School of Fine Arts system. It shows the challenges to face to adapt to the changing needs and paradigms within the field of architecture specifically sustainability issues.

From the pedagogical reform of 1997 until today several attempts, have followed one another to restructure architectural studies in Tunisia dealing with multiple challenges such as teaching methods and knowledge delivered.

Table 1. Evolution of Architectural Studies in Tunisia.

YEAR	IMPORTANT HISTORICAL EVENTS IN ARCHITECTURAL STUDIES IN TUNISIA
1922	Establishment of a studio in the Medina, Baccouche Palace.
1930	Establishment of the School of Fine Arts in Tunis, creating EBAT (School of Fine Arts)
1967	Birth of the Higher Section of Architecture + Study of the main lines of higher education in architecture at the School of Fine Arts
1973	Transformation into ITAAUT (Technological Institute of Art, Architecture, and Urbanism): Architecture and Urbanism Section + Fine Arts Section.
1979	Architecture and Urbanism Section + Fine Arts and Graphic Arts Section
1995	Dissolution of ITAAUT + Transformation into ENAU (National School of Architecture and Urbanism of Tunis) and School of Fine Arts of Tunis.
1997-2000	Reform Meetings (1997-2000)
2003	Reform 2003
2011	Proposal for Reform 2011 (The Revolution in Tunisia)
2019	Reform Project (Phase 1)
2020-2021	Cancellation of Reform Project (Phase 2) due to COVID

We chose to focus our study on academic curricula at The National School of Architecture and Urbanism (ENAU) because it is the first and only public school of architecture in Tunisia and after years, we have experienced the birth of other institutions of higher education private architectural schools based on the program content and structure of (ENAU). Architectural studies are divided into two cycles, totaling six years of study (two years in the first cycle and three years in the second cycle). Each year consists of modules organized in one or two semesters. Training is provided in the form of design studios, theoretical courses, seminars, and workshops.

4. Literature review and Interview insights: Sustainability in Architectural Education and Urban Planning

Many studies have been conducted to integrate sustainability issues into undergraduate and graduate architectural education and Urban planning. The literature highlights geographical diversity, with case studies from North and South America, Europe, Asia, Africa, and Australia.

By combining quantitative and qualitative analysis methods, over 700 published and referenced research papers are examined, and 250 are selected for inclusion in our research. In this context, we aim to highlight international case studies that have pioneered efforts to incorporate sustainability within architectural education, as well as to provide discussions and theoretical research offering a holistic global perspective.

Environmental Assessment Method) in the UK, NF HQE (High Environmental Quality Association) in France and LEED (Leadership in Energy and Environmental Design) in the United States, among others. Accreditation standards also play a crucial role in determining the required level of student competence within architecture and establishing clear guidelines for integrating sustainable principles into educational practices. By meeting these accreditation standards, institutions demonstrate their commitment to upholding rigorous educational quality and fostering a culture of environmental responsibility within the architectural profession.

There are important distinctions in the geographical, political, cultural, educational level, and even climate of these different places which impose different architectural approaches and therefore different pedagogical methods and strategies. In general, Arabic countries should benefit from the expertise of those countries around the world to establish their own Architecture Accreditation and Validation Board based on the local climate, but also adapt to what is in the market (Saridar & Elarnaouty, 2014). The International Union of Architects (UIA) has a similar definition of the 3 terms accreditation/validation / recognition as a 'process which establishes that an educational program meets an established standard of achievement. Its purpose is to assure the maintenance and enhancement of an appropriate educational foundation' (UNESCO-UIA, 2011).

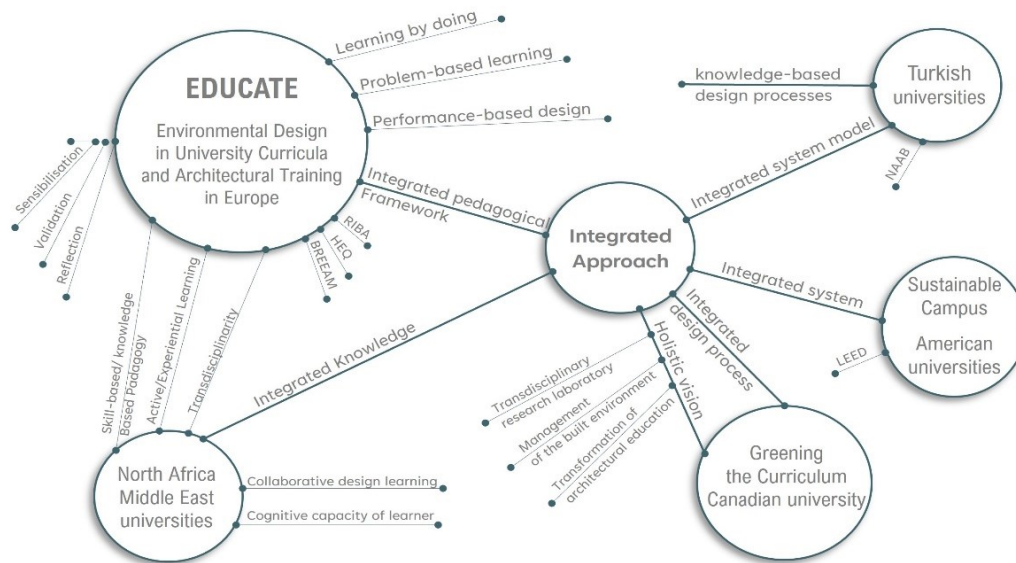


Figure 3. Literature review categories (Developed by Authors).

On the other hand, the literature review of case studies across various scales in architectural education unveils a dynamic landscape of teaching methods (Figure 3). In most case studies, educators emphasize the importance of curriculum flexibility and adaptability to accommodate evolving sustainability challenges and opportunities. They highlighted the need for continuous curriculum review and updates to integrate emerging trends, technologies, and best practices in sustainable development. Collaborative Learning with different stakeholders, government agencies, and local communities plays a crucial role in enriching sustainability education. These partnerships provide students with opportunities for applied research, community engagement, and professional networking, enhancing their learning experience and career readiness. Guest Lectures, experts, bringing in guest lectures, speakers, experts, and Professionals from various industries related to sustainability provide students with valuable insights and connect them with real-world practitioners. Field Experiences and Site visits offer a tangible connection between theory and real-world applications and explore sustainable initiatives in their local context. The interdisciplinary approach encourages students to draw from diverse knowledge areas, fostering a holistic understanding of sustainability. Many leading programs emphasize an interdisciplinary approach to sustainability education, integrating knowledge from various fields such as architecture, urban planning, engineering, environmental science, and social sciences. This interdisciplinary perspective allows students to develop a holistic understanding of sustainability issues and solutions. The student engagement and empowerment are important in sustainability education. They highlighted the need for participatory pedagogical approaches that foster critical thinking and creativity among students.

In addition, other teaching methods are employed including Knowledge-based Process, Performance-based design, and the Integrated approach also known as Integrated Pedagogy which requires the use of techniques specific to architecture as a complex discipline. Experiential learning methods, such as project-based learning are widely used to engage students in real-world sustainability challenges. By applying theoretical knowledge to practical contexts, students develop critical thinking skills and gain hands-on experience in addressing sustainability issues.

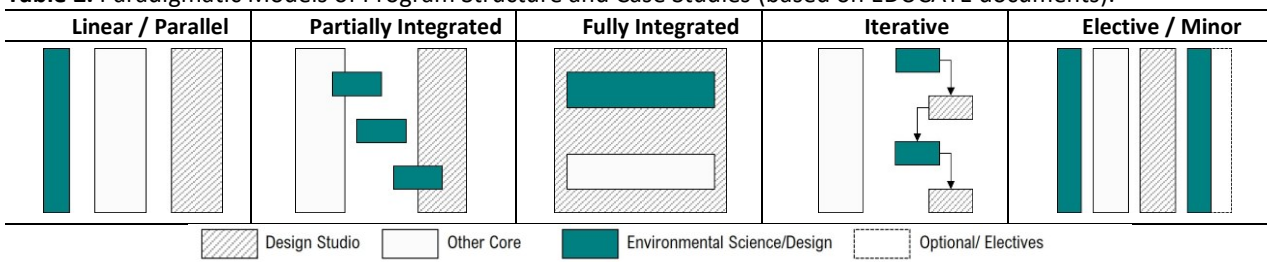
The qualitative interviews with educators provided further insights into innovative approaches and challenges in promoting sustainability education such as Professor Ashraf M. Salama, renowned for his expertise in architectural design theory and urbanism. His research frequently examines the complex interrelationship between culture, identity, and the built environment.

We also interviewed Professor Ozlmen Erdogdu, who highlighted one of the most important case studies: a teaching experience in Turkey where he led 24 students within the fourth-year studio during the 2019–2020 spring semester. Students were asked to imagine the Izmir Konak City Center from a visionary perspective, with the aim of raising awareness about the integration of the United Nations 2030 Sustainable Development Goals (SDGs) into architectural studio projects. The research explores how students incorporated these goals into their architectural designs, such as urban farming for Goal 9, combining new offices with old-school production workshops for Goal 8, and creating healthcare buildings and alternative urban spaces for Goal 3. It also highlights the challenges they faced in defining projects for the future and the successful guidance provided by the studio team in promoting socially responsible thinking and creating opportunities for SDG-oriented design.

We have also interviewed Professor Sergio Altomonte the coordinator of the EDUCATE project (Environmental Design in University Curricula and Architectural Training in Europe) which stands out among others as an academic project to promote environmental design education in university curricula and architectural education throughout Europe. Founded by the European Commission's Energy Agency for Competitiveness and Innovation (EACI) as part of the Intelligent Energy Europe Program 2008, this project was born from a consortium of seven academic partners in Europe. This Project helps to deconstruct the pedagogical barriers to the integration of environmental design and energy efficiency in university curricula and the practice of architecture, disseminates know-how and examples of best practices on sustainable design and energy efficiency in building practice and proposes a harmonization of educational systems, course structures, accreditation, and qualification prescriptions in Europe (Altomonte, 2009).

To identify existing opportunities in integrating environmental sustainability in the training of building professionals, the EDUCATE project has initially analyzed and consolidated the international state-of-the-art curricular structures and reviewed of higher education curricula. According to EDUCATE (Table 2), five paradigmatic models of program structure can be identified (EDUCATE, 2011). The linear parallel model is characterized by the fact that each disciplinary domain runs separately in parallel, and knowledge is delivered autonomously, with ex-cathedra lecture modules and studios being assessed independently. This 'satellite' structure may allow a coherent education on issues of sustainability, although an unclear integration between the studio and other courses. For the partially integrated model, taught modules of environmental science/design can represent the link between the studio and other core teachings. Although these modules can be taught as stand-alone units, they are generally, at least in part, integrated with other subjects in delivery or assessment. This structure allows the introduction of principles of environmental sustainability and their simultaneous design exploration. The fully integrated model is defined by Studio modules conceived as working spaces, where contents of different domains converge around the central role of the design project. Theoretical knowledge is delivered in accordance with the requirements, timing, and pace of the studio to support the design development. The iterative model is based on interlinked phases, where the contents delivered at one stage inform the competence acquired in the following.

Table 2. Paradigmatic Models of Program Structure and Case Studies (based on EDUCATE documents).



At each stage, knowledge is progressively deepened through a series of cognitive loops. This model emphasizes critical reflection and is built on a clear dependency between environmental science, design studio, and other core modules. Finally, the elective Minor model is based on contents enriched by optional courses, domain-specific modules, or Minor degrees and various electives that students can include in their study program. Each program structure brings its challenges and opportunities, so the curriculum must be supported by adequate approaches to teaching and learning to enhance the integration of sustainability in each model (EDUCATE, 2012).

Different transformations and strategies have to be within these Paradigmatic models of program structure to enhance the integration of sustainability. Such learning outcomes are proposed at three stages: Sensitisation, validation, and Reflection which could be potentially assumed to correspond to undergraduate, graduate, and postgraduate degrees (EDUCATE, 2012). First, Sensitisation is based on learning by doing, including empirical methods, and given in parallel to the transmission of knowledge courses. Students can take part in their learning and position themselves for sustainable development. Then, the students can develop autonomy in the design process, so they consolidate and develop knowledge by evaluating problems and proposing original solutions. Finally, during the reflection stage, students are empowered to critically link learning to practice.

5. Results and Discussions

The findings reveal several significant deficiencies related to an outdated curriculum that fails to address contemporary issues and problems adequately.

Sustainability is still looked at as a facultative matter and the challenges are to deal with multiple constraints and difficulties at different levels like teaching methods, knowledge delivered.....

One of the challenges lies in the lack of vertical coordination, and discontinuity between courses in the same module from one year to the next, lack of transversal coordination between courses and modules in the same year, absence of transdisciplinarity, need for practice and experiential learning...

Within the sample investigated curriculum, there are only a few courses that address sustainability and environmental consciousness paradigms in their content (Figure 4).

A detailed examination based on the literature review reveals that this limited number of courses explicitly address sustainability in their content. Furthermore, even Philosophy statements and objectives of these courses refer to relating design artifacts to the natural environment and a focus on the social aspect of sustainability, with relative neglect of the environmental and economic aspects.

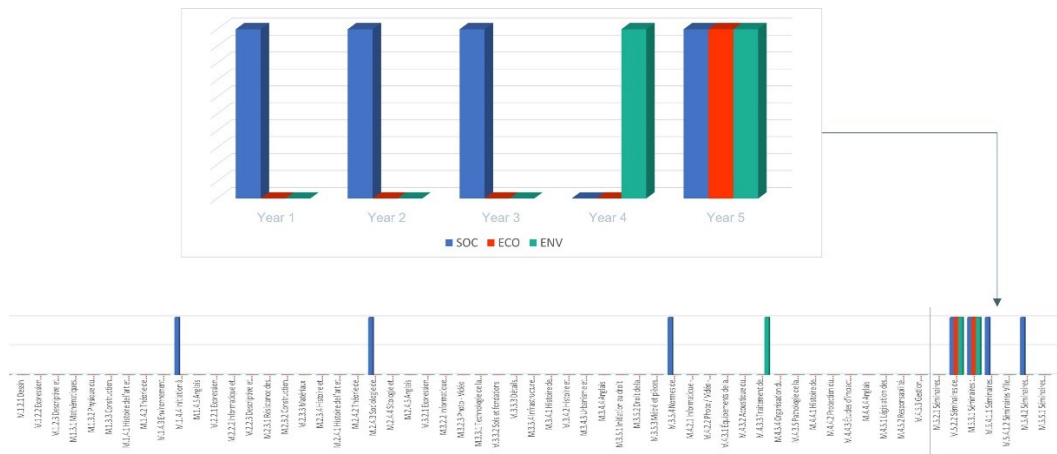
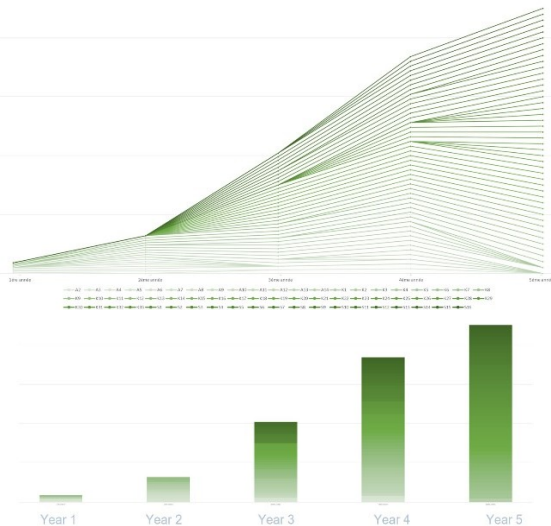
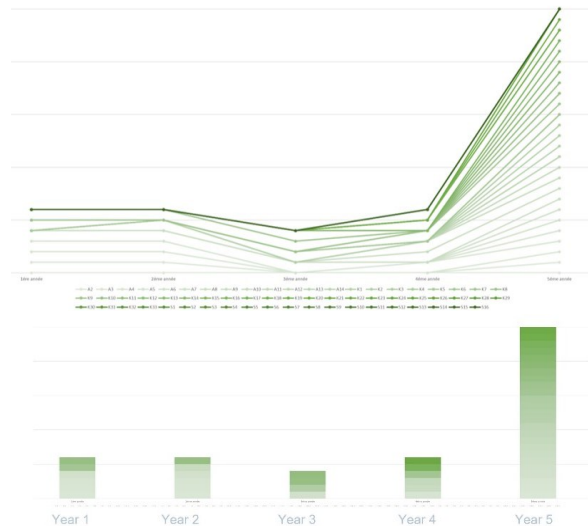


Figure 4. Findings (Developed by Authors).

These courses rarely appear during the early years but become more concentrated in the fifth and final year. Instead of following a progression based on levels of complexity in terms of awareness, knowledge, and skills, as illustrated in the examples from the state of the art, a different pattern seems to emerge (Scheme 1, Scheme 2).



Scheme 1: Findings from International Case Studies



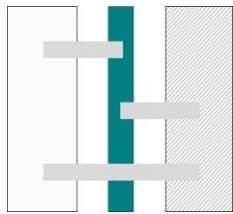
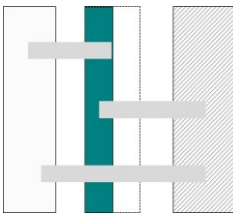
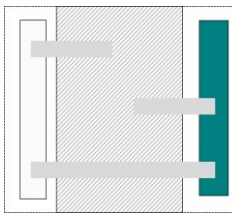
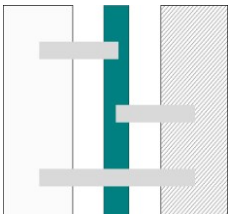
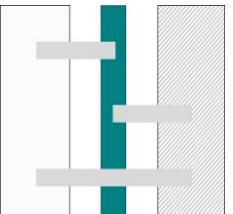
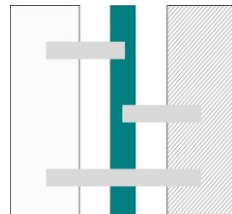
Scheme 2: Findings from Course Content Analysis in Tunisia

Based on the literature review on architectural education and examining EDUCATE outcomes, the findings provide evidence that the local structure of our academic curriculum is a linear and parallel Model (Table 3).

As proposed by these case studies, to enhance the integration of sustainability within this model, the interconnections among disciplinary domains could be promoted by a transversal integration of seminars, workshops and case studies that bridge theoretical lectures, environmental science/ design, other core modules and design studio. Seminars and focused workshops could foster Sensitisation at the early stages of education. At the second stage, the validation,

environmental science teaching could be supported by elective courses, while at the third stage, the Reflection, priority should be given to design studio, supported by guest lectures, investigation of case studies, and research-based analysis of design application (EDUCATE, 2012).

Table 3. Sustainability issues within Paradigmatic models of Program structure

Paradigmatic models (EDUCATE)		
		
Sensitization	Validation	Reflection
Exploratory approach Students explore concepts and principles via direct experimentation.	Propositive approach Students validate, qualitatively and quantitatively, their knowledge, by research-based design.	Critical approach Students are exposed to scholarly and practice-based research and to its contributions to the design process.
Pedagogy is based on the application of theoretical concepts in design studio and other courses.	Pedagogy is based on exploring opportunities of a sustainable design.	Pedagogy is supported by transfer of experience, knowledge, methods
Paradigmatic model (Tunisian Context)		
		
1st and 2nd Years	3d and 4th Years	5th Year
Cycle 1	Cycle 2	
Sensitization		

Our comparative study of literature reviews and the Tunisian context reveals significant insights into the challenges and opportunities associated with rethinking sustainable development in architectural and urban planning education. By examining international initiatives and engaging with educators from leading academic institutions, we have identified key challenges and opportunities that can inform the adaptation and enhancement of sustainability education in Tunisia.

The findings highlight the need for a holistic approach to sustainability education that integrates social, environmental, and economic dimensions while addressing local context-specific challenges.

6. Conclusion

Originally considered as a purely technical profession, architecture has now been enriched with a social, societal, and environmental dimension, requiring holistic thinking, interdisciplinary understanding of the situation, and sometimes even ethical questioning.

The goal is for architectural education to become a key to change in values, attitudes, skills, behaviors, and lifestyles for sustainable development at the national and international levels. The analysis reveals that sustainability has not reached mature levels and it is still looked at as an added matter to be included in the architectural curricula taught in Tunisia. Programs should be structured to respond to the specificities of the teaching, learning, and organization of the institution concerned.

In conclusion, our study contributes to the ongoing discourse on rethinking sustainable development in architectural and urban planning education, both globally and within the context of Tunisia.

This includes the adaptation of international models to align with Tunisia's socio-cultural and environmental context, the integration of themes of social and environmental justice, curriculum review and flexibility, collaborative partnerships, and student engagement and empowerment.

Moving forward, academic institutions, policymakers, and industry stakeholders in Tunisia need to prioritize sustainability education and invest in curriculum development, faculty training, and infrastructure to support the implementation of innovative pedagogical approaches. By fostering a culture of sustainability within architectural and urban planning education, we can empower future generations of professionals to design and plan resilient, inclusive, and environmentally responsible built environments.

Ultimately, our research underscores the importance of collective action and collaboration to address the complex sustainability challenges facing Tunisia and the broader global community. By working together to enhance sustainability education, we can contribute to positive social, environmental, and economic outcomes and build a more sustainable future for all.

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Conflict of Interests

The Author(s) declare(s) that there is no conflict of interest.

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