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Strategies to Integrate Sustainability Concepts in Different Courses of Architecture Curriculum

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Abstract - This paper describes the curriculum design of an Architectural studio route geared toward making principles of sustainability reachable, understandable and manageable to Undergraduate students of Architecture. Architecture is a completely unique subject that facilitates spatial answers for human desires and has a fundamental duty to make certain a sustainable built surroundings. Signified as a mixture of era and design, Architecture is strongly related to diverse disciplines inclusive of sociology, psychology and physics. Furthermore, the contextual political and economic conditions are influential on Architectural exercise. Inside this multi-faceted nature, it's far necessary to apprehend Architecture as a combination of creativity, scientific understanding and technological innovation. Basically a contested concept with a mess of approaches and sustainability is taken into consideration vital for Architecture discipline. Despite the fact that it is either underestimated or dominates design procedures with technological superiority. Similarly, coaching sustainability in Architectural Education is by means of settlement described vital; however, the general public of curricula are inefficient in integrating sustainability with a comprehensive approach. However, in order to envision a sustainable constructed surroundings, the Architecture curriculum has to cover a simple know-how of the link between sustainability, generation and design. Consequently, constructed upon the arguments in literature, this theoretical paper discusses the approach to underpin concepts of sustainability within a responsive Architecture curriculum. In a continuously evolving Architectural practice, the want for a mind-shift for educators, students and professionals concerning sustainability approaches is an crucial constituent to offer holistic design methods, which will reap such development, revisions within the Architecture curricula that establish a balanced comprehension among creativity and integration of sustainability approaches are of maximum significance. Architectural schooling and design pedagogy is fashioned and interrogated in India ,by using including exemplars, voices and practices from worldwide, historic, vernacular and modern contexts, information of sustainability is enriched. To achieve this ,the approach to route design have to consist of decolonising the curriculum and making it relevant for globally diverse future professionals. The idea of “memory and records” as responsiveness to context and experiencing the website could be applied in studio. students must study approximately a way to define vicinity, and articulate form and area with sensitivity toward social, cultural, environmental and ecological components. The lectures, sporting events and interactive sports ought to be deliberate in a way, emphasising design technique, in-development paintings, and experimentation thru sketching, diagramming, drawing, and making look at fashions which scaffolded student gaining knowledge of underneath the steering of tutors. So that you can make the procedure of mastering to design in an environmentally responsive way specific for college students, strategies to curriculum layout ought to have a global and inclusive curriculum, have interaction college students in experiential learning through doing/making to broaden critical thinking talents, encourage college students to synthesise and transfer mastering to and from different settings and contexts, and interpret understanding electricity, relationships and co-construction procedures embedded in studio-based totally coaching and gaining knowledge of.

Keywords- Design studio, Architectural education, Curriculum design, Decolonising curriculum, Sustainability

I. INTRODUCTION

Sustainability is essentially a contested idea (man and Farmer, 2001) and a distinguished declaration in vocalizing our worries about the destiny of the world, even the subject count number diverges from economics to urban studies, strength regulations to politics, healthcare to transportation. In this good sized pool of numerous discourses, the focal problem is common: discussing what sustainability is and how it has to be defined, emphasised or addressed as a capability objective. No matter this not unusual awareness, a constrained path has been paved toward a sustainable destiny since the Brundtland report (world commission on surroundings and improvement, 1987; Murray and Cotgrave, 2007). The purpose for such a delay in development is understandable, whilst it's far realized that the required depth of the concept isn't always met considerably. Contrastingly, in discourses, sustainability is used as an appealing instrument with a ‘supernatural’ trouble solving capacity, without realizing the diversity of the constituent procedures. Sustainability is a “contested and value led idea” (Geurel, 2010; Ismail et al., 2017; Warburton, 2003), a “social construct” (guy and Farmer, 2001), and considers the surroundings, social, cultural and political contexts, environmental and ecological worries, financial and technological factors, and the users and occupants (Gucyeter, 2016, pp. 245–246). often confused with the word ‘conservation’ (Callicott and Mumford, 1997), sustainability

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is typically underestimated and rendered to a sure modern 'motto', used as a denotation 'to maintain and maintain the modern fame' (Rozema, et al., 2012). moreover, keeping the popularity quo (Räthzel and Uzzell, 2009) is a key determinant in politics, as a result sustainability impetuously will become a political statement, emptied into natural symbolism, and represents an 'awareness-like' mindset among stakeholders. Nonetheless, the question that needs to be answered is whether or not the character of sustainability is that tolerant to be manipulated with such attenuation. The problem both stems from the ambiguous nature of the concept, or is brought about by the complexity of endeavors required to comprehend the concept holistically and act upon it accurately (Altomonte, Rutherford and Wilson, 2014). Whichever the purpose is, a prosperous perception with multi-dimensional and multi-disciplinary elements turns into rendered right down to a phrase attributed with positive alien connotations, to a image often used as a prefix for troubles related to development disguised in an environmentally sensitive way, and it is not grasped within a holistic method. rather, it's miles pragmatically implemented with its maximum palpable characteristics.

Given the discussions on how sustainability is perceived and translated into discourse as a device for modern shipping of environmental sensitivity, the Architectural schooling as nicely, requires a more in-depth search for integrating the idea in its curriculum. Just like the connection between the notion of sustainability and its articulated form in other disciplines, Architectural Education as properly fails to deal with the concept in a holistic way (Altomonte, 2009). Therefore, it's miles important to scrutinize the area of sustainable methods and technologies in Architectural schooling, since it offers the know-how basis for the profession (guy and Farmer, 2001; Altomonte, 2009; Jennings, 2009). The try and ensure a sustainable built environment requires properly-skilled specialists (Murray and Cotgrave, 2007), mainly architects. Therefore, an Architecture curriculum is of high importance in assisting professional choices in Architectural exercise. However, curricula in the majority of faculties lack the thorough integration of sustainability inside Architectural schooling (Lidgren, Rodhe and Huisingh, 2006). This paper, consequently, specializes in investigating the vicinity of sustainability in Architectural education, with a theoretical dialogue that aims to expose how sustainability is perceived in Architecture practice and schooling and a responsive curriculum thought that asserts an method to underpin how ideas of sustainability may want to holistically be delivered within curricula. Critical exploration of the paper pursuits to deal with the expertise gap and implications associated with sustainability schooling in Architecture. For this reason, it might be viable to claim an technique (Masseck, 2013).

II. THE PLACE OF SUSTAINABILITY IN ARCHITECTURE

Sustainability is one of the few concepts, on which discourses and debates are huge, yet repercussions of these debates in disciplines together with Architecture are biased and critically gapped in addressing its thorough nature. The phenomenon originates, both due to the large and open-to-dialogue nature of sustainability, or the dearth of interdisciplinary knowledge to recognise the aspects within sustainability. So that it will improve this argument, it would be big to cognizance on how sustainability is perceived inside Architectural practice.

Brundtland record (global fee on environment and improvement, 1987) elaborates the sustainable development idea with a commonly quoted definition: "improvement that meets the wishes of the prevailing without compromising the capability of destiny generations to fulfill their personal desires." This definition almost became the seize word for the majority of the research, debates, and reports that intention to integrate sustainability in the discourse of a field. Consequently, the 'symbolized phrase' supplied an immaculate public understanding to disseminate the idea similarly, yet with positive deviation from what sustainability in reality covers. Lower back in 1987, this definition, honestly has furnished a valuable clue on how humans need to relate with the environment and its resources, but its electricity is exploited as a stereotype definition these days (Murray and Cotgrave,2007).

In Architecture, sustainability is denoted with terms together with 'green', 'ecological', 'environmentally touchy', and 'energy-green', because the discipline is a mixture of creative, ecological, social, political and moral issues (Ghani, 2012). But, none of those conceptual phrases basically correspond to the multi-dimensional nature of sustainability. Architecture, considered because the artwork and technology forming the built environment, becomes the flawlessly appropriate medium to propagate sustainability as a prefix to rationalize technological innovation, rather than incorporating its type of discourses as design choices. Similarly, policy makers, aware of the opportunity to exploit the quantifiable elements sustainability offers, invent a wide variety of manipulate mechanisms referred to as the building rating systems, commonly tailored to economic regulations. As a result, rating Architectures completely provide checklists to assess buildings within an array, from sustainable to unsustainable.

In these days aggressive economic and political surroundings homes are regularly appeared as commodities, and the act of 'constructing' is perceived as a manifestation of political strength and governing. Accordingly, processes such as organising manipulate Architectures, providing electricity ratings unexpectedly grow to be vital to legitimize the negative outcomes of the hastily growing built environment. Methods that decide their 'sustainable' and 'environmental' characteristics promise 'permitted' buildings with an environmentally more secure, touchy, and less harmful operation. However, it's miles as well viable to claim that the presented marketplace ameliorations and emblematic values in the constructing region effects with extra profit. Alternatively, research at the building overall performance gap points out conflicting consequences: buildings do now not carry out as expected or ranked within accreditation techniques (Menezes et al., 2012). As seemed inside an engineering technique it's miles possible to nation that a big part of the gap is because of loss of put up-occupancy assessment (De Wilde, 2014). Yet, studies on overall performance gap factors out every other substantial factor to

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be addressed; any such hole is associated with dismissing the social and behavioral aspects in sustainable Architecture and perceiving it solely as an engineering hassle (Altomonte, Rutherford and Wilson, 2014). This gap is in part because of the contested nature of sustainability, significantly mentioned by using man and Farmer (2001), and is a big motive for the underestimation of the idea within the production of the built surroundings.

except the insufficiency to cope with sustainability very well in the manufacturing of the constructed surroundings, there's a terminological shift that defines the supremacy of the quantifiable. At once after the architect's layout and drawing approaches are finished, production will become the principle supply of terminology to define the Architectural work. Consequently, sustainability in Architecture is often mentioned within technological and engineering advances associated with production, where quantifiable aspects are manifested with parameters. As a result of the multidimensional nature of sustainability, principles that are hard to assess (consisting of the outcomes of occupants on energy consumption, elements which are related to fitness, comfort and productivity of occupants) are overlooked, with a reflex to quantify benefits so that it will rapidly suggest a go back for monetary reputation. Therefore, the layout becoming manner of creation and sustainable Architecture measures that need to be quantified reason a shift in the perception of sustainability from a holistic idea to an assessable technological fix.Quite complementary, Henning (2005) indicates that moving sustainable technology from drawing board or advertising facilities to the distance is related to "revel in, behavior, and methods of thinking amongst a sure organization of people", no longer handiest the monetary impulses.When considered within this quantification-orientated pragmatic approach of the development practice, this assertion may assist to point out a lack of responsiveness regarding the occupants of the built environment, and as nicely with the qualitative elements of sustainable Architecture.

Discussing merely a section of the contrasts in the perception and application of sustainability concerns for the built surroundings, it's far feasible to say that an intensive knowledge seems unlikely in near destiny, where the trending competencies of the construction area overshadow different components of sustainable Architecture. Consequently, it is significant to turn the look towards Architecture education, which fails to provide alumnae who're able to comparing all aspects of sustainability for the destiny benefit of the built surroundings (Altomonte, Rutherford and Wilson, 2014).

III. SUSTAINABILITY IN ARCHITECTURAL EDUCATION

Paramount to the dialogue of the 'integrity' between sustainability and Architecture is to talk about how the ideas of sustainability are considered in Architectural schooling. Integrating sustainability within Education has been an growing awareness over the last many years, because the Brundtland report's (1987) grievance towards the Education systems at the approach of teaching concepts of sustainability (Figueiró and Raufflet, 2015). for you to ensure sustainability in the constructed environment, the Architecture curriculum should be considered of excessive importance in supporting the profession. but, the barriers to combine sustainability into curricula still exist and are because of an array of reasons, which originate from the shortage of hobby, cognizance, compatibility in expertise, and persistence on defining an closing method of teaching sustainability (guy and Farmer, 2001; Altomonte, 2009). It's far vital to pressure that almost all Architecture colleges have courses devoted to environmentally sensitive layout of their curricula (Frederick, 2012).Notwithstanding, most faculties try for the methods to train sustainable Architecture, with a problem whether or not the career is dealing with the hazard to be dominated by way of engineering factors and the education device might end up having alumnae appearing as 'entire building engineers'(Hartman, 2012). for you to complicated this type of disadvantage, one of the essential identifications to be made is whether the Architectural schools are a medium for job schooling or they ought to have the belief to supply a way of wondering. as the layout courses and the cause behind Architectural design tactics are considered, it is viable to say that the belief of delivering a way of thinking is without a doubt the core of Architectural Education. However, this notion nourishes a perception that the Architecture curriculum, strongly certain to aesthetics and social elements in design and principle and that has developed a 'rationality complaint mixed with nature romanticism and generation skepticism'(Keitsch, 2012), has no longer a lot to do with the quantifiable elements of sustainability. Correspondingly,take a look at by means of Frederick (2012) demonstrates that 'Architecture college students diagnosed themselves as, appreciably more interested by Architecture and design than sustainability andengineering'.

Further grievance that might be useful to expose the alienation of Architectural schooling from high-quality sciences is quoted by man and Moore (2005) as follows: "Contemporary era, argued Heidegger, has a tendency to enframe or restrict our expertise of (Architectural) phenomena to slender classes of quantitative performance, as a consequence 'concealing' or 'tough' the validity of qualitative meanings". The complaint is comprehensible whilst the nature of Architecture is solely taken into consideration as layout troubles and theoretical history, and vice versa. Architects have a tendency to distance themselves from the quantitative elements of the discipline and make stronger the debate inside it, when Architecture is perceived as a shape of innovative composition. To increase the argument similarly, it's far possible to assert that architects, creatively cultivated in integrating unique layers (concept, spatial excellent, accessibility, software and so on.) of design necessities through a couple of selections, normally decide upon a more situated technique that fulfills theoretical, aesthetical and practical elements of the design and leaves environmental concerns (e.g. sustainable add-on technology) to engineers, who are task- and solution-oriented experts (Banham 1984). Subsequently, the layout of homes becomes partly in control of architects and partially in control of engineers,

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who're organized to introduce the state-of-the-art generation / carrier in selection of substances, environmental systems etc.
Hartman (2012) places an emphasis on the "Dismissive mind-set of Architectural historians –and the profession itself – in the direction of the environmental elements of Architecture" as underlined by means of Banham: "A widespread range of historical subjects extremely applicable to the development of Architecture is neither taught nor cited in many schools of Architecture.Mechanical environmental controls are the most manifestly and spectacularly critical, … but they may be the least studied." Banham (1984, p.eleven) argues that works and opinions of different disciplines, especially the ones related to building offerings engineering, have been part of Architectural education as low as viable, hence the control of era oriented environmental measures have largely exceeded to constructing engineers/experts. On one hand, as the building engineers and experts continued to introduce new technology within the building, new troubles (e.g. poor indoor air great due to air tightness) emerged and were solved by way of new technological fixes (e.g. mechanical ventilation). On the other hand, architects who've distanced themselves from the engineering-driven tactics have in turn thrived to cope with issues regarding sustainability through the use of traditional creation methods and environmentally responsive design decisions (Banham 1984). However, given the reality that Architectural layout is a precise composition of creativity, clinical information, technology, social and environmental domains, architects have the obligation to have sufficient background knowledge to guide the interdisciplinary design choices related to sustainability. Otherwise, a know-how hole emerges and Architectural schooling fails to combine even the environmental design selections inherent in the records of Architecture.
On one hand, it's miles possible to argue that the emphasis at the 'strength efficient design' in the final a long time widened the distance between the technological and theoretical components of Architectural education. On the other hand, 'energy efficiency' is confirmed to be a critical component for the sustainable built surroundings and is an final results of a system that includes multidisciplinary methods (Manu et al., 2010). Given these contrasting factor of perspectives, it's far viable to say that Architectural Education needs to embody the reality that sustainability and its worries are 'associated' to Architecture (predominantly with an emphasis on sustainable technologies, that are mainly seemed as engineering methods). Further, the subjects must now not be taken into consideration because the duty of engineers who are specialised in 'whole constructing' studies. A pluralist approach that acknowledges environmental layout decisions (i.e. passive / climatic design), conventional strategies that can be tracked via records of Architecture (Banham, 1984), and engineering-driven and building included sustainable systems might emerge as a good deal extra green in addressing the ideas of sustainability without fundamentally aside from one-of-a-kind components of the idea.
in this framework, it's far vital to talk the belief of sustainability to students of Architecture on account that they would turn out to be experts in the Architectural practice. The simplest manner to bridge the above-mentioned information gap is an in-depth know-how of sustainability standards and their relation to the Architecture area, with a responsive curriculum based totally on pedagogies that combine technical and holistic troubles of sustainability (Altomonte, Rutherford and Wilson, 2014).

IV. THE RESPONSIVE ARCHITECTURE CURRICULUM

Architects' statements often involve the accessory to 'design the future' and as quoted in Wright (2003), Boyerd and Mitgangassert, "Architects and Architecture educators assume a management role in keeping the environment and planet's resources." An area with such priorities desires a substantiation of the claim with non-stop rethinking and thinking of related ideas within Architectural practice, Education and their outcomes at the society(Durmus,2012). As diagnosed in previous sections, sustainable Architecture is frequently perceived as the governing name for power related troubles inside the constructed environment. This misperception is the primary barrier in opposition to the integration of the concept in the Architectural education. Given the fact that elaboration of sustainability appears to be the challenge of universally implemented evaluation techniques (such as BREEAM1, LEED2). These techniques usually operate with the tendency to take the constructing as a be counted of clinical evaluation and as end result alienate 'green' or 'sustainable' buildings (Farmer and guy, 2010) from strong elements as design issues and theoretical backgrounds. Therefore, the supremacy of sustainable technologies over concepts along with locality, minimal use of assets, environmental layout techniques may bring about stereotype sustainability measures within the built environment, which aren't included inside the aesthetics of design, and are completely technological fixes (Keitsch,2012).
On this scope, it's miles vital to include vital changes to Architectural Education, which might be helpful to transform the curricular information of the idea inside Architecture area and to instigate a reaction in the exercise of the constructed environment in the direction of a holistic sustainability technique. Whilst buildings are taken into consideration as a layout outcome, which continuously transforms the social and environmental contexts, and which defines the interplay of its occupants with the constructing and every different, the want for this sort of holistic approach turns into more clear. Intrinsic to the classical version of sustainability, the intersecting set of environmental, economic, social and technological concerns (Räthzel and Uzzell, 2009; Pappas, Pierrakos and Nagel, 2013), adopting a holistic method has the potential to introduce an more desirable Architectural pedagogy that encompasses Architectural design concerns, constructed environment, social, cultural and political contexts, environmental issues, monetary and technological issues and the occupants (Figure 1).

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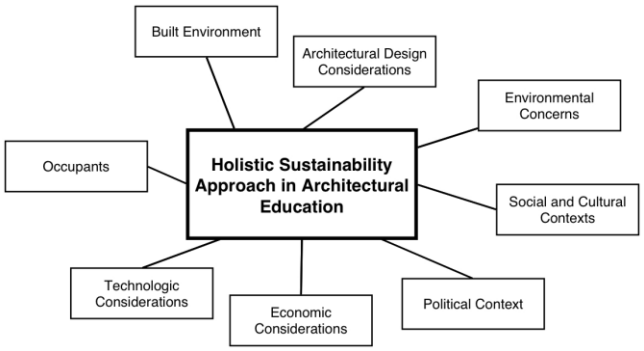

Figure 1. Considerations that Compose a Holistic Sustainability Approach in Architectural Education

In order to suggest the means to holistically comprise sustainability ideas in Architectural Education, the boundaries want to be addressed first. The obstacles can be summarized as issues regarding faculty shape, concerning sustainability as a postgraduate situation, concerning sustainability as an area of specialization and thinking about sustainable Architecture as a separate music inside Architecture curriculum. possible motives to brush aside a responsive Architecture curriculum that covers sustainability as an underlying center idea ought to stem from loss of school individuals associated with the ideas of sustainability, considering that it isn't feasible to make a change in the curriculum, concerning the idea as in great, accepting that students are not interested by the situation, energy to maintain the modern-day popularity of the curriculum, restricted time body of school participants, multidisciplinary factors of sustainability studies, and lack of understanding (Becerik-Gerber, Gerber and Ku, 2011; Lidgren, Rodhe and Huisingh, 2006; Ceulemans and De Prins, 2010). Normally, standards inside sustainability are taken into consideration as postgraduate topics, given the direction load and diverse specialization of faculty workforce (Altomonte, Rutherford and Wilson, 2014). This perception is precarious, because majority of the alumnae of undergraduate Architecture programs opt to work inside exercise, actively contributing the production of the built environment. At the contrary, most people of put up-graduate college students generally tend to maintain their understanding within the academia. In this regard, it's miles glaring that the discourses and technologies inherent in sustainable Architecture face the danger of staying in a theoretical sphere. Consequently, in undergraduate studies a firm expertise of sustainability, as a way of wondering instead of perceiving it as a trend is of extreme significance and might be beneficial to let the students be able to supply the basics of sustainability into the built environment practice. As Jennings (2009) argues it is vital to be worried approximately the environmental problems and to deal with them as urgent, but only few realise the basic reasons at the back of the issues. Moreover, the concept of specialization is essentially opposite to the character of sustainable Architecture, because it covers an extensive range of decision-making in distinct scales (e.g. from massing to city scale decisions). Consequently, as curricula advocate specialization, Architecture students discover themselves in a music of interest (e.g. design, technology, records, etc.). This interest in a specialization of Architectural profession is herbal but; it does not suggest that the scholars may alienate themselves from the contents of other tracks. Corresponding to selecting a chief and sufficiency required in minor tracks during undergraduate research, sustainability and its diverse techniques want to be reconciled inside Architecture Education as well. As a result, the primary idea can be adopting sustainability as an extra track in the curriculum. However, a sustainable built environment requires a holistic understanding of the approaches within the sustainability idea (figure 1), in relation to the variety of tracks within Architecture curriculum. Consequently, faculty participants who teach Architecture want to adopt the duty to introduce to the scholars the literacy of sustainability, each with the qualitative and quantitative elements of it. As John, Clements-Croome and Jeronimidis (2005) assert, “the natural world has a massive amount to inform us about the way to achieve sustainability” and as Hartman (2012) places ahead, “Sustainable design does not happen by itself”. Those statements will be understood as the primary references for an Architecture curriculum, which accurately incorporated ideas of sustainability. The first assertion honestly propagates an understanding of the sustainability expertise, no longer in the shape of mere facts, however with strong conceptualization possibilities inside the herbal international. The second announcement, then again, suggests that so that it will integrate this knowledge into implementation to interpret standards of sustainability within Architectural layout, a knowledgeable method is fundamental (Blewitt, 2004; Kumar et al., 2010). Based totally on these two statements, the framework for a holistic sustainability method in Architectural education might be promising so long as the situation is seemed as know-how in place of statistics and because the faculty members offers a mind shift in the direction of perceiving sustainability as a concept, inclusive of social, cultural, and technological aspects (Altomonte, Rutherford and Wilson, 2014). As Savageau (2013) suggests that long time behavioral change is limited in teaching sustainability and to triumph over such limitation there may be a sure necessity to adjust the behavior of college individuals and students. Consequently, a complete progression for conceptualization and implementation of sustainability in Architecture curriculum might turn out to be glaring, because of the responsive mindset of faculty members, students, and experts inside the built environment practice (Kumar et al., 2010). A responsive Architecture curriculum consequently should goal to establish an existence-long getting to know and implementation of sustainability principles. To acquire such an intention, the first step is to embrace sustainable Architecture as a concern and understand that sustainable layout is a middle trouble of Architectural schooling (Wright, 2003). As Wright (2003) quoted Fraker, this will be only feasible by designing a responsive curriculum, which offers intensity within the knowledge and preference past introductory publications. In addition, the necessity to set up a manner of thinking amongst Architecture college students and enough expertise on the notions of sustainability and sustainable measures inside the constructed surroundings

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suggest the need to awareness on offering a responsive curriculum that can provide sustainability as an inseparable idea from all inherent aspects of Architecture. Given the truth that most schools of Architecture have a layout method that has end up normative, it'd best be viable to actualize a responsive curriculum via defining its steps accurately. Previous to structuring the curriculum, college participants would possibly need to work on consensual and conflicting troubles. Figure 2 offers a probable approach for instigating paintings on a responsive curriculum, via which every college member may want to have the danger to take part and combine principles of sustainability in step with their potentials and specializations. the first steps of the approach in determine 2 indeed purpose to deliver ahead the potentials and thoughts via a dialogue primarily based on the composition and point of view of school participants in regards to their views on sustainability. Teaching sustainable Architecture standards via a responsive curriculum might either be typical or rejected as a result of this discussion. Accepting the responsive curriculum would require identity of the sort of procedures in sustainable Architecture and the definition of their relation to disciplinary tracks of Architecture (e.g. layout, history and concept, constructing science, computer aided design). As a subsequent step, the means to offer necessary background records on ideas of sustainable Architecture as complement to path tracks, broaden responsive methods to integrate sustainability idea within the curriculum, and set up hyperlinks between the route song for the dissemination of sustainability understanding might be formulated to facilitate addressing sustainability holistically. Consequently, all tracks inside Architecture might be able to make certain that they accomplice their discourse or content material with appropriate emphases on sustainability. due to this approach, the summary know-how would be internalized past becoming a perception of ‘mere statistics’ and integrating sustainability in Architecture curriculum would have the danger to turn out to be more interdisciplinary (Blewitt, 2004).

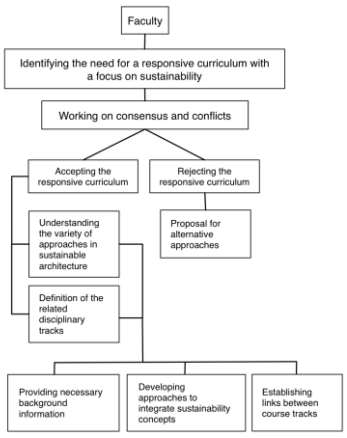

Figure 2. Steps for Adopting a Responsive Curriculum with a Focus on Sustainability

This technique would then also be useful to take away the criticism that integrating sustainability into the layout curriculum could cause the engineering and generation components to exceed the intrinsic artistic and arts embedded in the area and vice versa. As a way to completely get better Architecture schooling from such an deadlock there may be an simple necessity to integrate sustainability worries to all guides inside a dialogue-based totally technique and evidence-based totally learning.Each the discussion-primarily based approach and proof-based totally studying, will be operated as major processes that initiate the responsive nature of the curriculum, because the interplay between the elements of curriculum could provide a way of teaching through conceptualization, coordination and execution. Therefore, at the side of the prominence of creativity, skill and intuition of Architecture students, an accessory may be placed on diverse issues including generation, surroundings, economy, sociology and politics if you want to emphasize that the paintings of an architect must severely deal with troubles related to the context, constructed environment and social, cultural and humane aspects (Salama, 2005).

In an effort to elucidate the discussion-primarily based technique, initially it's far essential to introduce the ideas as a way of wondering.Concerning the ideas to existence practices might be extra effective in growing the interest and cognizance towards the standards of sustainability.As an instance, in order to speak about the ‘greenness’ of constructing substances, discussing students’ recycling behavior in the daily lifestyles can be cordial to position an emphasis on the importance of the use of building materials which can be recyclable. This technique is sizeable seeing that it is immediately related to life-style and belief in the direction of the surroundings. As the students internalize such an opinion and begin changing conduct in daily lifestyles it would be greater promising if they increase a stage of focus as designers, who determine on the constructed environment. A growing focus, in many cases, is greater critical than sincerely declaring stereotype statistical records all through lectures.in order to suggest the means to holistically comprise sustainability ideas in Architectural Education, the boundaries want to be addressed first.

The obstacles can be summarized as issues regarding faculty shape, concerning sustainability as a postgraduate situation, concerning sustainability as an area of specialization and thinking about sustainable Architecture as a separate music inside structure curriculum. possible motives to brush aside a responsive Architecture curriculum that covers sustainability as an underlying center idea ought to stem from loss of school individuals associated with the ideas of sustainability, considering that it isn't feasible to make a change in the curriculum, concerning the idea as in great, accepting that students are not interested by the situation, energy to maintain the modern-day popularity of the curriculum, restricted time body of school participants, multidisciplinary factors of sustainability studies, and lack of understanding (Becerik-Gerber, Gerber and Ku, 2011; Lidgren, Rodhe and Huisingh, 2006; Ceulemans and De Prins, 2010).

A further paradigm in integrating sustainability within the Architecture curriculum may be to decorate the discussion-primarily based procedures with evidence-primarily based

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getting to know. Once the students grasp the connection among design selections and sustainable measures, the theoretical understanding could without problems be coupled with proof. as an example, measuring the indoor thermal profiles of college students' accommodation and correlating the records with energy bills could without difficulty provoke an knowledge of the occupant comfort on energy performance. In conditions when evidence-based totally mastering methodology isn't always relevant publications that integrate easy simulation equipment, which facilitate rapid

Course Tracks	Strategies to Integrate Sustainability Concepts in Different Course Tracks of Architecture Curriculum	
	Discussion-Based Approach	Evidence-Based Learning
History and Theory	▪ Discussing the history of mechanization of environmental management (Banham 1987) ▪ Discussing environmentally sensitive traditional building principles as a part of history courses (Banham 1987) ▪ Discussing certain periods' economic, political, environmental social contexts and their relation to architectural movements	▪ Asking students to identify sustainability principles for the discussed examples through sketches and drawings (in coordination with building science and computer aided design courses) ▪ Endorsing students to critically assess the changes in building construction through the course of history and theory of architecture.
Architectural Design	▪ Discussing the necessity and conflicts in including sustainability knowledge acquired from other course tracks within the design process ▪ Discussing the occupant and occupant needs as essential concepts ▪ Discussing social, cultural and economic aspects and their relationship with sustainability (along with discussions in history and theory courses)	▪ Endorsing students to conduct field studies to collect qualitative data regarding the occupants' perception on diverse subjects such as sustainability, comfort, health, energy and resource use, spatial use, social and environmental aspects of the built environment, etc. ▪ Formulating short-term design problems that allow the comparison between different design decisions and their effects on environment, resource use and other targeted sustainability concepts (in coordination with building science and computer aided design courses)
Building Science	▪ Discussing resources in terms of environmental degradation and act of building, with certain emphasis to political, economic and technological contexts ▪ Discussing the main denominators behind material selection in history of architecture and current context ▪ Discussing sustainability goals other than green roofs, photovoltaic facades, building integrated wind tribunes etc.	▪ Posing research questions regarding sustainability measures ▪ Data collection and understanding concepts and tools to evaluate the collected data ▪ Drawing conclusions on the possible effects of sustainability measures ▪ Interpreting drawn conclusions for further design problems (in coordination with building science and computer aided design courses)
Computer Aided Design	▪ Discussing the capabilities of computer aided tools designed to evaluate sustainability measures, understanding their strength and weaknesses ▪ Acknowledging the beneficial aspects of the tools and discussing whether these tools are of ultimate priority in sustainability assessment	▪ Delivering the basic understanding of computer aided tools to evaluate sustainability measures in building design (in coordination with building science courses) ▪ Relating above-mentioned tools with assignments from building science courses or architectural design problems

Table 1. Strategies to Integrate Sustainability Concepts in Different Course Tracks of Architecture Curriculum

effects, is probably useful to cultivate college students' belief on special layout selections and their effects on sustainability. Such an technique will be realized through integrating supplementary publications, which do now ,not immediately influence the layout direction, yet gives the student remarks at the possible environmental outcomes of design selections. The above-stated motives for the proposed dialogue-primarily based

approach and proof-primarily based studying techniques may boost questions on a way to set up the hyperlinks between two tools of the responsive curriculum and the direction tracks of the structure. a good way to make clear that, table 1 gives the strategies to combine sustainability standards in specific path tracks of Architecture. The strategies presented on this desk could be improved, converted or altered in line with the Architectural pedagogy tradition of a specific college. therefore, preserving the attempt to formulate the curriculum around a dialogue-primarily based method and evidence-based totally mastering strategies and providing links among course tracks could offer an intensive understanding of sustainability ideas and at a certain stage would nevertheless be effective regarding the sustainability of the built environment.

In summary, to stimulate attention and high-hobby in sustainable Architecture, the weekly curriculum of every course have to take the responsibility to address discussions to cause a crucial understanding of the concept. Even a story of sustainability ideas for the duration of dialogue-based totally course hours and use of analogies which include lifestyles-cycle questioning in choosing a shopping bag, recycling habits, modeling or measuring real world phenomena or knowledge the principles via pc fashions and assessing effect of sustainable measures will be used to stimulate hobby and awareness.Consequently, the belief of concepts of sustainability might turn out to be internalized and can be used as fundamental capabilities which offer the potential to establish methodological thinking while there may be the want to develop a holistic sustainable Architectural technique with one of a kind weights of its ingredients (context, social construct, electricity performance, funding, indoor environmental health and so on.). For that reason, without underestimating any of the qualitative and quantitative checks for a particular case, it'd be viable for future architects to provide the anticipation toward the usage of a bendy technique in fully addressing sustainability of the built surroundings.

Certainly there may be no unmarried direction to follow in setting up such responsive curriculum, given that there can be no widespread pedagogy that covers the perception of coaching/gaining knowledge of Architecture. but, integrating environmental, technological, cultural and human focused methods to Architecture curriculum may be considered within the composition and tradition of every school.In order to obtain a responsive Architecture curriculum, know-how the strengths of college participants in sustainability standards, presenting change of perspectives, and facilitating education possibilities might bring about a consensus in teaching techniques to increase the interest and consciousness of college students. Therefore, the revisions to the curriculum, by means of integrating a discussion-based approach and proof-based learning that cover a social and technological information of sustainability inside the constructed environment, have to be finished. Due to the precision in such interplay and non-stop move-referencing among guides of various tracks could be useful for the comprehension of students on the belief of sustainable structure.

V. CONCLUSIONS

It's far obvious that the dearth of thorough know-how of sustainability in Architectural Education is strongly influential at the Architecture profession and the guidelines designed to reap a sustainable constructed environment. Considering the idea of teaching sustainability as the final aim in Architectural Pedagogy might offer ineffective effects for the reason that expertise hole among the quantitative and qualitative approaches may not be bridged efficiently. Given the discussions above, it is futile to introduce a stereotypical curriculum to stimulate sustainable Architecture Education. Architectural education, owning a precious variety of cultural, social, aesthetic and technological standards, ought to embrace a bendy approach that ambitions to introduce the belief of sustainability as a way of information the relationship between the built, natural, and contextual environments.This flexibility ought to best be done via supplying a responsive curriculum that integrates sustainability worries to all courses inside dialogue-based technique and evidence-based getting to know. This paper supposed to offer a basis for dialogue for destiny undertaking to integrate sustainability into the Architecture curriculum with a responsive method.Destiny research would possibly cover a detailed survey with professionals, educators and students to show their method and perception towards sustainability as a holistic concept and inspire variety of tactics to be incorporated within Architectural curricula.

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V. REFERENCES

[1] Altomonte, Sergio. 2009. "Environmental Education for Sustainable Architecture." Review of European Studies 1 (2): 12-21.DOI= http://bit.ly/1Q54ehp.

[2] Altomonte, Sergio, Peter Rutherford, and Robin Wilson. 2014. "Mapping the Way Forward: Education for Sustainability in Architecture and Urban Design." Corporate Social Responsibility and Environmental Management 21: 143–154.DOI= http://doi.acm.org/10.1002/csr.1311.

[3] Banham, Reyner. 1984. The Architecture of the Well Tempered Environment. Chicago: The University of Chicago Press; 2nd edition.

[4] Becerik-Gerber, Burcin, David J. Gerber, and Kihong Ku. 2011. "The pace of technological innovation in Architecture, engineering, and construction education: Integrating recent trends into the curricula." Journal of Information Technology in Construction 16: 411-432.

[5] Blewitt, John. 2004. "Introduction . Blewitt, J. and Cullingford, C. Eds." In The Sustainability Curriculum: The Challenge for Higher Education, by John Blewitt and Cedric Cullingford, 1-9. Earthscan.

[6] Callicott, J. Baird, and Karen Mumford. 1997. "Ecological Sustainability as a Conservation Concept." Conservation Biology 11 (1): 32-40.DOI= http://doi.acm.org/10.1046/j.1523-1739.1997.95468.x.

[7] Ceulemans, K., and M. De Prins. 2010. "Teacher's manual and method for SD integration in curricula." Journal of Cleaner Production 18: 645-651.DOI=http://doi.acm.org/10.1016/j.jclepro.2009.09.014.

[8] De Wilde, Pieter. 2014. "The gap between predicted and measured energy performance of buildings: A framework for investigation." Automation in Construction 41: 40–49.DOI=http://doi.acm.org/10.1016/j.autcon.2014.02.009.

[9] Durmus, Serap. 2012. "Change and Transformation in Architecture: On the Concept of Zeitgeist." Global Built Environment Review: A Journal for Architecture, Planning, Development and The Environment (GBER) 8: 22-36.

[10] Farmer, Graham, and Simon Guy. 2010. "Makingmorality: sustainable Architecture and the pragmatic imagination." Building Research & Information 38 (4): 368–378.DOI=

[11] Figueiró, Paola Schmitt, and Emmanuel Raufflet. 2015. "Sustainability in higher education: a systematic review with focus on management education." Journal of Cleaner Production 106: 22–33.DOI= http://bit.ly/1mStOhe.

[12] Frederick, C. P. 2012. Curriculum Improvement in Education for Sustainable Development: Measuring Learning Outcomes in an Introductory Urban Planning Course. Master Thesis, Arizona State University, Unpublished.

[13] Ghani, Fatima. 2012. "Issues in Sustainable Architecture and Possible Solutions." International Journal of Civil & Environmental Engineering 12 (01): 21-24.

[14] Guy, Simon, and Graham Farmer. 2001. "Reinterpreting Sustainable Architecture: The Place of Technology." Journal of Architectural Education 54 (3): 140–148.DOI= http://doi.acm.org/10.1162/10464880152632451.

[15] Guy, Simon, and Steven A. Moore. 2005. "Reflections and Engagement: Towards Pluralists Practices of Sustainable Architecture." In Sustainable Architectures: Cultures and Natures in Europe and North America, by Simon Guy and Steven A. Moore, 221-239. New York: Spon Press, Taylor & Francis Group.

[16] Hartman, Hattie. 2012. "Is Sustainability Just Another "Ism"?" Architectural Design, April: 136–140.DOI= http://doi.acm.org/10.1002/ad.1444.

[17] Henning, A. 2005. "Equal couples in equal houses." In Sustainable Architectures: Cultures and Natures in Europe and North America, by Simon Guy and Steven A. Moore, 89-104. New York: Spon Press, Taylor & Francis Group.

[18] Jennings, Philip. 2009. "New directions in renewable energy education." Renewable Energy 34: 435-439.DOI= http://doi.acm.org/10.1016/j.renene.2008.05.005.

[19] John, Godfaurd, Derek Clements-Croome, and George Jeronimidis. 2005. "Sustainable building solutions: a review oflessons from the natural world." Building and Environment 40: 319–328.DOI= http://bit.ly/1RWzuDL.

[20] Keitsch, Martina. 2012. "Sustainable Design: A Brief Appraisal of its Main Concepts." Sustainable Development 20: 180–188.DOI= http://doi.acm.org/10.1002/sd.1534

[21] Kumar, Satish, Shruti Narayan, Sanyogita Manu, and Tulsyan Ankur. 2010. "Role of Architectural Education in Promoting Sustainable Built Environment." New Delhi, India.

[22] Lidgren, Alexander, Hakan Rodhe, and Don Huisingh. 2006. "A systemic approach to incorporate sustainability into university courses and curricula." Journal of Cleaner Production 14: 797-809.DOI= http://bit.ly/1PRLfZG.

[23] Manu, S., A. Bajpai, S. Kumar, S. Narayan, and A. Tulsyan. 2010. "Architectural Curriculum Enhancement for Promoting Sustainable Built Environment in India." Proceedings of the ACEEE Summer Study on Energy Efficiency in Buildings. 196–212.

[24] Masseck, T. 2013. "Teaching Sustainability through Living Labs in Architecture: The case study of the UPC-LOW3 prototype solar house." Engineering Education for Sustainable Development. Cambridge, UK: The proceedings of the EESD13 Conference. 1-9.

[25] Menezes, Anna Carolina, Andrew Cripps, Dino Bouchlaghem, and Richard Buswell. 2012. "Predicted vs. actual energy performance of non-domestic buildings: Using post-occupancy evaluation data to reduce the performance gap." Applied Energy 97: 355–364.DOI=http://doi.acm.org/10.1016/j.apenergy.2011.11.075.

[26] Murray, Paul E., and Alison J. Cotgrave. 2007. "Sustainability literacy: the future paradigm for construction education?" Structural Survey 25 (1): 7 - 23.DOI= http://doi.acm.org/10.1108/02630800710740949.

[27] Pappas, E., O. Pierrakos, and R. Nagel. 2013. "Using Bloom's Taxonomy to teach sustainability in multiple contexts." Journal of Cleaner Production 48: 54-64.DOI= http://dx.doi.org/10.1016/j.jclepro.2012.09.039.

[28] Räthzel, Nora, and David Uzzell. 2009. "Transformative environmental education: a collective rehearsal for reality." Environmental Education Research 15 (3): 263-277. DOI=http://dx.doi.org/10.1080/13504620802567015.

[29] Rozema, Jaap G., Alan J. Bond, Matthew Cashmore, and Jason Chilvers. 2012. "An investigation of environmental and sustainability discourses associated with the substantive purposes of environmental assessment." Environmental Impact Assessment Review 33: 80-90.DOI= http://bit.ly/1TzWvxx.

[30] Salama, Ashraf. 2005. "Skill-based / knowledge -based Architectural pedagogies: An argument for creating humane environments." 7th Intl Conference on Humane Habiate-ICHH-05. Mumbai, India: The International Association of Humane Habitat IAHH Rizvi College of Architecture.

[31] Savageau, Ann E. 2013. "Let's get personal: making sustainability tangible to students." International Journal of Sustainability in Higher Education 14 (1): 15 - 24.DOI= http://doi.acm.org/10.1108/14676371311288921.

[32] World Commission on Environment and Development. 1987. Our Common Future - Brundtland Report. United Nations Report, Oxford University Press.

[33] Wright, James. 2003. "Introducing sustainability into the Architecture curriculum in the United States." International Journal of Sustainability in Higher Education 4 (2): 100-105. DOI= http://doi.acm.org/10.1108/14676370310467131.

[34] Salama, A. (1995). New Trends in Architectural Education: Designing the Design Studio, Tailored Text and Unlimited Potential Publishing, Raleigh, North Carolina, USA.

[35] Salama, A. (1998). A New Paradigm in Architectural Pedagogy, In J. Teklenburg et al. (eds.) Shifting Balances: Changing Roles in Policy, Research, and Design, EIRSS Publishers, Eindhoven, The Netherlands. pp. 128-139.

[36] Salama, A. (2005 a). Skill-Based/Knowledge-Based Architectural Pedagogies: Toward an Alternative for Creating Humane Environments, Keynote Speech: Proceedings of the 7th International Conference of the International Association for Humane HabitatIAHH, Mumbai, India.

[37] Salama, A. (2005 b). A Process Oriented Design Pedagogy: KFUPM Sophomore Studio, CEBETransactions: Journal of the Center for Education in the Built Environment, Vol. 2 (2), pp. 61-31.

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