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Digital Technology in Architectural Education

Sub theme: Goal 4- Quality Education

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Abstract:

In last fifteen years the computers are not only used for calculations and analysis but they are also used for creating images and also do the photorealistic renderings. The latest computer technologies help to view and analyse the data while creating it.

Virtual Reality is very significant tool for Architects as it allows them for creating the spaces by experimenting with the basic elements and experiencing them by means of immersion. Due to specific qualities of the boundaries, there is a feel of actually being present in the model.

The technique of stimulating three-dimensional realities can be exploited in learning Design. Computer works as an artistic medium that explores elements as colours, space, light, form while integrating them with motion. The Design process is explored, experimenting with these elements while taking advantage of the advanced technology.

The virtual spaces can be perceived as actual spaces, which would help to redesign and remodel the spaces to a designer's satisfaction. Virtual Reality can be used to its utmost by taking advantage of its important facts as immersion, interactivity, information intensity and use of intelligent objects in teaching Design. The technique of stimulating three-dimensional realities can be exploited in learning digital technology.

Architecture needs lot of creativity, techniques and intuition, which are basically the functions of a human brain. There are many fields where brain proves to be more powerful than a computer. The synergetic use of human brains and computers may be significant in producing better Architectural work atmosphere with the addition of sound.

The use of 3d imagery in Design teaching can include group learning, review and a collective work. The data collection can be put on web, analysed and reported. The web offers opportunities for collective review of students work in a non-studio setting by digitising the samples of students work to open the communication channels between teacher and students.

Keywords:

Architectural Design, Digital technology, digital architecture, skill development, Architectural Profession

1. Introduction

Digital Technology in Architecture:

In Architectural education teacher prefers to teach in a classroom. It is very difficult to analyse, explain & draw the complex objects. The concepts of virtual reality greatly come to an aid in this case. It not only shows the actual model in three dimensions but can rotate, pass, produce cut sections for better understanding. User interface is also compatible on the websites and it is not just useful in limited area of classroom but can have wider audience.

The virtual spaces can be perceived as actual spaces, which would help a Designer to redesign and remodel the spaces to his satisfaction. Virtual Reality is used to its utmost benefit by taking advantage of its important facts as immersion, interactivity, information intensity and use of intelligent objects in teaching Design.

The significance of virtual Architecture its capability of stimulating the three dimensional images. This technique helps a an Architect to envision Design process through simulation. The process of 3D imagery aids the user to replicate most scenarios that they will encounter during the design, construction, and eventually the life of the structure they are attempting to build.

Virtual Reality is very significant tool for Architects as it allows them to create the spaces by experimenting with the basic elements and experiencing them by means of immersion.People have a feeling of being present inside the model due to the specific characteristic of immersion in virtual environments. The technique of stimulating three-dimensional realities can be exploited in teaching Design.

The multilayer online role-playing games offer us to experience the virtual world that is created.There are various elements of Design presentation that can be represented through renderings.These elemnts include vegetation,human figures,shades and shadows,atmospheric effects with the inclusion of sounds as well.

The use of 3d imagery in Design teaching can include group learning, review and a collective work. The data collection can be put on web, analysed and reported. The web offers opportunities for collective review of students work in a non-studio setting by digitising the samples of students work to open the communication channels between teacher and students.

Architecture needs a lot of creativity, techniques and intuition, which are basically the functions of a human brain. There are a lot of fields in which a brain is more powerful than a computer. The synergetic use of human brains and computers may be significant in producing better Architectural work.

Figure 1: *Galaxia-Burning Man Temple,2018.*

Ref: westminsterresearch.westminster.ac.uk

Figure 2:*Better Visualisation through 3D Renderings:*

A project by Grasshopper

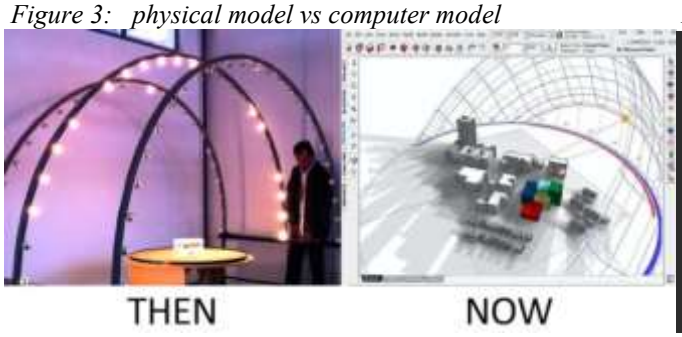
Ref:www.bicommunity.com

1.1 Development of digital skills in students:

The application of digital technology in architectural drawing and design is not only restricted to sketching, modeling, 2D and 3D drawings but it is also used for the subjects as building construction, structural design and environmental simulation. Architecture student can improve upon the drawing skills and timings by usage of major drawing and designing software. The technique of stimulating three-dimensional realities can be exploited in learning digital technology. Architectural rendering plays a significant role in presentation of the drawings. There are several packages that aid the students in improving their design skills. All these packages can aid the Architectural students in presenting their vision realistically and more beautifully.

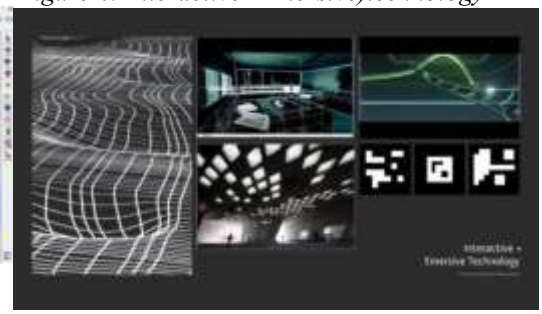
The building information modeling (BIM) concept is significant in modern Architecture. It relates to the development of sustainable buildings. Many clients put sustainaibility on high agenda. There are many packages for energy modeling; these are the digital tools for testing building performance, they aid the students in simulating building performance from the early stages of Design .The significance of virtual Architecture is its emergence to accurately simulate three-dimensional reality through the computer's ability of imaging while exploring the modern technology .

Figure 3: physical model vs computer model



Ref: www. architizer.com

Figure 4: Interactive+Emersive)technology



Ref:www.archdaily .com

1.2 Virtual Reality in Design learning:

1.3 Virtual reality is the stimulation of three dimentional reality. This method facilitates a modern Architect to envision Design process through simulation. The live imagery helps to replicate the actual scenes that would be encountered while designing and construction of the structure which they would be eventually building. The process of 3D imagery aids the user to replicate most scenarios that they will encounter during the design, construction, and eventually the life of the structure they are attempting to build.

Virtual Reality is very significant tool for Architects as it allows them to create the spaces by experimenting with the basic elements and experiencing them by means of immersion People have a feeling of being inside the model due to the specific attributes of immersion. The technique of stimulating three-dimensional realities can be exploited in learning Design.

The virtual spaces can be perceived as actual spaces which would help to redesign and remodel the spaces to a Designers satisfaction. Virtual Reality can be used to its utmost by taking advantage of its important facts as immersion, interactivity, information intensity and use of intelligent objects in teaching learning.

The multilayer online role-playing games offer us to experience the virtual world that is created. Photo-realistic trees and vegetation, moving people, shadows, atmosphere effects can be shown in a realistic manner and beautifully render accoumpanying the appropriate sound track.

Fig 5:Virtual reality in Design learning

Fig 5:medium .com/studiomd

1.3 Use Of Computers in Urban Planning:

It becomes easier to examine density,zoning,sunshade,views as well as open spaces in design process by the help of Computer Aided Design.

New technologies are helping communities to participate in planning,governance and taking other decisions. Communities can evaluate the potential action for and against their vision by visualising the possible development scenarios.

They influence in developing social networks, navigation through cities, understanding new places and locations, and provision of information on utilities and services. The urban form is influenced by the rise of information and and

communication technologies. With the development of ICT,the scarce resources can be allocated and managed in a better way.The valid data can be handled in an advanced manner while upgrading the quality of urban planning as well as the urban management. CAD based design also supports to plan and make decisions by offering quick solutions on critical questions and observing issues.

Fig 6:Chronological Integration of ICT & AI in Urban Planning

Ref:www.researhgate.net

Fig 7:Usefulness of GIS in Urban Planning

Ref:www.esds.co.in

1.4 GIS in Urban Planning:

An effective development planning approach is required to achieve the desired objectives and goals. Urban planning includes various functions such as scales, stages and sectors.The commonly involved sectors of urban planning include, transport, shelter, land development, and environment.GIS can play a very significant role in urban planning.

Various advantages of GIS Planning:

1.Improved mapping:GIS can lower the expenditures for data storage while increasing the efficacy of thematic mapping. GIS offers planners and engineers with the tools with which they can design their cities and neighbourhoods

2. Increased access to vital information: Storage ,management and the accessibility of the data from different sources becomes easier. GIS cloud bids the allowance of accessibility of the data from any device. GIS helps the storage, manipulation and the analysis of the all sort of data of a city that includes physical, socialand economic data .

3.Increased quality and efficiency for public services: The public portal created by using GIS can open the flow of information between government organisations and people. People can have access to all the necessary information.

4.Increased support for strategic decisions: Planners can explore different scenarios due to access to a wide choice of information and alternative approaches. They can come up with effective and stronger strategies.

GIS has multilayed mapping features.Variety of things can be visualised by a Planning Committee that include plain lands,agricultural lands,high flood frequencies,surface water tables,highly erodable lands etc.The changes in the geographical features of the land over the years can be identified and thus aid the professionals to make decisions regarding the development of that specific area. GIS tools enable Urban Planners to analyse the problems effectively.Find out the solutions and observe the progress for the betterment of the community.

Using the multilayered mapping feature of GIS, a municipal planning committee can visualize a variety of things, for instance, prime agricultural land, surface water, high flood frequency and a highly erodible land. GIS also helps in identifying changes in geographical features or behavior of a land over a specified time. Such information enables professionals to make informed decisions about the development condition of an area and plan accordingly. GIS tools help planners analyze problems more quickly and thoroughly, formulate solutions, and monitor progress toward long-term goals for the betterment of the community.

1.5 Computers in Parametric design,Synthesis design,3D Printing:

i.Parametric design:

Computers help to explore the alternative designs using parameters and associative relationships .The structure and its variations are developed and revised during design process. They are also accessed and guarded throughout the design process. It becomes easier to prototype the design, experiment with the innovative design, mass customise the design towards industrialisation in cost effective manner.

ii.Synthesis design:

Digital techniques are explored for discovering various forms through different materials,geometric organizations and simulations. The design variations are simultaneously considered as they become affordable The advanced computational and fabrication technology is applied to achieve excellent results.

iii.3D Printing:

Scaled models are quite impressive while communicating any Design. 3D Systems printers translate a blueprint into an remarkable visual with fine details and specified colors . 3D printers also help the production of contours, and urban maps very fast and at affordable costs.Maps like analytical maps,educational displays and communication models can be produed without any limitations.

Fig 8: Parametric Design,Peix Olímpic by Frank Gehry.

Ref: www.autodesk.com.

Fig 9: 3D printed model

Ref: my3dconcepts.com

2. Digital Technology in Profession

Digital design software is crucial in the modern Architectural Profession. Clients expect to see more than the concept drawings, blueprints, and physical models. They want to see more detailing and experience the spaces. Due to Virtual realistic spaces an Architect can represent and enhance his work and also give them a real life experience. The virtual spaces can be perceived as actual spaces, which help Architects to redesign and remodel the spaces to their satisfaction.

Computers perform various functions including building drawings, fabrication, climatic simulations, collaboration and building Management. Digitalization provides an alternative to the drawings. The drawings can be quickly and effectively manipulated and seen in their actual forms because of virtual reality and augmented reality.

The advantage of Design software is that it automates common processes. It saves a lot of time. Clients can get more alternatives and can enjoy and efficient workflow. Computational representation has become a necessity in Architectural Profession.

Previously drawing perspectives and colouring them perceived the forms, drawn in two dimensions. Technology has enabled an Architect to handle complex forms that were difficult to draw and build. Even very complex forms can be easily handled and their effect can be perceived in three dimensions. Geometry, materials and representations can be easily perceived by the use of modern computer technology. Advanced computation also can be easily incorporated in design process.

There are various interesting tools added to an Architects toolkit everyday.The initial CAD drawings are modified and updated.So as the building modelling (BIM) has been added to the toolkit.The technological advancement has been embraced and adapted by Architectural profession successfully. The inclusion of parametric design,design synthesis and 3D printing have added the value to Architectural respresentation.It has aided an Architect not only to ctreate but implement his design in practice by an excellent visualisation.

3. Conclusions

Digital Architecture is becoming an integral part of the Architectural education and Profession. It includes machine learning, fabrication technologies, artificial intelligence and analysis of huge data. The importance of these tools has led to their use in architecture schools, independent firms and corporate practices. The digital tools are used for building design and construction as well as the fabrication, 3d models and design synthesis. Artificial intelligence is used while design and fabrication. This is also the case throughout how we experience the built environment. Digital Architecture is omnipresent; from the objects we use to communicate or from the infrastructure we use to navigate the world.

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