Information Technology and its Entry into Architectural Engineering

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Abstract:
Communication systems and information technology are an integral part of human life today. Because information is unlimited and endless and the trend towards quality has attracted the attention of developing countries more than ever. In fact, the trend towards quality and competitive architecture has created a new trend in these countries. Information technology as a powerful and growing tool is one of the most controversial issues in architectural engineering and its evolution. It is no exaggeration to say that all architects in the field of architecture have considered the issue of technology and its effective role in the emergence of modern architecture as an important issue. In the new millennium, a new world is being built, and the advancement of information technology in the field of architecture questions such as "how information technology is applied in the field of architecture" and "whether architects can accept all "IT capabilities are before us." Information technology tools are also used as a new tool in architectural offices to avoid duplicate activities and present a wide range of solutions to improve the quality of designers in this field. Also, this tool has led to increasing educational opportunities and improving the level of professional and educational skills in architecture, so that today this technology is recognized as an essential element in the educational system. Information technology with significant progress and high entry speed in the field of engineering, design and education of architecture has been able to provide appropriate opportunities to improve the quality of architecture in these areas in order to approach the standards and achieve success in this field. The present article first defines information technology and architecture separately and examines the relationship between these two sciences, then deals with the entry of IT into the field of architecture and its education to finally reach its role in architecture.
Keywords: information technology, architectural engineering, architectural education, architectural spaces

Introduction:

The advent of information technology and its rapid expansion has changed the daily life of human beings, as many experts believe that the world will be conquered by information technology and the globalization of all societies will change. This change will be in various dimensions such as cultural, scientific, economic, legal, political, environmental, security, etc., and will affect human life in the recent century. Architecture and its education are no exception to this trend, and the advancement of information technology by providing new definitions of space and place as well as innovative tools has caused great effects on the structure of architecture and its teaching, creating modern and intelligent buildings is a good example for Describing the importance of technology entering this art. The art of architecture, using the infinite knowledge of information technology, tries to create a favorable environment to meet the needs of its users.

It is undeniable to say that the speed of knowledge transfer with the phenomenon of information technology is much faster than architecture, and now information technology is recognized as the main design tool in architectural engineering education. "The speed provided by the concept of design by information technology can eliminate the delay between the concept of the idea by the designer and the stakeholders and serve as a springboard for new ideas" (Kalay, 2006, 374). "This has significantly affected the level of skill and professional culture of architects and has led to the development of some architectural styles and the provision of opportunities to create new specializations and expand the realm of architectural design." Today, this technology and its advanced tools are considered as a necessary and vital element for success in the architectural profession "(Reffat, 2008, 900). At the beginning of the introduction of information technology in this field, it attracted many designers and was welcomed by the people; But in the end, as the harms along with the benefits became clear, the rate of its use reached the current and normal level, because the excessive use of information technology could exceed the stagnation of creativity and thought, and finally the stagnation of ideas. Over time, this science has established its position as a member of the process and implementation of architecture along with other members and tools of architectural design. Looking at the textbooks and textbooks of primary and secondary education, it can be seen that for all educational sciences and technologies, topics for familiarity are included, but unfortunately, information technology and architecture, which are two important sciences of our societies today, are less discussed. Such issues are very few and far between. Also,

the continuation of traditional education and away from specialization and lack of attention to information technology and new educational methods has caused a lack of educational progress. In order to use information technology in the field of architecture, we must first know each of these two sciences and find the relationship between the two for their optimal use, because the use of information technology in the design and construction of buildings will cause popularity, desirability, fascination and increase demand.

Information Technology (IT)

Information technology, called IT, has been added to the vocabulary of everyday life. The term defined by the American Information Technology Association (ITAA) can also be defined in three simple words: technology, processing, and information. This means that information technology is a science for managing and processing information. It actually includes the tools and methods that receive the information and use it after it is stored and processed. Information technology has taken over the flow of organizational management that all sciences and organizational elements use this technology to use the storage, retrieval, transfer and processing of information and modern management. In other words, technology is a combination of science and knowledge, skills and abilities, materials and machine tools that humans have used to process and convert raw data into valuable information. This science is also called the knowledge of using hardware, software, infrastructure and telecommunications and near and far. This knowledge is so vast that it encompasses all new technology in the six areas of data collection, storage, processing, protection, transmission and display, and its mechanism is based on global laws and regulations. "Assuming that information technology is an apple, computers, networks, software and other tools related to this field are like the tail of an apple by which the fruit is fed, now it is the apple itself that is the main product and the result in it. Summarized "(Sixth International Conference on Information Technology Management, 2009 - Seyed Hamed Khosravani Shariati).

Architecture-science or art Architecture has an ancient background both as knowledge and as art. Architecture is the process of organizing space, which is based on science, experience and art. Ever since man entered the realm of life, he has scattered architecture in the form of numerous buildings and structures in the world. In Latin it is called Architecture and in Arabic it is derived from "Omar" and means development. The word architect means very constructive. According to John Ruskin, "architecture is the art of building and adorning a building by man." The process that leads to the design and construction of buildings and other structures. In architecture, science and art are intertwined, and for thousands of years we have seen buildings built with knowledge and known as cultural-artistic symbols. Thus, ancient civilizations are usually identified by their architectural remains and achievements. But architecture became more important when it attracted the attention of the frontiers of knowledge and education of architecture and specialization, and human societies academically learned the technical topics of this art. Today, with the entry of information technology, mathematics and humanities into the field of architecture This science should be considered interdisciplinary knowledge.

1. The relationship between information technology and architecture

The interaction between architecture and information technology can be interpreted as follows; Architecture is the skill in presenting the effect and technology and technology, the way and tools to implement this skill. Art comes from the Latin word Art and the word Ares in other encyclopedias means skill and does not refer only to architecture but also to all fields of poetry, music, dance, sculpture, literature, etc. Applying skill in creating aesthetic subjects is called art, and technology means craftsmanship and includes the way things are made. The integration of industry and art is one of the requirements of the current world and in order to achieve industrialization and globalization; Because information technology in the role of tools and knowledge, along with architecture, takes steps in the creation and organization of space and provides the necessary necessities.

2. The introduction of information technology in architecture

Technology entered architecture seriously after the age of industrialization and led to modernization in the present age. An age in which man tended to satisfy his material and physical needs. Thus, the boundaries of architecture to provide shelter worthy of human life were limited and became a tool in the economic market to provide maximum efficiency and greater profits. It can be seen that architecture is a function of space and changes due to the new position of man and nature and explains a newer attitude in accordance with human will; Like the possibility of supplying cold and heat through mechanical systems and the supply of light by electrical energy with the introduction of technology into architecture.

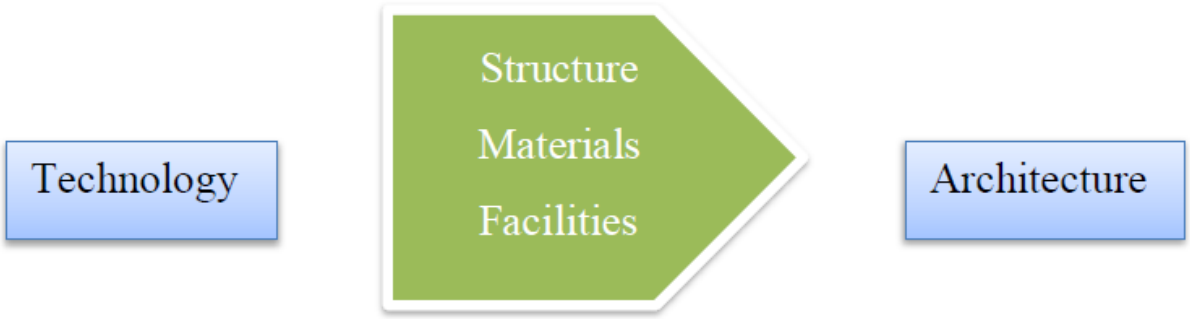

Figure 1 - How technology enters architecture

Technology in other ways and with the need to create various buildings such as banks, hospitals, exhibitions and the like, whose use was not previously defined, caused the change and transformation of architecture. Technology in the modern sense led to the creation of tendencies centered on the belief in the originality of technology and painted a special and superior vision for the future of architecture, which aroused human fascination with these achievements and their replacement with old values. "As Mies van der Rohe claimed in industrial construction in 1924, all social, economic and artistic problems will be solved by technology" (Charles Jencks, 1997, p. 54) and "This kind of thinking of ability Technology originated in the realization of architects' creativity "(Shayanfar, 2003). So what architects in the twentieth century could only depict on paper was practically designed and implemented decades later, and these unattainable aspirations were made possible only by technology. In this regard, the architects used technology in an extreme way to create innovation and modernity to maximize efficiency and minimize energy consumption. An example of this is the design of the Reichstag dome by Norman Foster in 1993, which used smart windows, photovoltaic solar cells, and renewable gas to generate electricity without pollution in the building. Now that we have realized that architecture is both a science and an art and is related to the future and is prone to innovation and change, we can also see to a great extent how IT has been able to add new aspects to the profession of architecture and architectural tools. Just as information technology data is evolving, evolving, and evolving, so is architectural engineering facing a wide range of information. "The emergence of software and systems for expressing data and information and organizing and monitoring them in the field of architecture, has caused a professional change in architecture" (Habib, Hosseini, 1389, 34). Who must know the design processes, is also required to know the application of design tools. IT as a tool is linked to and integrated with architectural engineering and architectural education; For this reason, it has helped the architect in design processes and has provided the possibility of simulation and calculations at a wide level of management. In fact, this interaction between humans and information technology in the field of architecture has been highly considered and used in recent years. Another example of the introduction of information technology into architecture is the use of this science as a shared space, and it has made it possible for architects around the world to use the global network and increasing access to information resources, their ideas To share. Another example is the entry of internal and external networks into the building; Just as with the advancement of science and technology, electricity could enter the building through electricity, in today's world, the internal network and even the network between two buildings and the communication and sharing of resources has become possible, and as Electrification of the necessary building and the main component in the construction of the building, performing passive network processes for the building (not only office and special buildings) is also increasingly observed with the help of information technology.

3. The role of information technology on architecture

The architect must meet the needs and desires of the employer, and to meet this need, in addition to creativity, innovation, specific ideas, intelligence and experience, he needs tools that enable growth and development and ideation in the best way. Make possible. Information technology provides the designer with several types of tools that can be useful in this regard. Examples of these tools: AutoCAD, computer prototypes, computer modeling. Some of these tools are in the design process and others are technical, such as AutoCAD, which is mostly used for detailed drawings that can not be considered a basic design tool, but a

tool such as a sketch is used to create original designs. . Information technology has made it possible to make faster editing in this software than manual sketches or to turn it into an architectural map. Many designers also scan their ideas manually and open them into computer sketches in a variety of programs, with computer imaging in a place where the benefits of rapid change can be used. AutoCAD software today looks a little more than a drawing software and is a technical skill by technicians in architectural offices, in addition to drawing two-dimensional drawings such as plan, facade and section, hand drawings. It has transformed designers into architectural drawings, which is now the common language software of architecture. Three-dimensional models can also provide a realistic view of the scale, fit and spatial relationships of the design for architectural designers. Most of these three-dimensional models are made of wood and foam and take a lot of time and money to build. In addition, these models are not portable and can be easily damaged. Information technology allows designers to use solid, grid, or surface 3D models that do not have such problems. The method that the computer uses to create a 3D model using the capabilities of information technology and advanced software is very similar to the manual method, which has two main advantages. First, these models are fully automatic and with Accurate and perspective measurements are created. Secondly, the points of view provided by the computer model are more and more natural than the three-dimensional model than the manual models, and in the end they can be rendered.

Given that such techniques are constantly evolving and developing, increasing the power and capability of information technology will lead to increasing growth and create more capable and better techniques in the design process and the creation of computer models. On the other hand, this technology is so powerful in the architecture industry that it is not possible to perform some processes in the traditional way, and it is only science that brings architecture to its ultimate goal. Having high quality 3D animation in introducing the project to the employer is 10

one of those processes that help designers in introducing and presenting the project. Architectural animation is a wonderful presentation of small and general parts of the building using three-dimensional computer graphics, which is not possible with hand tools because this tool uses three-dimensional movements without points. It is a fixed vision that is not possible in the traditional and two-dimensional way. With all these descriptions, it can be understood that information technology will have a significant impact on the quality and quality of the architectural engineering process by providing various tools and using the latest knowledge and technology.

3.1 IT map on architectural spaces

You may have heard the terms digital, cloud, and cyberspace by now. The creation of these words originated from the effects of information technology on architectural spaces. From the middle of the nineteenth century, when communication and information and new innovations in the field of technology were introduced, the concept of space changed in the human mind. The concept of the real world was manifested for man with architecture and geographical space, and technology challenged this view with its power; Because architecture has always been associated with space and place and thus has been understood by human beings. Now, with the impact and interaction between information technology and architecture in the virtual environment, the concept of space and place has a fluid identity and architectural spaces are moving towards cyberspace. Digital concepts have had such a profound effect on the human way of life that they now have access to spaces that were not possible before. "Architecture is the essence of space, and new technologies are leading us in the direction that space-making

materials have been transformed into electronic power and highly sensitive digital networks." Buildings with complex forms and fluid urban spaces Like the designs of Franggari and Zaha Hadid, it represents the spatial interpretation of these architects of the information society and their efforts to show the translation of the tendency of this era to space "(Moghtadari, 2009, 93). These transformed architectural spaces, now known as cyberspace, are a space between the mind and the world, and just as architecture is a connecting point for face-to-face interaction with people by constructing space and real space, so is information architecture with the network. It deals with and leads to the electronic explosion of space and architecture, in other words, architecture and the creation of space using information technology, has provided designers with the opportunity to create an imaginative and imaginative space without using models and mock-ups and creating the next nature. To the extent possible.

3.2 The role of information technology in presenting architectural designs

As stated in the role of information technology on architecture in general, information technology as a tool or platform-jump makes the designer better understand the design and idea, strengthen and help with manual methods and increase the speed of transfer of concepts and idea creation. It is true that information technology is purely technical, but it is a powerful support for the transmission of qualitative concepts and architectural processes. Traditional and manual methods such as sketching, modeling, drawing the building plan, etc. were methods of presenting architectural designs, which was a very important process for the formation of formal plans and modeling. . In fact, the main trend in architectural design was traditionally done that today with the entry of information technology into this field, these trends have undergone fundamental changes and we are witnessing better and better design processes. In addition to improving the process of architectural processes and the growth of ideas, information technology as a tool has found other applications in the field of architectural engineering in areas such as drawing, information modeling, creating virtual buildings and More qualitative and detailed architectural steps are very powerful. On the other hand, as a tool, it provides the possibility of communication and information transfer to the audience and the use of different materials and materials. "In addition, the role and function of the computer in the field of structural computing can be very important. , Executive parts and details pointed out that it has made it possible to design and implement sustainable structures "(Gharibopour, 2009, 8). "Computer-aided design or technology that provides efficient and better design documentation and 2D drawings and computer modeling, increase the transfer of ideas to others, reduce the time and cost of drawing a map and build a physical model." Selective increase and end use ”(Kalay, 2006, 376). Thus, information technology, while providing extensive facilities to architects, saves time and money and reduces the incidence of human error.

3.3 The role of information technology on architecture education

Architecture education is a complex process and is currently taught academically in some traditional schools. Learning architecture requires design, delineation, and analysis, and this is why architecture education classrooms take on a more active form and are rich in learning experience. But concerns are growing that traditional methods are still being taught in educational institutions, and that teaching methods and architectural models and practices are appropriate for the challenging future of architecture. "Given the persistence of past experience and the fact that there is little evidence that the method of teaching fine arts is effective, most educators still teach design in the same way" (Beuder, vredevoodg, 2006, 45).

Architecture education should be accompanied by appropriate and sufficient understanding and mastery of science, art, mathematics, etc. and based on various educational methods in order to be able to properly train future educators in this field and its future architects. . In parallel with this educational process, paying attention to the rapid trend of technology and globalization is one of the requirements of this field, because the way of educator-learner interaction and even the educational space and its tools and requirements should be changed in accordance with the flow of innovation. Establish a richer foundation. Architecture education is the biggest challenge for experts in this field with the development of information technology, which always leads to the creation of new specialties and the expansion of the field of architecture and design education. "It is essential that government and academia provide

access to technology-based higher education for the general public in the global village market (which is the main focus of Anvin Simon)" (Wang, 2009, 1137); In addition, information technology itself is an effective way to learn. Design and architecture learners typically learn by making better use of new technologies that provide information-rich environments and multimedia network environments (Kurta, 2011, 3989).

The most important part in architecture education is architectural design education and the most important developments in information technology in design education are: computational design methods, code visualization, paperless design studio, virtual design studio and technology-based architecture curriculum Information.

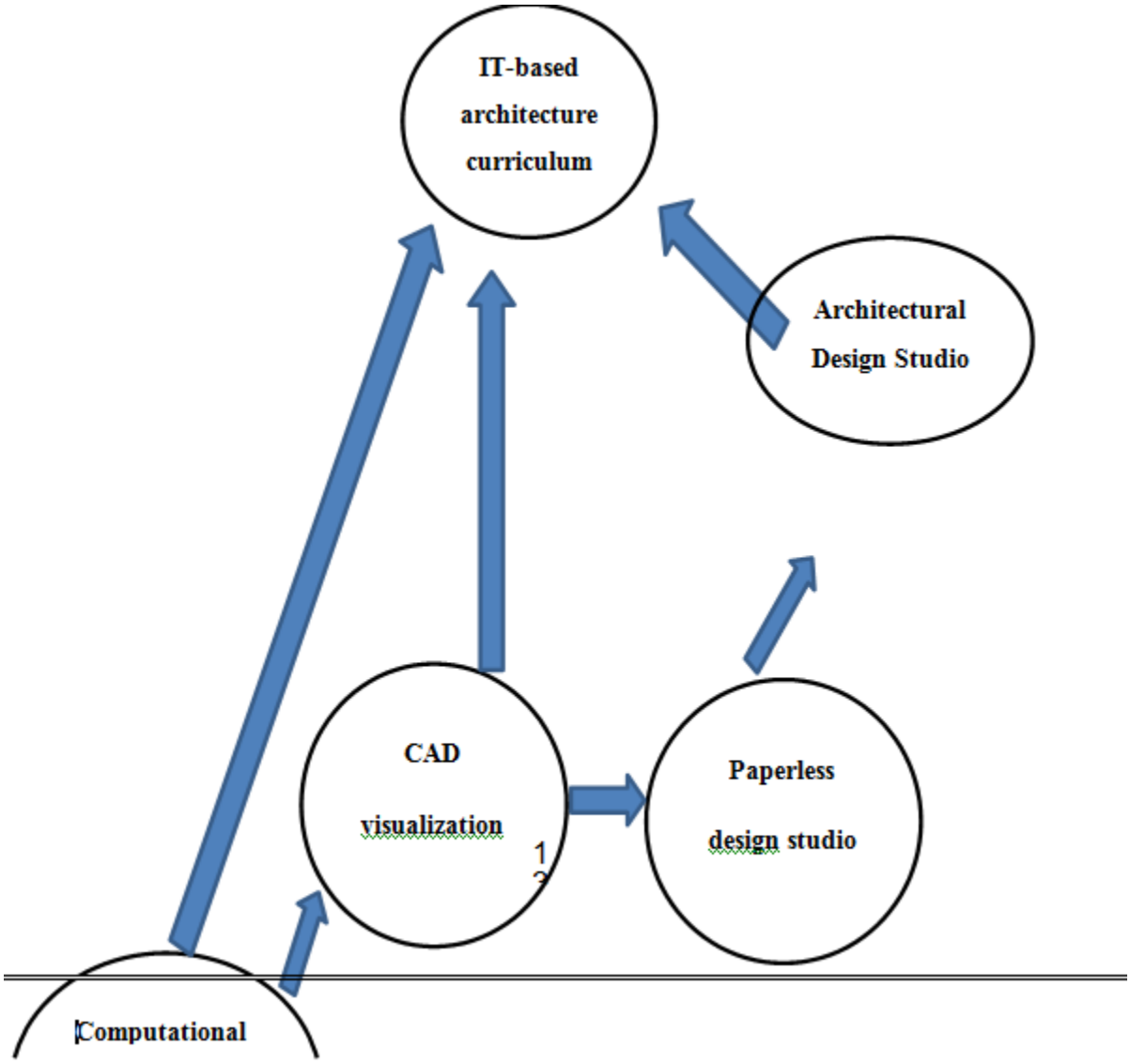

Figure 2 - Some of the most effective IT developments in architectural design training

Design tools have also undergone significant changes in recent decades, and the computer is an essential factor for the success of architectural design along with other design tools and can easily identify design flaws and the complexity of designs for architects can be easily understood. To solve. However, some schools of architecture and design still teach architecture using traditional and manual techniques, regardless of the development of serious learning methods. It is necessary and necessary to use new tools and methods based on information technology in order to improve the standard of education quality and to create more effective and accurate results, in order to facilitate the necessary preparation for the future of architectural challenge for future architects.

Conclusion:

Information technology has created a new culture in all aspects of human life. Architecture, which has been the most important scientific-artistic event of human life since the construction of the shelter, has not been excluded, and information technology has established its importance in architecture. Architecture is a creative process that requires mental imagery, flexibility, communication, speed and accuracy of execution, and new tools. The process of entering technology into architecture is not a fixed trend and in recent decades has always imposed new concepts and tools on the process of architectural design and architectural
15
education, which has been an essential tool in the process of architecture. This fundamental process increases efficiency and speed and reduces human cost and error. Nowadays, the desire of designers and professors in this field to learn new IT skills is evident because the ability of these tools has become more and more obvious to everyone. It is obvious that creating learning methods to improve the standard and quality of architecture education is also a It is considered a necessity. Although this training is not considered until entering academic education, computer and some kind of information technology are now available to home users and those interested in architectural design enter the university with very little or no knowledge of architecture and little knowledge of computer. وند شوند . But the challenge begins when educators and professors in this field have a very high knowledge of architectural engineering but do not know the age of information technology, which requires that the process grows and does not forget the strong presence of information technology.

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