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# Exploring the Architecture 2.0 for the Future of Building Design and Technology

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**Abstract**

Architecture is the embodiment of an ongoing discourse among socio-cultural, techno-legal commentaries, radical discovery, technological innovations, political processes, and artistic expressions; per say. It addresses the problems of enclosure, connectivity, permanence, usage, organization, aesthetics, and structure. Further, digital technologies, emergence of regulatory authorities, response to climate change and its effects, growing energy and water needs cannot be ignored. Dwindling economy, dropping pay packages, loss of jobs etc are the concerns that shape the future of investments in architecture. In the light of such crucial conditions, architects need to be accountable; not only to clients, but to the society and governments at large. Performing Aesthetics thus emerge as the only panacea for this scenario that is not bright, but gloomy. While mass consumerism, standardization, and mass production were the buzzwords of the second industrial revolution, where performance and efficiency are crucial, the first industrial age focused on the need for machinery and mechanization in both production and construction. Furthermore, post-modernism emerged as a result of mass production monotony. Architecture is preparing for mass consumption in the future, with 3-D printing allowing for mass customization and online building transfers in the form of electronic data. However, there are very few academic conversations that incorporate explanatory theory and aesthetic education. The development of performing aesthetics that stresses the improved "worth and value" for money—the primary focus of the current situation worldwide—requires the identification of a suitable definition as well as the contributing elements and characteristics. The goal of this study is to identify a novel strategy for creating "Architecture 2.0 which generates aesthetically enriched productions" for the future of technology and building design.

**Keywords**

Architecture 2.0, Building design, Technology, Dwindling economy, Electronic data.

## 1. Introduction

One of the main objectives during the Byzantine, Egyptian, or Classical periods of architecture was aesthetics. Applying fundamental design components and principles, such as balance, composition, rhythm, and other visual principles—even visual illusions and corrections for optical illusions, as seen in Greek temple architecture—was the main objective of designers and master builders in order to achieve beauty (Kolarevic, 2003). In contrast to the Industrial Age, which focused on the need for machinery and mechanization in both construction and production, the second Industrial Revolution saw mass production, standardization, and consumerism as the buzzwords in the fields of practice and academia where efficiency and performance are crucial. Furthermore, post-modernism emerged as a result of mass production monotony (Latha Siv Asankari et al. 2015). Architecture is preparing for mass consumption in the future, with 3-D printing allowing for mass customization and online building transfers in the form of electronic data (Biswas et al. 2024). The expansion of architectural design ideas and vocabulary during the last century has created pluralistic and diverse architectural productions with the plurality in aesthetics. However, scholarly discussions that include aesthetic education and explanatory theory are lacking and scanty to find. Finding a suitable concept, as well as the characteristics and contributing elements, is crucial for the development of performing aesthetics (Luo et al. 2017).

The demands of performance are increasing day by day; especially in this world of limited resources. Further, nations all over the world are entangled in the energy and water crisis which pulls these demands to extreme limits. Architecture in Classical terms had to be replaced by ‘architecture that is plural in nature’ with the cultural explosion and globalization in past decades. This is clearly reflected by the example of US that is described as a ‘melting pot of cultures’ where one can find many

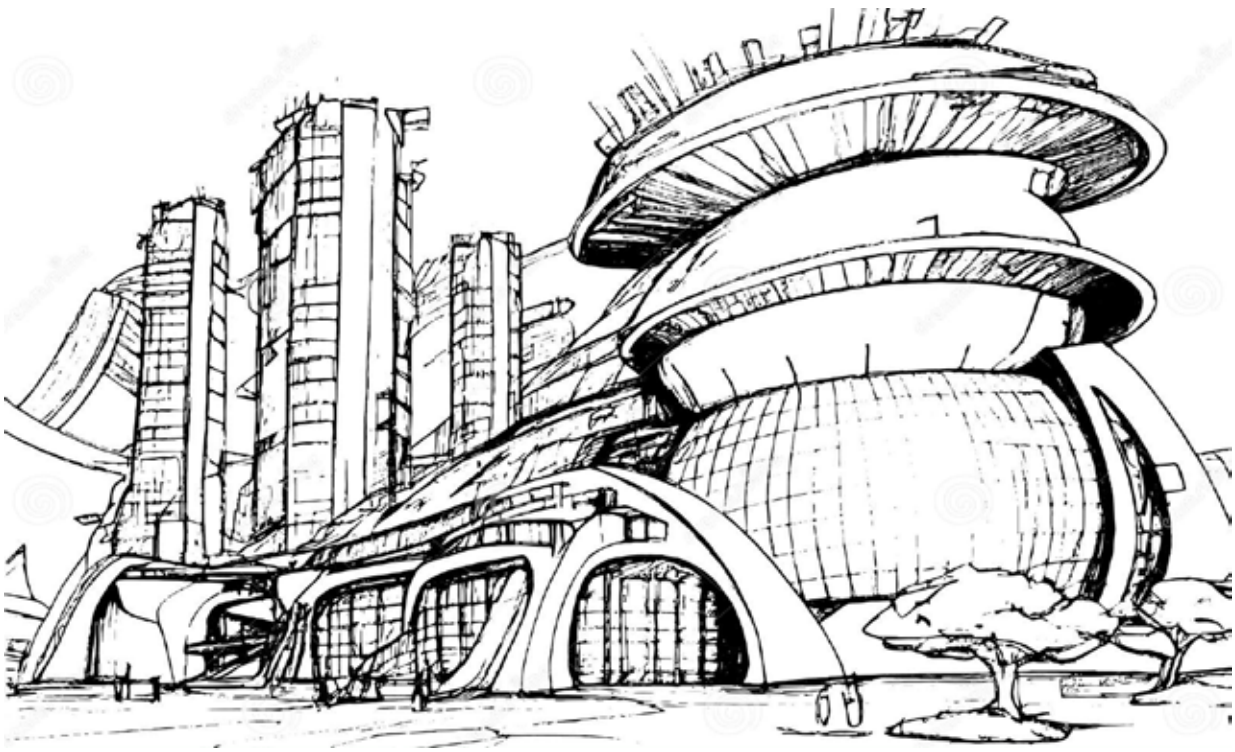

**Figure 1.** Fantasy Futuristic Architecture

pioneering and better performing architecture under the close scrutiny of regulations and controls. Free and rational thinking, liberal policies and careful scrutiny that need close 'monitoring and rating of building performance' have led to the emergence of certification like LEED (Abdelaal et al. 2022; Wu and Margarita, 2024). In India the national rating system 'GRIHA' has taken control of built form performance in various domains. Architectural expressions have witnessed the Modernist Movement, Post-Modernism, Neo-modernism, High-tech architecture and have reached a state of 'nowhere to no limits' with the advancement of computerization in designing, manufacturing and construction; but 'performance' (Poursheikhi and Torkestanib, 2015). Hence, it cannot be assumed that classical theory of aesthetics will 'hold good any more 'in a complex, pluralistic and technologically advancing world (Armstrong and Allwinkle, 2017). Thus, architects are constrained to conform to prescriptions of performance prescribed as the most important criteria in any successful built form expressions (Rahimian et al. 2021). Fantasy Futuristic Architecture shown in Figure 1.

Design is the most important skill which demands the major portion of architecture curriculum to be dedicated to design process and related courses. First-year students are exposed to basic design, without any understanding of the complex relationship between form and performance. Although they are taught to make compositions of forms, colours and other elements of design, no attempt is made to relate with built forms, cultural and performance requirements. Architecture design is a process in continuum, which uses previous knowledge to new knowledge production for the betterment of human lives. However, the continuum can be maintained only if overlaps are established though relations between form and performance. Unless such continuity is established through impartation of knowledge regarding the relationships that exist among form, performance, cultural relevance, market economics and rating systems, students will receive only compartmentalised information with extreme difficulty to correlate and make useful knowledge.

**2. Literature Survey**

Classical meaning of Aesthetics derives from the Greek word aisthetikos, or "sensitive", meaning "to perceive" so it can be concluded as "sensitive perception" or "sensibility". According to (Wartenberg, 2005), this approach was further redefined in 1750 AD by Alexander Baumgarten as "study of good and bad perceptions". But aesthetics took a prominent position in academics through the seminal work 'Critique of Judgment' by Kant in modern aesthetics. While the perception of beauty per say was of interest since Medieval times, aesthetics became an independent discipline identified as "philosophy of art" in the middle of the 18th Century. According to there is consensus on two large fields where there is an active discussion of aesthetics: philosophy and psychology. Scruton, argued that the primary concern of philosophy is to "comprehend principles and the essence of art and architecture interest". In comparison, insists psychology's primary concern is to determine the essence of the human experience and its causes. Jon Lang outlined the two aesthetic approaches as speculative and empirical aesthetics. "Speculative aesthetics intends studying aesthetic philosophies and creative processes", and "empirical aesthetics is studying perception, cognition, and attitude formation" (Rometsch et al. 2022)

Lang's speculative aesthetics is somewhat similar to philosophical aesthetics and empirical aesthetics is similar to psychological aesthetics. However, both the theories are subject to discourse and be analysed to incorporate the need of the times; performance. The legal systems with its insistence of building bylaw on setback, leads to the formation of stepped roof sections and associated stepped views; which are reflections of the implementation of setback rules (Suprihartini et al. 2023). So too, is the application of earthquake code and fire code. Again, sustainable rating systems necessitates the use of solar panels and surfaces according to the movement and orientation of sun, wind and energy efficiency.

Aesthetics in 18th Century mostly concerned with discipline of fine arts. Architecture as being a utilitarian

art never been a primary interest of high-end appreciation of taste, per say. Their main emphasis was on literature, poetry, paintings, music, dance, and sculpture though Immanuel Kant, Hegel and Nelson Goodman explored the nature of Architecture's aesthetic aspects. In 'Critique of Judgement' Immanuel Kant saw architecture as formative art that expresses ideas through figures in space according to the form of representation.

According to Aesthetics is also debated as an ethical term where; ethics has two meanings in general-morality and goodness. David Hume argued about the relationship between aesthetic property and moral property. An artwork's ethically reprehensible aspects distract of its artistic value. When an artwork reflects a worthy disposition, it can have additional artistic interest. In turn, there is a common viewpoint that ethical considerations regarding artworks are viewed as outward to the artwork itself. Nelson Goodman, Lagueux debated that while the ethical/moral concern of the artist is problematic if the work includes artistic properties, it is believed that the work of art should be admired (Pak and Verbeke, 2015; Ancira, 2020; Moralioglu).

**3. Materials and Methods**

Architecture has made its presence felt in human lives since the beginning of this world. It has constantly evolved from ancient to medieval and modern eras. Various cultures as well as societies across the world have adopted it. In contemporary times, technology in architecture has transformed this sector.

Architectural technology has provided breakthroughs to architects in using their imagination beyond the present times and creating futuristic designs. In this blog, let's discover how technological advancements have impacted the field of architecture.

3.1. Building Information Modelling (BIM)

BIM is an integral part of the construction projects in the modern times. Architects are leveraging this technology in architecture to create captivating designs. It facilitates real-time, dynamic and interactive processes that include the physical and functional characteristics of the structure.

Moreover, BIM opens the door for better collaboration between all the project stakeholders, like architects, contractors, engineers and clients. Hence, improvements in the building design, construction and management ensue.

Project stakeholders can make informed decisions regarding the planning, demolition and construction of a building with BIM usage. It ensures sustainability and cost-effectiveness.

3.2. Artificial Intelligence (AI)

Artificial intelligence (AI) does the repetitive tasks and has empowered architects to dedicate more time to the creative process. Architects use AI algorithms to analyse a massive amount of data and generate designs that suit specific criteria.

Furthermore, this technology in architecture stays at the forefront in energy efficiency, building performance and structural integrity optimization.

3.3. Smart Buildings and Sensor-Based Systems

Responsive environments and smart buildings are the welcome change in the architecture sector. Today, buildings are equipped with climate control systems, automated lighting, sensor-equipped facades and interactive building interfaces.

It has resulted in enhanced comfort, safety and convenience for the occupants. Building performance and energy efficiency have been made possible with such technology in architecture.

3.4. 3D Printing

3D printing is another revolutionary architectural technology that has impacted the architecture industry. It enables architects to see their designs in accurate physical form to better understand the spatial dimensions and relationships.

Architects are leveraging 3D printing to construct entire components of the buildings and also entire structures in some cases. It can significantly reduce waste, costs and construction time.

3.5. Virtual Reality (VR)

Virtual reality fever has gripped gamers and social

media users. It offers the users to interact with a 3D space virtually. Architects are also using it to show the 3D renderings of their designs. This technology in architecture allows project stakeholders to have a walkthrough of the designed space through a virtual tour.

VR provides a closer look at the entire building to the project stakeholders through a headset. Hence, better clarity of the design in the planning stage for project members saves time as well as costs.

3.6. Generative Designs

The use of technology in architecture is gaining popularity in design generation. Architects are using one set of ideas or requirements like materials, budget and building techniques to create different designs.

The use of generative designs can boost the accuracy of new designs as they learn from previous ones.

3.7. Animation and Rendering

The introduction of animations and 3D renderings is a massive shift from still photos of designs in the AEC industry. This technology in architecture lets the architects create and design spaces that look as good as finished projects.

3D digital renderings offer a clear look of the project at scale size, lighting, colouring and textures. Furthermore, animation allows the architects to provide a virtual tour of various spaces of the projects to the clients.

3.8. Digital Sketches

The evolution of architecture from hand-made designs to digital ones does not mean that drawings are outdated. Today, AEC experts are using digital sketchbooks to create, save and organize designs. This technology in architecture is easy to use and one can send the drawings to clients and colleagues.

3.9. Focus on the Individual

In the future, architecture will be more and more concerned with serving the requirements of its occupants. These days, when architects design buildings and spaces, their occupants' comfort and well-being are given first consideration. This people-centric approach to architecture, also known as "people-first" or "user-centric" design, emphasizes the importance of understanding the needs and desires of individuals when shaping a building or space.

The architecture of offices, retail establishments, and other public areas already reflects this trend. To make these areas more comfortable for individuals, architects are adding features that encourage natural light, air movement, ergonomics, and safety.

3.10. Sustainable and Adaptable Materials

Future architecture must employ sustainable materials that can be modified to meet evolving requirements. Architects can take into account natural materials like steel, bamboo, hemp concrete, and repurposed wood as renewable energy sources gain prominence. Additionally, these materials must to be adaptable to changing needs and technological breakthroughs. For example, nanoparticles are used in modern construction to improve energy efficiency and insulation. Identified Parameters and Criteria of Performing Aesthetics shown in Figure 2.

**Figure 2.** Identified Parameters and Criteria of Performing Aesthetics

3.10.1. Research Approaches

Education being a multifaceted field, there can be no prevailing paradigm or normal science. A paradigm is an analytical window through which the researcher

perceives the world. The methodology used for this research is 'Mixed method 'including both qualitative and quantitative in nature. As a definition, Mixed Method emerged from the use of multiple methods in the mid-20th century, then established their identity and were confined to mixing quantitative and qualitative components (Rane et al. 2023). Mixed Method design is a scientific method having Deductive as well as inductive logic. Mixed method design is used when a researcher has multiple objectives and the focus is multiple lens. Purposive and probability sampling are combined in the nature of sampling; behaviour is examined in multiple settings. Common sense realism and a pragmatic perspective on the world are characteristics of reality in mixed method design. Open-ended and closed-ended questionnaires, document data, text and picture analysis, focus groups, interviews, and archived data are some of the structured and unstructured methods and technologies used in data collection. Combining quantitative and qualitative analysis, data analysis allows for the generalization of validated findings through triangulation.

Sample Size Determination

The sample size determination by proportion approach was used to calculate the sample size. A uniform group of academicians from prestigious institutions with more than five years of experience and sufficient knowledge of architectural aesthetics, as well as architects with more than five years of experience and a sufficient number of completed projects, were key selection criteria for data collection. It is expected that 50% of the population will fit these criteria because the precise percentage of respondents who meet them is unknown and is determined using worst-case scenarios.

Reliability and Validity

Two methods for evaluating the quality of the measurement tool being studied are validity and reliability. The capacity of scale to yield consistent outcomes is known as reliability. It is a gauge of the scale's reliability. It is the scale's capacity to yield comparable outcomes when used repeatedly for a hidden variable (construct). Reliability is the extent to which items of a construct gel well together (corelate with each other). Cronbach's α is used to study interval consistency amongst item measuring a construct. Cronbach's α is the most popular instrument to study reliability. Cronbach's α will range between 0 to 1, the threshold being 0.7 and above.

The ability of a scale to yield accurate results is known as validity. For latent construct validity is the extent to which items of a construct define or explain underline construct. Factors loading and average variance extracted have been used to confirm validity.

**4. Architecture 2.0**

In the past, architecture was associated with creating individual works of art and culture, primarily on an individual basis, using the time-tested technology and science that were accessible at the time. The design process was primarily intuitive and mainly depended on the skill, experience, and judgment of the individual designer. Even though this approach to architecture has produced some amazing accomplishments from earlier generations, the profession now faces many "global nature" challenges, such as the growing power of computers, the evolving roles of professionals, the dangers of climate change, a faltering economy, and man-made disasters that jeopardize its traditional roles. Design is the most important skill and a major portion of the architecture curriculum is dedicated to designing and related courses. First-year students are exposed to the basic design, without any understanding of the complex relationship between form and performance. It is time to think whether the authorities responsible for controlling education in architecture are taking appropriate steps to impart knowledge that is useful and enabling, skills that are giving choice and confidence for the students to face the changing requirements of a 'being changed' world. It is time to adjust to the quickly evolving demands of the profession, even though the pedagogical approach that is commonly used in architectural design offers better opportunities and covers all facets of architectural ideas, including formal aesthetics, building technology, theory, history, and practical skills like drawing or model making. Understanding the requirements for B. Arch graduates'

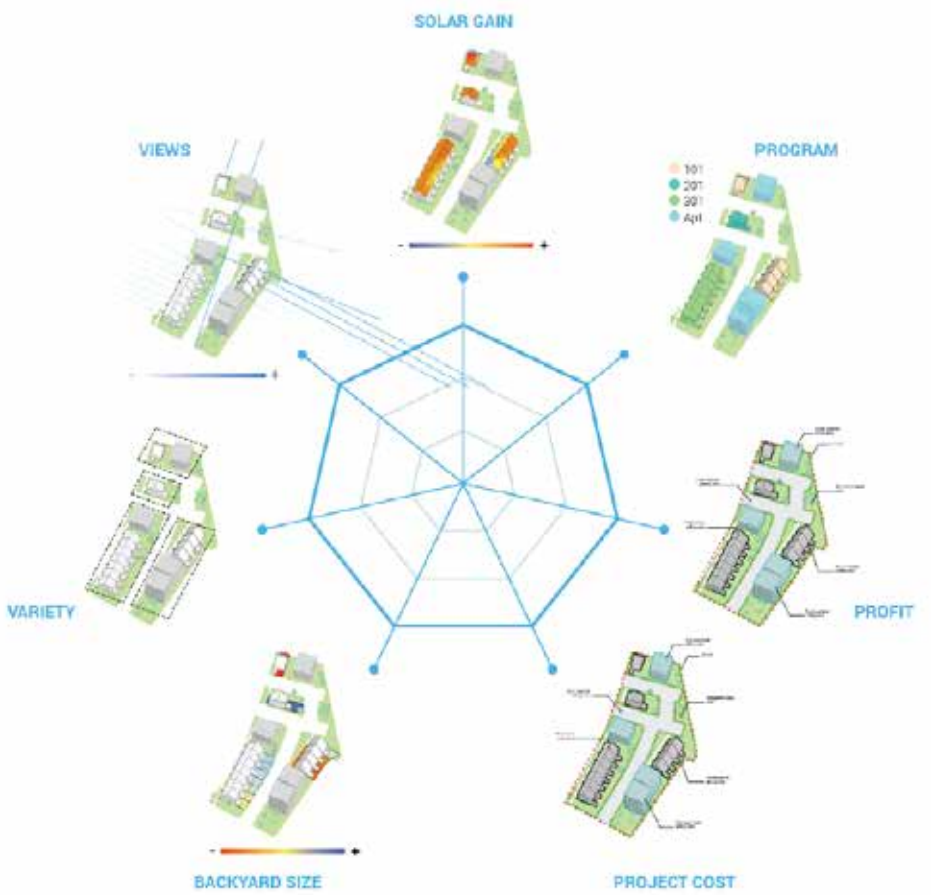


**Figure 3.** Future Architectures

empowerment is crucial, particularly when it comes to overcoming the problems of the modern world. The modern world has higher expectations for design professionals in computation, modelling, efficiency evaluation, performance evaluation, and simulation that use sophisticated modelling, simulation, and computation tools, even though sketching, colouring, and model building are still necessary. Additionally, in addition to the fundamental sciences, expertise in building physics, services, BIM, project management, and a thorough comprehension of contemporary materials and technologies shown in Figure 3..

**5. Experimental Analysis**

Regarding the concept that "Building Performances is the determinant of Aesthetic value for making a preference," When choosing a building, 17% of respondents strongly agree that its performance determines its aesthetic value. 35% respondents agree that building performance is the determinant of aesthetic value for making preference. 9% respondents somewhat agree that building performance is the determinant of aesthetic value for making preference. 22% respondents are neutral about building performance is the determinant of aesthetic value for making preference. 6% respondents somewhat

disagree that building performance is the determinant of aesthetic value for making preference. Nine percent of respondents don't think that aesthetic value is determined by building performance when making a selection. 2% respondents strongly disagree that building performance is the determinant of aesthetic value for making preference (Figure 4).

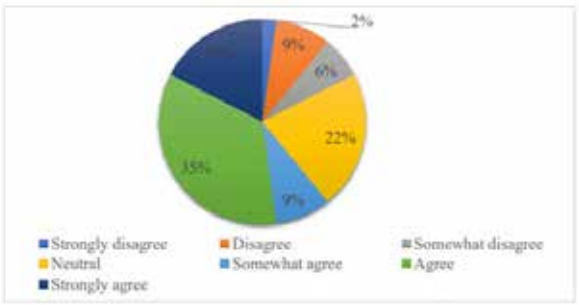


**Figure 4.** The factor that Determines Aesthetic Value When Choosing is Building Performances

For the construct, "The aesthetic assessment basis varies over a period of time or remains static", 85% thinks aesthetic assessment varies. Aesthetic Assessment and Time shown in Figure 5.

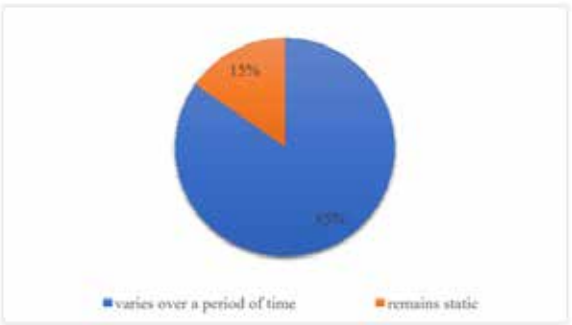


**Figure 5.** Aesthetic Assessment and Time

For the construct, "Building can be conceived as more like a piece of sculpture" 15% respondents strongly agreed that building can be conceived as more like a piece of sculpture. 35% respondents agreed that building can be conceived as more like a piece of sculpture. 13% respondents somewhat agreed that building can be conceived as more like a piece of sculpture conceived as more like a piece of sculpture. 7% respondents disagreed that building can be conceived as more like a piece of sculpture. 17% respondents strongly disagreed that building can be conceived (Figure 6).

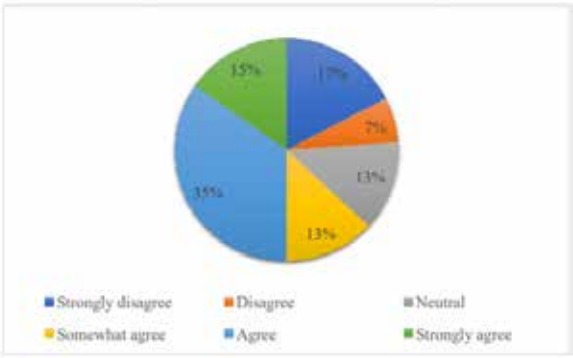


**Figure 6.** The Building can be Conceived as More Like a Piece of Sculpture

Regarding the concept, "Sociological and Psychological performance criteria: are they significant factors in determining a built form's aesthetics for yourself?" The aesthetics of a built form are determined by social and psychological performance, according to 33% of respondents who strongly agreed with this statement. A constructed form's sociological and psychological aesthetics were somewhat agreed upon by 26% of respondents. Two percent of respondents have no opinion on the significance of sociological and psychological performance in determining a constructed form's aesthetics (Figure 7). Therefore, it can be said that sociological and psychological performance standards are significant factors in determining a built form's aesthetics.

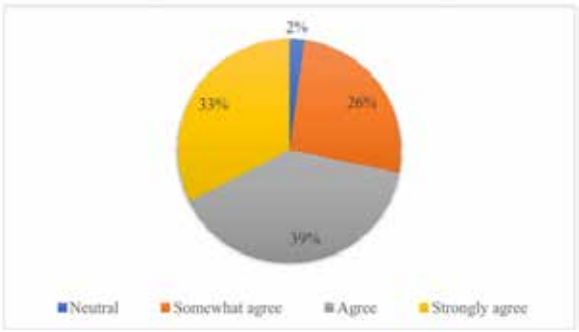


**Figure 7.** Sociological and Psychological Performance Criteria

Architecture is a cultural product, which is primarily meant for humans, to better their use and habitation. The and its experiential quality in terms of psychological comfort depends extent on the aesthetic qualities of the space and the form of enclosure and psychology of the users affects the performance of a building and the response it evokes.

**6. Conclusion**

In order to prepare the next generation of architects to understand the current critical need of sustainable built environment development to preserve the natural resources and use them very carefully so that we can protect Mother Earth from destruction, research on the methods and practices of architecture teaching or the significance of architecture pedagogy is necessary. But it is analysed that there is enormous scarcity of specialized trainers or teachers who actually worked the methods and practices of architecture teaching as its separate identity needs to have specialized architecture professionals in architecture pedagogy to inculcate present day required knowledge in coming generation of architecture professionals. As masters is the minimum qualification for the recruitment of architecture teaching there is need to focus on skill and understanding of sustainable issues development at post graduate level. The study findings therefore proposed recommendations for policy level changes, conceptualization and implementation of Sustainable Built Environment and produce young professionals coped with these principles at post graduate level, new three compulsory courses and two open electives that can merged in syllabi of post graduate architecture courses in any institute of architecture in India, and proposed yearly trainings of at least two weeks for the teachers already recruited for teaching as per required demand of sustainable issues and skill development to deliver to the upcoming generation of architects.

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