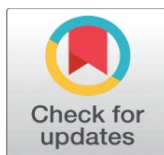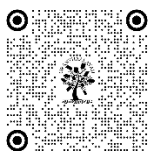# ARCHITECTURE EDUCATION TOWARDS A SUSTAINABLE FUTURE: A REVIEW

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ABSTRACT

The field of architecture, a major contributor to the consumption and conversion of resources, is also a main stakeholder in developing a sustainable world for the future. Presently when the whole world is focusing on achieving the SDGs (United Nations, 2015), architecture education can be a role player in transforming the future into a sustainable world. To identify the role of architecture education in building a sustainable future, a review was done to find the current status of architecture education in India, relevant published literature was reviewed to assess the ways of fostering sustainability through architecture education. Also, to identify the concerns and issues in aligning sustainability in architecture and highlighting the need for study towards developing a sustainable architectural approach. With the help of comprehensive analysis of the literature reviewed and the future recommendations suggested by authors, a wide gap between architecture and sustainability was found which leads to a scope of study in transforming architecture education to align with SDGs to meet future needs and enhance the relevance of architecture education in today's time. Although, sustainability in architecture education has been restricted to studying and not implementing or applying in practice; therefore, not only educating about sustainability in architecture but also regulating it is necessary. Thereby, awareness of sustainability needs to be supported by due considerations of incorporating sustainability in practice for which the gradutes should be equipped with all latest necessory tools and research driven learnings. To achieve this there is a need of focusing on envisaging ways in which contemporary issues are addressed in the academic curriculum and the endless possibilities of integrating them into teaching/learning processes and practices. Thus, helping our graduates to be future-ready with skills and knowledge to become contributing members in the attainment of overall sustainable development in India for a better future.

Keywords: Architecture Education, Sustainability, Future-Ready Graduates, Profession, Curriculum

1. INTRODUCTION

Architecture education has been in place across the world for more than 200 years since the first school of architecture, the École des Beaux-Arts established by the French state in 1816. With multiple reforms in alignment with the requirements and adaptations of society, architecture education has been in a transformative state to serve the people and meet their needs. The profession has always been a major role player in nation-building and development worldwide. In India, although it might not have received the required appraise and acceptance in society, with changing times and initiatives, the architecture profession will be leading the society to a developed nation. Thus, to prove its relevance, architecture education should make our graduates future ready to meet the contemporary challenges. (Tessy Varkey, 2021) also mentions that when education and practice are focused on producing international-caliber architecture that revitalizes the essence of the diverse cultures and legacies of the subcontinent, only then will the profession of architecture reach its full potential for the development of the nation. The connection between a professional setting and academic education should be proper so that the bigger purpose of education can be attained.

The idea of sustainability, which is one of the main criteria globally, finds its roots in architecture education and practice. India, being a developing country with a major world population, will have to attend to this concern of achieving sustainability development goals for 2030. Thus, the question arises can a reformation of architecture education cater to sustainability goals and environmental concerns and serve a bigger picture by bringing about a change globally. Further research by (Rosa Schiano-Phan, 2022) highlights the need for a stronger interdisciplinary approach where architectural students are equipped with a different pedagogical paradigm, better tools, and diverse sets of skills. There is a sincere concern that the current level of sustainability education provided in the mainstream of architectural curriculum is no longer sufficient to combat urgent climate challenges and meet the requirements.

1.1. SCOPE OF STUDY AND REFORM IN ARCHITECTURE EDUCATION

(NAIK, 2022) mentions that the current system of architectural education originated in the West and has been pushed on India. The existing educational system is a victim of the vast cultural differences between Indian and Western cultures. The current educational system was developed for the Western world and is not appropriate for the Indian environment. Indian traditional wisdom is our heritage and has been overruled by Western ideologies, thereby underutilized and subordinated to modern schooling. Thus, he builds connections between the contemporary Indian architectural education system and classical design knowledge principles. The theoretical gaps in current architectural pedagogy can be filled by Traditional concepts. Contemporary educational institutions have ignored the significance of these historical architectural design concepts and methods. Architectural education, which was already being questioned in the past decade for its gaps between education and practice, can be reformed with NEP. (SINHAL, 2016) also questioned Is it necessary for architectural education to adapt, and how quickly Indian society and the economic world are changing. In addition to that, we need to question whether the demands of society are being met by architectural education and whether it can serve its purpose in building society. Or is it necessary to make a fundamental transformation, as masters in their eras did, to significantly advance pedagogical science worldwide?

Figure 1 Source: https://sdgs.un.org/goals, Showing 17 SDGs as per United Nations

The United Nations has advised all educators to refocus their academic activities and research on sustainability to better grasp the requirements of sustainable development. Since architecture is the foundation of the built world, architects, especially those who teach architecture, have a great deal of responsibility. The designs created can either result in buildings that have a long-lasting, sustainable positive impact on the environment, or they can result in designs that do long-term environmental harm. The ability to create a cozy built environment that not only meets our social and cultural demands but also considers its effects on the environment is a skill that a future architect should possess. (Nida Jawad, 2022) adds that architectural educators must instill sustainability's significance, awareness, and understanding in architectural education. All of this can only be accomplished by changing the curriculum, which is a key determinant of the kind of architects that an architectural college will produce.

It is evident that not only academia in isolation is responsible for reforms in architecture education, rather a combined effort of professionals, researchers, and academicians to work towards the transformation of architecture education so that the needs of the market can be understood from professionals and the latest knowledge can also be

contributed by researchers, whereas academicians can look into the various ways of incorporating the latest trends into the learning process to attain a futuristic curriculum that makes graduates future ready.This kind of give and take relation exists between all stakeholders of the profession in a cyclic process where if due considerations are given to feedbacks from profession and outcomes of the research in the domain then definitely in academia students will have a holistic learning which is not only restricted to studios and classrooms. Before graduation students will be more aware and have exposure to industry and research along with their regular curriculum. This would make our gradutes future ready by being able to think criticals and work as problem solvers in practice.
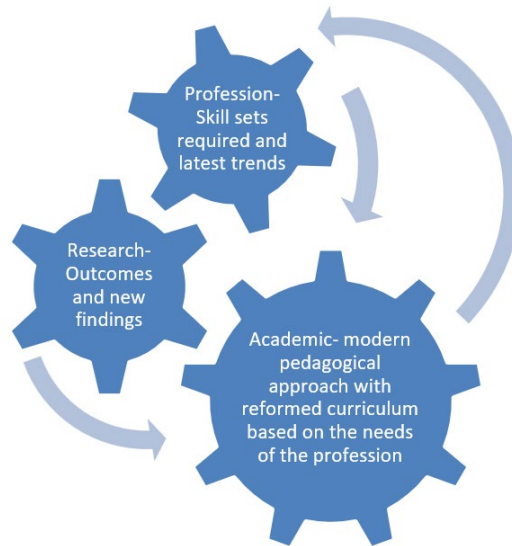

Figure 2 Source: Author, Showing cyclic process between profession, academia and research community

2. METHODOLOGY

This study is intended to provide a comprehensive overview of the current state of research, identify gaps in knowledge, highlight trends, and draw meaningful insights that contribute to a deeper understanding of architecture education in India. A rigorous systematic literature review was done to comprehensively and objectively analyse the existing body of knowledge focusing on assessing the ways of fostering sustainability through architecture education and identify the concerns and issues in aligning sustainability in architecture and highlighting the need for study towards developing a sustainable architectural approach. Intially around 16000 research papers related to the two main keywords architecture education and sustainability were available out of which in the time period of post 2020 scenario and with respect to indian context, some odd 800 review papers were shortlisted for reviewing. Out of which around 30 most relevant once were considered for the present research and also 10 papers between 2010 and 2020 were considered for learnings about architecture education in India from previous decade.
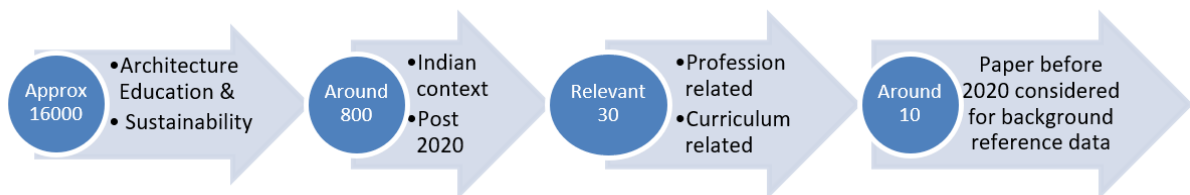
Figure 3 Source: Author, Showing refining of literature for review of this research

3. PRESENT SCENARIO OF ARCHITECTURE EDUCATION IN INDIA

The relevance and significance of architecture education can only be achieved once it serves its purpose in society and can meet the requirements of a diverse Indian society with context to its cultural setting, heritage value, sustainable adaptation, and ecological ethics. To pave the path for future-ready architects, academia will have to take into account

several exigencies from gaps in practice and research in the profession so that it caters to the fast advancements in the profession. (ALLU-KANGKUM, 2022) states that the constant need for modification in the learning process to meet changes and new requirements has had an impact on architectural education. It starts with accepting the need to reform our education and understand the multifaceted requirements of the hour while simultaneously meeting global standards and concerns. With major differences in approach towards architecture post covid a lot has been worked out to give architecture education in India a new face to serve the nation.

As stated by by (ASHRAF M. SALAMA, 2022) Covid-19 situation has also raised important issues regarding the difficulties that the established education in architecture and urbanism are confronting. This includes debating its applicability in a virtual world after a pandemic and what the future of architecture as a discipline inside the current university system would entail. During the pandemic when education worldwide had to transit to online mode which seemed to be the new normal, but now the change in pedagogy is no more driven rather it is now experimental in nature where we can be more involved in ways of transforming the pedagogy. For architecture education in India (ANURAG VARMA, 2021) argues that the greatest benefit of the pandemic is in removing the barrier of inertia, without which switching to online education could have taken years. In India, the extensive use of online instruction for undergraduate architecture programmes presents a chance to consider the field's future course in the wake of the pandemic.

The future of architecture education is a matter of concern today as transformation might be beneficial but also has to face lot many challenges in serving as an effective pedagogy.It has already been questioned in the past decade for its gaps between education and practice, and now with the introduction of the New Education Policy by (MINISTRY OF EDUCATION, 2020) in July 2020 to transform India's traditional education system by 2030, thereby enhancing quality education to diverse India. The adoption of NEP in architecture education is a way forward to minimum standards benchmark in the transformation of education but its recommendations will have a significant impact on architectural education and are projected to radically alter the organization of the undergraduate architecture programme.

4. SUSTAINABILITY AND ARCHITECTURE
4.1. SIGNIFICANCE OF SUSTAINABILITY IN ARCHITECTURE EDUCATION

Architecture is a field that is always evolving and facing challenges. Even in the Indian context, the importance of sustainability, the rise of anonymous urban sprawl and deregulation, the degradation of the historic fabric, and the disappearance of regional identities and customs are matters of concern and should be addressed. In the present decade, globally, architecture schools are confronted with a fresh set of issues arising from the current discourse on architecture, with much focus on the extent of integrating sustainability. (ALEKSANDRA ĐORDEVIC, 2022) in their research specify that in order to provide upcoming professionals with the skills necessary to act and think on many scales, architecture education needs to be better positioned within the context of a "knowledge-based society." In order to improve people's quality of life and overall well-being, sustainable architecture seeks to properly balance the cultural, social, economic, environmental, and technological components of planning, design, and construction. Thus, sustainable architecture education would revolve around adapting more innovative techniques of design and construction of the built covering various aspects of Environment cosciousness, smart new age systems, use of sustainable materials in construction, energy efficient net zero buildings, Adaptive reuse, etc. and many more. The below figure shows some aspects of sustainability in architecture education.
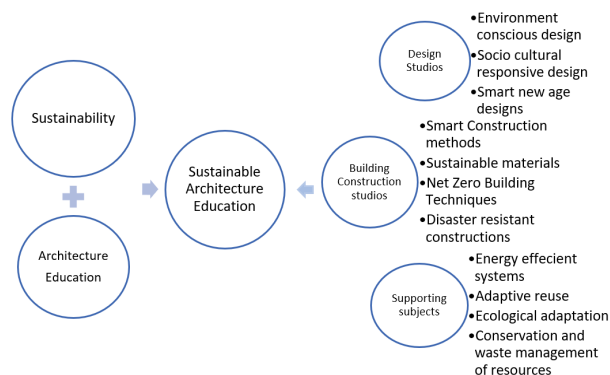

Figure 4 Source: Author, Showing sustainability aspects in architecture education curriculum

A more radical approach to education, as mentioned by (Navin Piplani, Architecture Education in India - a search for its roots, 2019) was by creating significant connections between modern learning and its roots. Adding to that (Navin Piplani, Traditional Building Knowledge: Contemporary Relevance for architecture Education in India, 2020) finds that a fundamental change from the current approach to design education will result from the consideration of pertinent elements of traditional building knowledge for contemporary architectural education, presenting a more comprehensive understanding of man and his surroundings. Even as suggested by (PaolaBoarin, 2020) globally educational institutions are actively encouraging the education of professionals who are concerned with sustainability to reduce the growing reliance on energy in the built environment. Integrating sustainability education within the curricula of architecture programs is a reasonable move, given that the building sector is largely responsible for the world's energy reliance.

Sustainable architecture is closely associated with major SDGs including good health and well-being, affordable and clean energy, sanitary conditions and clean water, decent work and economic growth, infrastructure and industry innovation, sustainable cities and communities, responsible production and consumption, and climate action. (Camille de Gaulmynn, 2019) in their study revealed that the situation in architectural education can entirely change, when students are given the contemporary context of climate change and shared ecological consciousness, young architects may be able to position themselves as game-changers, making this a tremendous challenge to accept. When they provide responsible and pertinent design for the built environment, they play an even more crucial part in the process by raising the bar on how our environments respond. Therefore, enhancing the design of our surroundings puts some cultural systems—like the education of aspiring architects and engineers—in jeopardy because they clearly have their limits.

4.2. INTEGRATING SUSTAINABILITY IN ARCHITECTURE EDUCATION CURRICULUM

Considering the incorporation of sustainability as a major critical aspect at different levels in the curriculum would involve rethinking and replacing preconceived silos in the discipline. So, sustainability in architecture education can be attained with a more integrated pedagogical framework, where sustainability itself becomes a driver for creative practice in the pursuit of a greater interdisciplinary, multidisciplinary, and transdisciplinary approach in architecture. This would imbibe deeper theoretical and, at the same time, more application-based sustainability knowledge in students. By including a substantial amount of sustainability integration in the course's curriculum and delivery method, as stated by (IBRAHIM, 2008) the ways that the sustainability agenda's ideas and concepts are adopted will vary depending on the contextual factors that influence its orientation, the diversity of its instructional methodologies, philosophy, and capacity for innovation. Adding to that a clear need was identified to strike a new balance between the pursuit of the arts and skill development and the more important goal of education, which is to inculcate moral principles and cultivate attitudes that are consistent with sustainable behaviour and requirements.

(METH, 2022) proposed that students gradually develop their self-awareness, empathy, and, most importantly, their understanding of the interdependencies between ecological and social systems, sustainable development, human rights, social justice, diversity, and important global and local sustainability. These concepts are in addition to collaboration and design process skills, as well as knowledge of sustainability-related concepts. Architecture education, as described by (STANISLAV AVSEC, 2022) is deeply entangled with the environmental, economic, and social surroundings, and as such, it may offer solid guidance on how to foster transformative, sustainable learning in students enrolled in both in-person and remote learning settings. The introduction of more experiential and action-oriented distance learning can aid in the growth of transformative learning processes and outcomes, as well as innovative abilities for a sustainable approach. Whereas, (HESAM KAMALIPOUR, 2022) and (NAN LI, 2018) emphasize more on interdisciplinary cooperation and a holistic understanding of the city as the nexus of environmental context, physical infrastructure, and human communities to address new and increased demands on the environment, energy resources, and infrastructure.

4.3. ALIGNING ARCHITECTURE EDUCATION WITH THE SDGS

The architecture profession has been experiencing a decline, primarily due to the deficiencies in delivering the best out of the profession due to the gap between academia and practice. Fresh graduates are not being able to achieve a better position in practice due to a lack of skills required in the profession. Although the architecture profession has the capability to increase its potential by catering to contemporary challenges. The focus of architecture education on building a sustainable future for all will also bridge the gap by making students future-ready graduates who are not only creative designers but also efficient creators. The world has to focus on achieving the Sustainable Development Goals

(SDGs), which calls for a sustainable future. As such, architecture education needs to adopt a new approach by incorporating the concept of sustainable development into higher education and addressing the various combinations of environmental, social, economic, and cultural sustainability.

In terms of research or design studio pedagogical practice, there hasn't been any significant attempt to explain how the SDGs fit into architectural education. Because there is so little information available on incorporating the Sustainable Development Goals into architectural education and design pedagogy, addressing architectural pedagogies and sustainable development is necessary. A crucial first step towards a sustainable future is comprehending, valuing, and exchanging the various initiatives and strategies to integrate SDGs into architectural pedagogy. (BURTON, 2023) mentions that to take this further, there should be an investigation by gathering important information about the role that knowledge of sustainable design plays in architectural education, validation, and accreditation on a national and international level, aligning with current international initiatives that prioritize architectural pedagogy excellence by tackling SDGs.

With a focus on sustainability and pedagogy in architecture education, all aspects of sustainability must be covered when adding sustainability-related topics to a curriculum. Through the process of horizontal integration, students are trained to view sustainability from a systemic perspective. (BATAEINEH M, 2022) adds that active and practical teaching approaches (e.g., project-based learning and case studies) aid students in integrating sustainability concepts into their existing body of knowledge. (PARK, LICON, & SLEIPNESS, 2022) mention that the development of critical thinking, problem-solving skills, design and planning abilities, and teamwork are the most noteworthy skills to be instilled in graduates. In architecture, the students should be capable of tackling difficult problems by taking into account real-world, complicated issues. Sustainability courses can aid in the development of future graduates' critical thinking abilities to become contemporary problem solvers in society.

Many of these SDGs are closely tied to architecture and the built environment, or rely on it for implementation. A few include Goal 7 – that makes sure everyone has access to modern, affordable, dependable, and sustainable energy, Goal 9 – which focus on creating a robust infrastructure, encourage equitable and sustainable industrialisation, and cultivate creativity and Goal 11 – that looks into making human settlements and cities robust, safe, inclusive, and sustainable. (Paola Boarin, 2022) mentions that the agenda explicitly addresses education in SDG 4 - that makes sure that everyone has access to high-quality, inclusive education, and encourage lifelong learning opportunities and emphasising its role in making certain that every student gains the information and abilities necessary to advance sustainable development, including, but not limited to, education for sustainable development and sustainable lifestyles. Adding to that (TAN HAN LEONG, 2024) mentions the sustainablity principles will equip future architects with the knowledge, skills, and ethical principles to create spaces that enhance lives, harmonise with the environment, and positively impact the world.

Figure 5 Source: Author, Showing SDGs closely linked to architecture education.

5. DISCUSSIONS

The way environmental challenges are approached in architecture education reflects the way that research and practice approach the topic. One could argue that the technical aspects of architecture have already included sustainability. (SANTINI, 2020) comprehends that the curricula present exhibit several shortcomings that architects find objectionable, such as an overemphasis on energy efficiency and a fragmented approach that is indicative of actual practice. Rather, students should be well equipped with tools and relevant knowledge to effectively work on the latest strategies to combat contemporary issues. Hence, higher education universities and associated organizations have the responsibility to leap forward and upscale education for future-ready graduates by taking it up as the main agenda to meet future needs.

With the incorporation of sustainability into the curriculum, the main challenge that arises is having well-experienced and trained instructors to help students attain the desired knowledge. Another focus on attaining sustainability in architecture would also require an effective pedagogical approach, apart from a well-aligned curriculum, which is another complex requirement. Thus, even the curriculum and teaching-learning method will have to undergo multiple revisions, duly supported by deep research in the area. With a diverse inheritance of traditional knowledge in the architecture of India, to attain the modern ways of sustainable architecture, we will have to go back and find strategies to incorporate our rich heritage into the contemporary world. Even the global standards, would help us in upscaling our knowledge system to an international benchmark of quality education in architecture, which would pave the path to a new era of sustainable living.

6. CONCLUSION

The study summarizies different opinions and relevance of sustainability in present scenario not only in India but world-wide requirement of sustainable living. Hence highlighting the position of architecture education and imbibing sustainable approach in architecture profession and curriculum to become a leading contributor to sustainable development. By focusing on improving the ways of evolving new transforms in architecture education, it can help in achieving the goals for 2050. Thereby also help it achieve relevance in Indian society by becoming a game changer in future challenges and contemporary issues of habitat and living. Overall achieving SDG 4 of Quality education atleast in professional course like architecture can align achievement of other SDGs also.

Even though there is much more scope for research in the area yet not much of exploration in this direction is being done. Although individual researchs are being done for enery efficiency, climate responsive designs, waste management, adaptive reuse etc but a gap has been identified where reforms in architecture education are only talked about in terms of aligning with NEP 2020 but not towards attaining bigger goals for future. Thus, it is recommended that further research should be done to develop a methodological framework for aligning architecture curriculum to attain goals of sustainability, we initially need to envisage ways in which architecture is positioned in various Indian contexts where future architects and urbanists, design and plan buildings, communities, and cities in response to contemporary challenges. Then focus on the ways in which they are addressed in the academic curriculum and the endless possibilities of integrating them into teaching/learning processes and practices, so that architects can be leaders of tomorrow.

CONFLICT OF INTERESTS

None.

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None.

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