

The Evolution of Architectural Practice and Education: Redefining the Role and Scope of the Profession in a Dynamic World

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Abstract

The paper first examined what architecture is and how architects are trained in chronological order from antiquity to the present. Adopting logical argumentation from first principles, the paper traced the origins of theories in architecture through the written works of Vitruvius Polio to medieval period of the 'master masons' and the renaissance period of plato's academy of art; the architect as 'master builder', trained practically on site with traditional materials (such as stone, bricks, timber) for construction, combining generalized skills as an artist, scientist, engineer, town planner, jurist, etc. Towards the end of the seventeenth century, with the discovery of wrought iron and reinforced concrete, engineering separated from architecture as a distinct scientific discipline, the paper affirmed. The training of the architect took a formal school (off construction site) system with the establishment of ecole de beaux-art in France and later the Bauhaus of Germany in the twentieth century. However, the impact of twenty-first century digital technology revolution in the construction industry is not only changing the education and practice of architecture but also the way building projects are procured. The paper finally concludes that the elitist nature of contemporary practice of architecture contributes to its misconception. The paper recommends diversification of practice of the profession through inter-disciplinary approach to design within the urban context and advocacy projects as awareness campaign strategy to touch on the lives of ordinary people who normally constitute overwhelming majority in most developing economies of the world.

Keywords: architect, artist, building, engineer, shelter.

Introduction

Architectural profession has undergone significant transformation since its emergence as a distinct discipline, in response to the changing environmental needs of the society, population growth, increased urbanization and technological advancement. The history of architecture is deeply intertwined with the history of its educational methods. Architecture is a profession that existed and was practiced since the primitive periods, when man struggled to provide decent shelter over his head. It goes beyond mere provision of ordinary popular buildings (architecture without architects) as practiced by the traditions, to the production of innovative iconic structures that meet aesthetic appeal, structural stability and functional requirements. Hence, the first architectural works that stand the test of time were the pyramids of Egypt's Nile valley (Fig. 1), MayanAztec of Latin America, and those of Mesopotamia. A replica of the Egyptian pyramid at Giza (Plate I) was built in Luxor Hotel, Las Vegas for urban tourism.

In modern times, architecture is defined as the art and science of provision of built environment for human use. It involves all the processes of design, construction, maintenance and alterations of the built environment. Space is the very raw material for architecture; hence where ever there is space and human being is engaged in spatial activity, there is architecture. In simple terms architecture or arkitekton is translated as '**master mason**'.

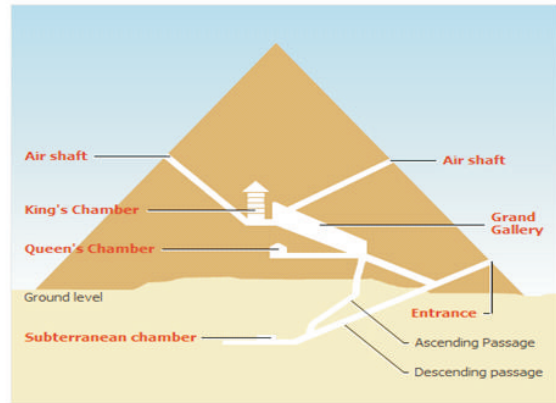


Figure 1: Pyramid at Giza - burial ground of the Pharaohs, Egypt. (First surviving Architectural work dating back to 7th millennium).



Plate I: Mimicking Pyramid of Giza at Luxor Hotel Las Vegas, USA.

The emergence of architecture as a distinct discipline was traced since the first century BC. The paper gave an overview of the development of history and theory of architecture since antiquity, elucidating how architecture gave birth to other professions, particularly engineering and town planning. The impact of the twentieth century industrial revolution and the role of the machine in mass production of buildings was discussed. Finally the presentation highlighted the ever expanding roles of the architect and architecture in twenty-first century digital age. The emerging new roles of the architect necessitate urgent diversification of the

profession particularly in the developing economies of the world facing rapid urbanization and consequent challenges of the construction industry in the twenty first century.

Architectural Theory in the Field of Tension

Architecture is a Trinitarian discipline, sitting in the field of tension between **art's** variety, **science's** variables and **philosophy's** variations. The very essence and meaning of architecture is contained in 'buildings' which largely accepts more than one solution, even if such solutions contradict one another; since architecture is more of activity of synthesis rather than analysis. The validity of these solutions is judged by the constantly changing values that form the basis of architectural theory. In contrast, scientific methods are analytical and never allow 'A' and not 'A' to co-exist. Such is the philosophical dilemma of any theory of architecture. Thus, theory in architecture is hypotheses, hopes and guesses about the synthesis of all ingredients that make the built environment in a particular way, place and time (Kruft, 1994).

Global Perspectives of Architecture From Antiquity

Marcus Vitruvius Polio described the syllabus architects used to learn in ancient Rome at the beginning of first century BC in his Ten Books *de architectura* discovered in the late fifteenth century. 'Theory was the ability to demonstrate and explain the principle of proportions while practice is the continuous and regular exercise of employment where manual work is done... according to the design of a drawing'

(Broadbent, 1995). As stated by Vitruvius:

'In all matters, but particularly in the study of architecture, there are these two points: the thing signified and that which gives it significance.' As to the student of architecture, according to Polio, 'let him be educated, skillful with the pencil, instructed in geometry, know much history, have followed the philosophers with attention, understands music, have some knowledge of medicine, know the opinion of the jurists, be acquainted with astronomy and some theory of the heavens'. The idea of a multi skilled architect is not new, it seems nothing has changed (Broadbent, 1995).'

In the first century B.C., Vitruvius Polio suggested that architects developed a generalized skills set in the erstwhile role of 'master builder';

“An architect should be a good writer, a skillful draftsman, versed in geometry and optics, expert at figures, acquainted with history, informed on the principles of natural and moral philosophy, somewhat of a musician, not ignorant of the law and of physics, nor of the motions, laws and relations to each other, of the heavenly bodies... 'Those unto whom nature has been so bountiful that they are at once geometers, astronomers, musicians, and skilled in many other arts, go beyond what is required of the architect, and may be probably called polymaths, in the extended sense of that word. Men so gifted, discriminate acutely, and are rare...” (Broadbent, 1995).

So nothing much has changed since antiquity. The Architecture curricula these days resemble that described by Vitruvius with heavy grounding in history and theory, descriptive

geometry; though that may be computer aided. Few schools seem to teach music as they should despite the notion that architecture is generally frozen music, or the statement that the way form follows function is much like the way melody of a song follows the poem on which it is based. We may not understand the language in which the poem is written, but nevertheless, the memory lingers on. Some knowledge of medicine has now become the domain of environmental health. The Vitruvian Triad is summed up in his perfect building (Fig. 2) that displayed Utilitas, Firmitas and Venustas (Kruft, 1994).

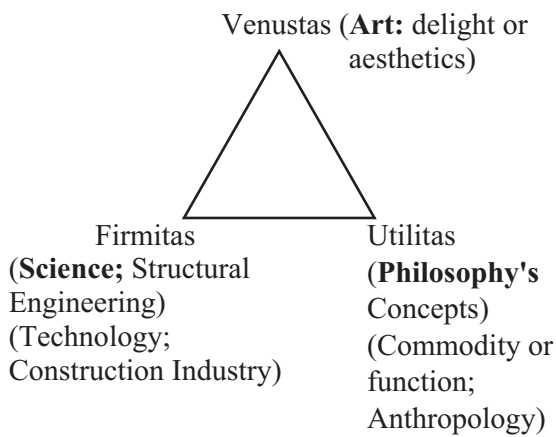


Figure 2: *The Vitruvian Triad adapted by the Author*

Medieval Period of the Guilds and Their Lodges: (A Blind Spot in History)

The emergence of architectural literature can be seen as the starting point of theory, somewhere around the late fifteenth century with the discovery of Vitruvius's treatises. The history of architectural education might have begun in the middle ages when the master masons had lodges where they taught their 'secrets', inaccessible to the public and to even other ordinary masons. The contributions in

literature and building traditions of the great master masons, developed, protected and transmitted orally with particular secrecy so as to protect the craftsmanship and the profession. As posited by Broadbent (1995), the works of Villard de Honnecourt (c1235), Mathes Rorczer (1486) and Hans Schmuttermayer (c1488) revealed the great masonry works of Gothic architecture which relied on the invention of mathematical instruments to produce drawings and construction works.

Some 2,000 Gothic drawings survived in various parts of Europe and it was clear that such instruments as rulers, compasses, dividers, pen and ink were used in their preparation. Although there is available evidence of drawings and instruments used in their production, very little is known from documented literature about the theory behind creation of medieval architecture or about the 'trade secrets' of the guilds and their lodges, the craft associations where architectural knowledge was developed and transmitted. These areas are bound to remain as '**blind spots**' in architectural history (Kruft, 1994).

The Renaissance Period (First Academy of Arts; The Academia Platonica):

The Renaissance began with a revival of classical literature and philosophy initiated by Dante (1265 1321) and Petrarch (1304 1374). This naturally led to an interest in buildings surviving from Roman times. Leon Battista Alberti was a prolific writer on matters to do with human relations and in 1435, he turned his attention to the study of architecture, perspectives and proportions. In 1450, Alberti wrote his guide to the ruins of ancient Rome, with carefully measured drawings and maps. In 1452, he wrote in Latin, his *De re aedificatoria*

which started circulating in manuscript form, (Egbert, 1980).

In his treatise, Alberti argued that of all the arts, architecture was the most susceptible to theory. Unlike painting, sculpture, literature and poetry, architecture could be developed philosophically as it was firmly rooted in ideal forms-the primary solids: the cube, the sphere, the pyramid. Alberti indeed saw himself as a philosopher, very much in a manner of Plato. By 1485, Lorenzo de Medici had become so interested in Alberti's treatise that he sponsored its publication and adoption as teaching material in the first ever private academy of arts; - the Academia Platonica. The Academy was located in a Garden which Lorenzo owned in Florence, the purpose was to counter the influence of the Craft Guilds which still survived from the Middle Ages. The Director of the school was Bertoldo di Giovanni, a sculptor and students were admitted who studied, ate and slept in buildings within the Garden school. There were collection of drawings, models and paintings of contemporary masters for the students to study in their workshops. Undoubtedly, Alberti's treatises were used in the theoretical teachings. (Broadbent, 1995: pp 15).

The most crucial point here was the departure from the conventional on- the -job training of architects, painters and sculptors by a master that characterized the times, to a more viable and formal method of an established school system. The Academia Platonica produced famous artist who had distinguished careers as architects as well, including Leonardo da Vinci who entered the academy in 1475 and Michael Angelo who was there in 1480 and was famed to have said that '*great artists and architects don't borrow, they steal*'. According to Chaffee (1977), the Italian

Renaissance and post Renaissance models inspired the French, so that by 1635 Richelieu set up the first Academie fraçaise to regulate the Language. By 1671, Colbert established the Academie Royale d' Architecture for King Louis XIV with Francois Blondel as Director of the world's first school of architecture *ecole de beaux-arts*.

Origin and History of Beaux-Arts:

According to Akin (1983), the Ecole Des Beaux Arts emerged from the system of government which sponsored the academic institutions established in France at the turn of the seventeenth century. The Ecole purported an agenda for the architect which was unique at the time: the architect was to be the master designer and the master renderer who specified buildings abstractly on paper through two dimensional sketches. This was consistent with the educational theory of the times: establishing an educational program as opposed to a vocational on-the-job training program practiced by the secret guild-system of the medieval period. This worked out well due to the limitations imposed by building technology and government regulations of the times. The Ecole Des Beaux - Arts, from its earliest inception, was controlled by an established system of teaching architecture. The instructors were closely allied with practice. The character of the studio varied from time to time, representing contemporary conditions and the best French thought during succeeding periods (Wheatherhead, 1941). The evolution of the Beaux - Arts system as the first formal school for the training of architects dominated the way architects were trained all over the world as opposed to the monopoly by the guild system of master masons that existed in the medieval period. The twentieth century

famous architect Le- Corbusier attended the Ecole and learned concrete construction from Auguste Perrete. The Ecole model with theory courses taught in the classroom and abstract design projects in the *ateliers* (studios) dominated the education and practice of architecture until the emergence of the Bauhaus system (Chafee, 1977).

The Ecole Model and the 1968 Revolt

The Beaux - Arts influence persisted for more than two centuries until the advent of industrial revolution, the Bauhaus school in Germany and the 'Modern Movement' after World War II. In 1968, a popular students' revolt for change all over the world led to the closure of Ecole de Beaux - Arts and its ateliers followed by complete reorganization of the programme of architecture. According to Abdulkarim (2011), in Zaria, Nigeria, the university set up the Egbor's Committee of 1968 to reorganize the programme. The major recommendations of the Committee included replacing the rigid 5-year single tier Bachelor of Architecture (B.Arch.) to a more flexible double tier BSc/MSc model. The renaming of Faculty of Architecture to that of Environmental Design was aimed at diversification through multi-disciplinary approach and introduction of two new programmes namely Building and Urban and Regional Planning. However, after more than four decades of implementation of the Committee's recommendation, there has not been any significant progress of diversifying the architecture profession through introduction of specialized programmes such as urban design, landscape architecture, interior architecture, etc. (Abdulkarim, 2011).

Origin and History of Bauhaus

With the change in technological, financial, and political factors, the model of the “ecole” eroded over many years until the emergence of the Bauhaus after World War I. The Bauhaus was another system of definition of the architects' agenda. It aimed at reinstating the control of the designer over other architectural decisions. Akin (1983) states that in Bauhaus the architect would continue to be the master designer even though he was still to reject the style of the “ecole”. The architect assembled the power of the design decisions through the understanding of form, materials, construction, economics, and sociology. The Bauhaus worked out well and established the designer as a supreme commander. Modern architecture was established and many modern masters emerged. The development of the Bauhaus consisted of three stages; the Bauhaus in Weimar, then in Dessau, and finally in Berlin.

According to Wingler, (1980), from the standpoint of cultural history, the Bauhaus was not an isolated phenomenon. It was the climax, and focus, of a very complex and multifaceted developments. Institutionally, the Bauhaus was an institute for art which emerged as the successor to an academy and a school of art through their integration. However, the Bauhaus was marked by an anti-academic attitude from its very beginning. Within the few years of its inception, the educational ideals of craftsmanship were already giving way for educating designers capable of designing for **mass production**. Therefore, it became one of the goals of the Bauhaus to undertake product development in its own workshops, and thus provide a broader economic basis. In 1919, after World war I, Walter Gropius as first Director of the school together with Johannes Itten, the master of

form who was responsible for the preliminary basic design course started the programme by combining all the arts and crafts together in the production of architecture. By 1928 Gropius appointed Hannes Meyer and were later joined as teaching staff by Marcel Breuer and Mies van der Rohe. By 1933 the Nazis closed the school and the mass immigration to the United States by both staff and students ensued. Gropius was made head of school of Architecture at Harvard and was later joined by Breuer. Mies was made Dean of Architecture at Illinois Institute of Technology.

The immigration of masters of the Bauhaus to the United States and the establishment of new departments of Architecture in different universities following Bauhaus principles influenced the training of architects throughout the world. During the period of 1940s and 1950s many scholars from different countries of the world studied in the United States under the influence of masters of the Bauhaus and 'Modern Movement' thereby spreading the model to the rest of Europe, Asia and Latin America.

The A-A School: A Contemporary Model for the Twenty-first Century

The Architectural Association (A-A) was founded so as to radically reform the education of the architect. It was created to be wholly independent and private, free from the influence of government, and would have as its central concern the *creative imagination* of individuals. Underlying this concern was the realization within progressive society for the preparation of individuals whose imagination belonged as much if not more to themselves than to the State. These concepts still form the character of the present school's programmes, where the most important task is the cultivation

within the individual imagination of what might be called landscapes of desire: visions of the future grounded in a clear strong sense of architecture as a noble embodiment of liberty, coupled with the competence and the will to build (Balfour, 1995).

The AA has had since its foundation a direct relationship to changes in the culture; over the past 50 years that influence has been worldwide, for the School was at the architectural centre of the liberal revolution that swept through Europe in the 1960s. Warren Chalk, Dennis Crompton, David Greene, with their colleagues Cook and Herron, made the AA the focus of all the enthusiasms of Archigrams. Equally influential, politically and professionally, were graduates of the previous generation Michael Hopkins, Richard Rogers, Nicholas Grimshaw. In the aftermath of the worker/student revolt of 1968 in Paris, many young architects throughout Europe and beyond were in search of a setting, a school in which all the promise of a radicalized reality could be developed and implemented. Thus, Bernard Tschumi, Rem Koolhaas, Boyarsky and, later, Krier, Libeskind and Zaha Hadid, as well as many others, were drawn to the AA as the only institution capable of giving form to provocative dreams and postrevolutionary frustrations. The School has maintained this reflective and receptive relation to the ambitions of those who seek progressive change.

The AA's three major divisions the Intermediate School, the Diploma School and the Graduate School maintain in all aspects the radical liberal agenda established at its foundation. Apart from providing a broad grounding in history, theory and technology, the school has no set curriculum. Each student

must make the critical choice of a design unit, within which he or she is free to shape an individual programme of study from the extensive offerings of lectures and seminars. Also, just as in the beginning, the School maintains no permanent academic staff all teaching appointments are renewed annually, allowing for the continual readjustment and redirection of the programme's relationship to architecture. Academic staff are chosen not only for their commitment to progressive thought, but also to represent a broad range of concerns in architecture. The design units, although widely different in content, are linked at all levels by a common concern for individualism. Subjective originality and an empathy for the full performance of architecture, physically and poetically, shape their programmes. The culture of the school as a whole is characterized by its distance from prevailing issues of style, reflecting the wish to continually reoriginate architecture. (Balfau, 1995)

Articled Pupilage; Frank Llyod Wrights' 'Organic' Architecture

Frank Llyod Wright learned architecture through articled pupilage from his master, Sullivan. He was one of the great masters of the 'modern movement' of the twentieth century and founder of 'organic architecture'. Wright's organic architecture has four characteristics: firstly, it develops outward from within, in harmony with the conditions of its being. Secondly, construction occurs within the nature of materials, a kind of design with nature. Thirdly, elements of a building are integral; part-to-whole, as whole-to-part. Lastly, the architecture must reflect time, place, environment and purpose. Made by the people reflecting their socio-cultural

aspirations of their time, place, local environment and must be functional. Organic architecture reflects the principle of design with nature or sustainability, currently dominating scientific discourse. Both Frank Llyod Wright and Le Corbusier had their vision of architecture of the future in their sketches of future city planning and high rise buildings that are currently evidenced today in our mega cities. The articled pupilage offers professional mentoring by a great master serving as **role model** sharing practical on-the-job experiences to his students. Frank L. Wright established the Prairie school where he mentored his philosophy of organic architecture to his students. One of the major contemporary problems of university training of architects is the absence of practical on-the-job experiences through mentoring by a great master. The idea of incorporating great masters as studio professors in the university system coupled with students' industrial attachment programme are necessary steps at establishing practical linkages with the industry in the training of the architect.

A Proposal for a University of Architecture

The most ambitious scheme for the future, however, seems to be that of Tomas Taveira, the Portuguese architect who seeks to set up a University of Architecture. He finds himself as Dean of faculty of Architecture in a technical university surrounded by Engineers who have their own immensely successful ways of thinking which they apply to various kinds of engineering thinking. But architects have their own ways of thinking too which involve a firm rooting in culture and history; the obvious skills of drawing and designing; profound understanding of human values, namely spiritual, physiological, psychological, social;

and the ability to 'juggle many balls at once' in the resolution of complex problems, fraught with ambiguities. They need knowledge of many crafts, technologies, and the ability to communicate the same, in Taveira's view, can be applied with equal relevance to all the visual arts to theatre in its very many aspects, to film and TV etc. So Taveira set up a University of Architecture in which all these fields are represented as faculties and feed directly from and off each other. This promises to provide and explore the different levels and branches of specializations within urban context of architecture in the twenty-first century (Broadbent, 1995).

How Architecture and Engineering Separated

It was towards the end of seventeenth century that the movement began which was to see the establishment of civil engineering as a distinct profession from architecture. With the discovery of wrought iron and structural steel, **civil engineering** works began with the construction of mills, railway lines and warehouses. Whereas architecture concerned itself with application of traditional materials such as stone, brickwork and timber, engineers with their more scientific skills, were delving into newer materials such as structural steel and later **reinforced concrete** which expanded their field of concern from traditional construction of canals and works of transport to encompass buildings and bridges (Thompson: 1999). In several countries, architects and engineers were considered to occupy the same profession. Even in Britain, there were some architects such as Thomas Telford who reckoned themselves as architect-engineers. Equally, in most Middle- East and Asian

countries, the architecture programme is situated in engineering faculty.

What is Theory of Digital Architecture ?

With the coming of information and communication technology (ICT) revolution at the turn of third millennium, a new theory of digital architecture would inherently be classified as research on current trends aimed at identifying and codifying thinking on a contemporary style of new architecture. In this case, the defining character of the style is the influence of the information technology revolution or the "digital" media. The question then becomes 'to what extent has the digital media produced a unique set of buildings or architecture that can be grouped and characterized?' 'How has the medium impacted on the production of such architecture, and what kind of unique goals or purpose does such architecture embody and how does it relate to both social and physical phenomena?' Since theory is the product of dialogue between past, present and future and within the profession, it is also necessary to examine what are the current debates about these issues? Are there agreements about digital architecture in respect of these issues and if not what are the various debates with regards to the various issues?

Theories, are general statements dealing with what architecture is, what architecture should accomplish and how best to design (Attoe, 1979). This, the author interprets as a system of classification based on analogies. The goals of architecture and goals relating architecture to other phenomena (social elements, built environment) and theories about how to design. Within the context of Attoe's definition, it now becomes possible for us to explore the concept of a theory of digital

architecture and also examine the debates and dialogues that are taking place within the context of this theory. In line with the definition adopted, the study will be asking and seeking answers to the following questions; 'can we distinguish a uniquely distinctive digital architecture?', "if so how can we classify that architecture?". "How does digital technology feature in the creation of this architecture? and how different is the digital process from the traditional practices of the profession?", "what is the reaction of architects to the use of digital technology in architecture?", "does digital architecture embody any ambitious social purpose for the transformation of communities?", "what are the debates going about digital architecture, digital design and the purpose of digital architecture in the profession?" Based on the exploration of all the above questions, could we really say that a theory of digital architecture is evolving?

Digital Architecture and its Component Styles

Is the digital technology producing a unique style of architecture, "how can this style be identified and classified?". What is the reaction to this style of architecture in terms of recognition and acceptance?

The defining character of digital architecture is the role of the computer in the production of such unique forms. The computer becomes an avenue for exploring forms and for enhancing creativity in the design of the structure. They in essence are a product of digital tools in terms of both creation or production and embody an aesthetics that is uniquely facilitated by the computer.

"...the opportunities and limitations created by the increasing use of 3D CAD and visualization programmes in teaching studios, suggests these tools are vehicles

for creating not only **new forms** of architecture, but also **new teaching methods** and enhanced design capabilities (Cuff, 2001).

The Software both reflects and enables forms of thought, as does language, according to the Whorfian hypothesis. Software shares some characteristics that influence design. There is a decided bias towards *surface* rather than space; organization of information and the design process are increasingly becoming significant... (Cuff, 2001). Digital is not just a tool as it incorporates a vast amount of information, and expert processes. It also enables design activities rather than act as a passive tool of the design. It is more like a language which can shape the thoughts and expression of the design. It is in this respect that it becomes possible to isolate a distinctively digital architecture compared to other forms of architecture. But digital architecture, is not subjected to being classified as a single style because of the vast possibilities in the use of the computer. Also digital architecture, while facilitating the creation of distinctively digital style, also sometimes sits at a cross with other established styles of architecture such as deconstruction, which is otherwise very difficult to achieve without the use of digital tools. Even traditional design seems to be better enabled by digital tools than through completely hand drawn methods.

Character of the New Architecture

Culture is transforming itself from the simple certainties of Modernism to a much more complex interpretation of reality, based on biology, mathematics and cosmology. Architecture is responding... there is no widespread cultural movement - nevertheless, one can discern the beginnings of a shift in

architecture that relates to a deep transformation going on in the sciences and in time... The new science of complexity fractals, nonlinear dynamics, the new cosmology, selforganizing systems, have brought about the change of perspective in architecture. We have moved from a mechanistic view of the universe to that of self organizing at all levels, from the atom to the galaxy. Illuminated by the computer, this new world view is paralleled by changes now occurring in Architecture (Jencks, 2005).

The emergent grammar is constantly provoking. It varies from ungainly blobs to elegant waveforms, from jagged crystals to impersonal data-scapes. It challenges the old language of classicism and modernism with the idea that a new urban order is possible, - one closer to the ever varying pattern of nature. One may not like it at first, and be critical of its shortcomings, but on second glance it may turn out to be more interesting, more in tune with perception than the incessant repetition of colonnades and curtain walls (Jencks, 2005).

Plurality of Styles in the New Architecture

OrganiTech (may include simulation architecture) these are at the edge of the new tradition, reflects both modernist roots as well as parallel natural forms. Organic metaphors that celebrate the organic nature of structure, the bones, muscles and rippling of the skin, pulsating exo-skeletons. Elements are however, still selfsame rather than self similar. Fractal Architecture resulted from the publication of the book; “The Fractal

Geometry of Nature” in 1977 by Benoit Mandelbrot. This idea was assimilated by architects and translated into computer production for buildings. It produced a new urban order that is always selfsimilar and always evolving an order more sensuous and surprising than the duplication of selfsame elements. Perception delights in fractals, in slightly varying stimulus.

Round fractals (Blob masters). Determined to capture field with blob grammar and arouse theories based on computer analogies cyberspace, hybrid space, digital hyper-surface, were some of the new terms. The blob, as a developed form of the cube. But these creations can sometimes be awkward, for instance around the entrance, or where they meet the ground or another structure. Norman Forster's two giant blobs, one for the mayor of London the other for a new music center in Newcastle have these problems. The internal space and structure are more convincing than the way they relate to the city. Computer is involved in the production. The Enigmatic Signifier reflects the shifting moods of nature, the slightest change in sunlight or rain. As posited by Rykwert (2005), Forms are suggestive and enigmatic in ways that relate both to the natural context and the central role of the museum in global culture. Peter Eisenman, Rem Koolhaas, Daniel Libeskind, Coop Himmelblou, Zaha Hadid, Eric Moss and now mainstream architects such as Renzo Piano and Frank Gehry (Plate I) produce suggestive and unusual shapes as a matter of course, as if architecture had become a branch



Plate II: Fisher Centre for the Performing Arts, Frank O. Gehry: Bard College, USA 2003: The use of Titanium outer skin introduces new material/technology and creates a new form, only digitally conceivable.

From a - telier (Analogue) to e - telier (Digital): Virtual Design Studios:

Learning to draw has long been a crucial skill for architects. It helps develop ability to imagine spaces and to express what can be imagined. It demands neuro-muscular training of the brain, hand and eyes. Increasingly, the goal of many CAD modeling and visualization programs is to replace manual drawing as much as possible; making the coordination of plan and elevations or the construction of perspective completely automated, thus short-circuiting the use of traditional manual skills. It is not yet clear that mastering the 3 - D fluidity of the computer helps architects - to - be develop the spatial and expressive abilities as learning to draw by hand (Laiserin & Linn, 2000).

Working directly in 3-D computer models, architects can explore hundreds of perspectives, or analyze digitally animated paths and processions faster than it used to take to construct and render a single view by hand. Computers can aid architects to not only

generate and explore forms, but to also rapidly execute mathematically rigorous calculations and simulations of day/artificial lighting effects, as well as a host of other design factors, ranging from structure and acoustics to energy performance (Laiserin & Linn, 2000). Computers extend the reach of architects across all practice areas, not just design. Software for financial management, bills of quantities, project management/administration, marketing, proposal generation and other practice chores has steadily reduced the amount of time required by non-design staff in architectural office with the development of Building Information Modelling - BIM.

Diversification in the Education and Practice of Architecture

The development of Building Information Modelling - BIM and several other software for simulation in Architectural practice such as UrbanSim, ArchGIS, Virtual City Template, CAVE - (Computer Assisted Virtual Environments) provides powerful computer-generated images and environments that may be 'more real' than what we can expect in reality. The revolution in ICT is opening-up new specializations in Architectural practice in addition to closer coordination of various professionals in the built environment. Diversification is needed in the practice of architecture particularly in the developing countries like Nigeria where sub-disciplines like Urban Design, Landscape Design, Interior Architecture, Transportation Architecture, Architectural Scientists/Software developers, - etc, hardly exists. Current debates in sustainable architecture practice leading to Green Building Rating System is yet to be developed in most developing economies despite its enormous benefits in tropical

climates. The issues of renewable energy (particularly solar) sustainable building materials/technologies, water efficiency and management, indoor environmental quality, cost reduction in building projects, which can all be harnessed through innovative sustainable design strategies and can lead us to increased specialization in the practice of architecture in the twenty-first century. All these call for structural changes in the training of the architect so as to provide the much needed diversification of the profession through a Faculty or School of Architecture system with the Tertiary institutions of Technology (Polytechnics & Universities of Technology) focusing on materials/technology applied-research while the conventional Universities focus on theoretical research.

Conclusion/Recommendation

The paper explored who is an architect from antiquity as the person who provides decent shelter for human habitation. He is at once an artist who gives form to the built environment, a scientist, an engineer who understands structures and construction, a philosopher who establishes concepts of the built space, a town planner who shapes the urban space, a jurist, a geometrician, a musician - as architecture is essentially '*frozen music*'... people so endowed by God that they are the creators of the built environment. The paper established that the need for shelter and (therefore architecture) is as old as the history of man, coming only next to the need for food (agriculture). The paper stated how engineering profession separated from architecture at the end of seventeenth century, with the discovery of wrought iron, structural steel and concrete as construction materials. A chronological exploration of the

practice and training of architects was presented up to the coming of the twenty-first century ICT revolution and the emergence of digital architecture. The need for diversification of the profession to offer a range of emerging specialization and sub-specialization needed to address the challenges of sustainable development. A re-structuring of the training programme is required through a Faculty of Architecture that will offer the range of diversification of the profession. A closer linkage between the schools of architecture, architectural firms and the construction industry is required to impart mentoring and on-site practical experiences during the training programme. As architectural practice is increasingly becoming urban based in the twenty-first century, urban design approaches to deal with the challenges of rapid urbanization have to be emphasized in the curriculum of training. The paper finally recommends advocacy projects that will touch on the lives of ordinary people particularly in developing economies like Nigeria, as a campaign strategy to educate people of the important role of the architect in the society is required so as to distinguish architectural services from that of allied professionals particularly the engineer.

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