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An Approach to Enhance the Digital Transition of Architecture Education

Dr. Deepti Pande Rana,
Associate Professor Amity School of Architecture and Planning,
Lucknow Campus, Mb- 9454109002, email- dprana@lko.amity.edu

ABSRTACT

Technology has repeatedly transformed particularly how architects are communicating. Architects and other stakeholders are communicating with the adoption of 2D, then 3D computer-aided design, and also students learn with the help of a teacher's soundtrack, literature, and in some courses existing in real site. Those methods are not enough at 21 centuries and also It has a health risk in existing in real sites. Especially the time of COVID 19 (2020-2021G.C). Moreover, it has risk in existing in real sites to assist Destruction of the historical site and also costly and time-consuming. (Maghool et al., 2018) was investigate the new situation of virtual reality technologies for architects, it is making projects more efficient, increase innovation, increase productivity, increase collaboration. Users of the virtual reality system may literally walk about and touch items as if they were real.This research gives the foreground of architectural education that allows us to adapt to the current digitalized situation especially Virtual Reality, evaluate to what extend the educational benefit of applying Virtual Reality in architecture. The research empowers the exploration of why and how to improve the transformation in digitization of architectural education. Today, almost all architects utilise computers. Computers are widely used in the industry, whether it's for 3D modelling, documentation, or simply making programme spreadsheets. Currently, architects must know virtually as much about software as they do about buildings, building regulations, and design.

Keywords- Technology, Architecture, Virtual Reality, Education, Industry, Software

INTRODUCTION

Reality is defined as "the state or quality of being real," whereas virtuality is defined as "being in essence or effect, but not in fact." The definition of virtual reality in its entirety is "an artificial environment that is experienced through sensory stimuli (as sights and sounds) provided by a computer

and in which one's actions partially determine what happens in the environment." A well-defined definition of virtual reality is a digital world created by a computer that can be experienced and interacted with as if it were real. The most typical application of virtual reality in the field of architecture has been to increase our understanding of exploring a structure that doesn't actually exist. Researchers are working to make virtual reality an efficient tool for studying and creating designs. Virtual reality (VR) has recently become widely utilised in design to visualise various design options for one key reason: it is simpler and less expensive to evaluate the shape and design in a virtual environment instead of making or altering a physical model. Systems for virtual reality can be used to create the design model and its surroundings in addition to visualising the virtual world. Virtual reality has been integrated by designers and architects into the design process and architectural conception, and is now used to explore the design with its spatial relationships and surrounds. (Abdelhameed, 2013). As (Maghool et al., 2018) researcher shows, there has already been some adoption of virtual reality in developing and developed countries, and this will grow, (Maghool et al., 2018) was investigate the new situation of virtual reality technologies for architects, it is making projects more efficient, increase innovation, increase productivity, increase collaboration.

Significance- The technology creates a 3D computer generated environment that explores intense human interactions. The computer-simulated environment helps in simulating the physical presence in the real world or imaginary world. Virtual Reality is **essential for the growth and expansion of the metaverse industry**. The technology supports the vision of metaverse clusters by aiding in creating the 3D virtual world. With VR, users can immerse themselves in interactive experiences that are hard to access in the physical environment. virtual reality **helps education by creating immersive lessons that are engaging, memorable and impactful for students**. The benefit of Virtual Reality to Designers and architects motivate to adopt Virtual reality is being integrated into the construction of architecture and used to examine design's spatial linkages. The design model and its surroundings, or the virtual world itself, can be built using VR technologies as a tool for architectural communication. Instead of relying just on imagination, designers may use virtual reality to practise architecture education in the designing process and architectural history. Real-world experiences are how people learn about natural phenomena. In most circumstances, natural processes cannot be controlled or reversed; nevertheless, users in a virtual environment have power over time. The construction process can be fast-forwarded or rewinded. Take "A Step-by-Step Simulator for the House Building Process," as an illustration.

Virtual reality near future fears

With the introduction of VR to society, there is a need for finding ethical norms for it. (Whalley, 1993) Furthermore, people need to be aware of the possible risks that new technology may have, including any bad or even catastrophic effects that they may have.

Virtual reality systems of the future can be divided into four groups according to two criteria: **social vs. non-social** and **creative vs. non-creative** (Stone & Environments, 1993) (see Table. 3).

Single users can engage with the environment in non-social virtual worlds- This can be an interaction either: with a prefabricated (i.e., preprogrammed) environment (they are then called: non-creative systems) or with an environment that can be modified according to the user's needs and wishes (they are then called: creative systems) (Mazuryk & Gervautz, 1996).

Contrarily, social virtual worlds enable interaction between a number of users and the environment itself. Again, as with non-social systems, the environment can be preprogrammed or it is created and altered by the user or a group of cooperating users (Mazuryk & Gervautz, 1996).

	Non-creative:	Creative:
Non-social:	**single user & preprogrammed environment**	**single user & modifiable environment**
Social:	**multiple users & preprogrammed environment**	**multiple users & modifiable environment**

Table 1 Four types of VR systems (from (Stone and Environments, 1993)

Different types of VR systems can have different influences on people's mentality. People may become isolated in their "own worlds" as a result of non-social virtual realities, for instance.Mazuryk and Gervautz (1996). This has already partially occurred; it would be difficult to get some of the most ardent computer game players to return to reality! And it can only become worse as systems get more convincing and lifelike. Non-creative applications (like games) may have an additional negative effect: closing the user in the world that cannot be modified is against human nature and can lead to the degradation of our imagination (Mazuryk & Gervautz, 1996). All these questions are intentionally left open. The overwhelming evolution of virtual reality technology indicates that there may be an all too real danger for society. VR may become the ultimate drug for the masses. It is our responsibility to choose the right dose (Mazuryk & Gervautz, 1996)

BIM-Enabled Virtual Reality

Building information modeling (BIM) is related to the creation and use of three-dimensional objects, which also contain relevant properties information (Gheisari & Irizarry, 2016; Song et al., 2018). The term "relevant property information" in this context specifically referred to the data that is necessary for a realistic building project throughout all phases of its life cycle, including design, planning, construction, operation, and maintenance. As a result, BIM-enabled VR depends on the model to recreate building processes and activities, emphasising the data binding and relationships behind the model more than other VR categories. According to Rahimian et al. (2014), visualisation is one of the most crucial aspects of BIM.

In an immersive visualisation environment, users may access BIM data and analyse variables like cost and material type to create efficient building designs in real-time. All components of the BIM model—from architecture and structural to mechanical, electrical, and plumbing (MEP)—can be explored in greater detail by going over the design details. In order to experience the BIM model in a virtual environment without being constrained to looking at 2D drawings and analysing the design area, BIM-enabled VR, for instance, enables users to take building design into a 3D virtual world with all pertinent architectural information. Tools like Autodesk Revit Live are available (Wang et al., 2018). to maintain the integrity of building management data in the virtual environment prior to the construction of the building to understand how all of the design elements will come together. To move easily from conventional 2D drawing design scenarios to those in BIM-based VR interactive environments. The model's capacity to reflect real-time changes is one of the main benefits of BIM-based VR, according to Wang et al. (2018).

Traditional VR models built using VRML (Virtual Reality Modelling Language) may have trouble incorporating real-time data, according to XIE, H., Shi, and ISSA. Compatibility issues may be to blame for these issues (Xie, Shi, & Issa, 2011). Additionally, a variety of decision-making tools have been created to support the decision-making process. For example, (Woodward & Hakkarainen, 2011)

developed a software system to combine 3D models with schedule information to visualize the construction work on site. (Park, Le, Pedro, Lim, & Practice, 2016) developed an interactive building anatomy modeling (IBAM) system. Students may interact with building components in a virtual reality environment thanks to the technology. An embedded question-and-answer game can also be integrated to enhance the learning experience (Wang et al., 2018).

Practical benefit Virtual Reality

In practise, architecture is a collaborative process that involves dialogue with a variety of design stakeholders, including clients, users, other architects, engineers, specialised consultants, construction managers, regulatory authorities, and more. However, the schools, through both their formal structures and their more informal socialization processes, may not be fully preparing students in the skills needed for participative practice (Nicol & Pilling, 2005). These advantages include things like risk reduction, a shorter training period for employees, better contextualization, cost savings, emotional reactions, and memory retention. With the use of virtual reality, it is now feasible to visualise both the appearance and feel of a structure or place. For instance, if someone wanted to build an addition to their home, they could see what the area would look like before it was really built, and then they could make modifications in real time.

Architectural technology in practice- Architects, architectural technologists, structural engineers, architectural/building engineers, and others who transform the idea or concept into a constructible reality engage in this profession. Following are some examples of the numerous tools used in architectural technology:

- 2D & 3D software's like Archi Cad & Revit
- Advanced technology such as BIM, and 3D printing.
- Archi Cad. Cinema 4D. Lumion.
- Artificial intelligence
- Artificial intelligence, CAD, BIM
- Today, a variety of modern technologies are employed in classrooms, including social networking, online learning, class blogs and wikis, podcasts, interactive whiteboards, and mobile devices.
- Blender. Auto cad
- Chief Architect & rendering App

In order to be listed by users of today, the listed technology has a direct and indirect connection with the current Virtual Reality technology. These are the know-how currently mature technology for educational and practical use of architecture.

Virtual reality technology is important for the educational and practical use of architecture- VR technology can enhance architectural students' learning since it is experiential. Even while research into VR applications for education is not new, it is rarely done in the context of new learning theories in the field of architecture education.

Virtual reality has an influence on students' education by generating immersive teachings that are interesting, memorable, and significant for pupils. These VR learning opportunities enhance academic performance and support students in developing critical social and interpersonal skills that they will need in the future, like empathy and teamwork.

Benefits of Virtual Reality in Education

- Boosting Student Engagement. Utilizing virtual reality, students may engage in active learning and experience the lecture.
- Improved Knowledge Retention.
- Improving Student Learning Outcomes.
- Developing Collaboration and Social Skills.
- Building Empathy
- Supporting SEND (**special educational needs or disability**) Learning.

The ability of teachers to act as facilitators, helping pupils to learn new knowledge on their own, has revolutionised the function of a teacher in a classroom. This departs from the usual lecture format. Instead of watching PowerPoints, kids conduct independent research. Teachers now have more resources to help students with the use of technology in the classroom. Technology offers teachers a variety of tools in addition to materials like textbooks and worksheets to aid pupils in comprehending the subject matter better. As a learning facilitator, technology greatly aids the instructor. It converts a passive classroom into an active and participatory one, using audio-visual aids and models, smart classrooms, and e-learning classrooms that inspire and boost students' attention levels.

The educational objectives of virtual reality technology which are best suited in architecture- VR technology can help architecture students study more effectively. Even if the research of VR applications for education is not new, it is seldom examined in the context of cutting-edge learning theories for the field of architecture. In response, the authors created an educational programme called LADUVR ("Learning Architectural Details Using Virtual Reality Technology") to demonstrate how VR will improve the present drawbacks of architectural learning methods.

The types of educational objectives virtual reality technology is best suited in architecture.

- Restoration and Preservation
- Advanced Mode
- Building Materials
- Environmental Planning and Landscape Design
- Graphic Communications
- Visual and History of Arts
- History of Architecture
- And most of them are They don't know about the relation between type of educational objectives and virtual reality technology

As most researchers illustrated the type of educational objectives the respondent responds to, the listed educational objectives have a direct and indirect connection with current Virtual Reality technology.

Topic of major challenges

- Level of Flexibility compared to traditional classes
- Transparency of the teaching and learning process
- The Amount of Information Disseminated

- Transferring On our Knowledge
- Knowledge Transfer into Practice
- Replacement for Teachers in to learning and teaching progress
- Virtual reality is a cost-effective tool for enhancing instruction and learning.

Level of Flexibility compared to traditional classes

Query raised to the students-Do you believe that the level of flexibility offered by virtual reality is greater than the actual ordinary learning path, such as Restoration and Preservation courses, Visual and History of Arts courses, History of Architecture, Environmental Planning and Landscape Design courses, Building Materials, and Architecture Design courses? Do you believe it would improve your ability to learn and teach?

The use of virtual reality to facilitate learning and teaching is cost-effective.

Virtual reality may be used in an economical way to support teaching and learning. According to the interviews they identify VR Cost Less, Time server, and Moneywise, using virtual reality to support learning and teaching is in this case cost-effective. However, there are up-front costs associated with creating the programme, implementation costs for VR vs traditional learning and teaching methods, and Immersive systems. For architecture students who want to conceptualise problem-solving and the present pandemic challenges, immersive VR systems, desktop VR, fish tank VR, and other solutions are among the supplementary architectural teaching tools that are crucial. The future of e-learning and how people view education will undoubtedly be greatly influenced by VR technology. The most from this new technology might be found in teaching architectural details and construction, along with other subfields of architecture. Additionally, VR may be used to overcome many of the difficulties in architecture education. In response, a VR-based educational programme called LADUVR was created. This interactive, immersive experience is versatile, enjoyable, and includes an evaluation component.

Inducement for encouragement for adaptation of technological changes in education-

Architectural schools have blamable to adapt to the current situation of rapid changes in technology. Especially the time of COVID 19 (2020-2021G.C) the tough conditions of the world, we are alarmed about the future, in order to that that COVID 19 (2020-2021G.C) disorganized to architectural school and large programs have been delayed. Architectural universities and architectural students were affected by the closure. this a time for rapid responses to an environment that is we are no longer safe with ordinary technology, or it is a revolutionary moment, we are call to rethink everything? In order to this Technology has repeatedly transformed particularly how architects are communicating. Especially the time of **COVID 19 (2020-2021G.C)** the hard conditions of the world. Moreover, it has risk in existing in real sites to assist Destruction of the historical site and also costly and time-consuming.

Users of the virtual reality system may interact with items physically by walking about and touching them as if they were real. In contrast to how contact between two or more people is typically conceived of, communication may also occur between humans and technology. This is an important element and the foundation of virtual reality. In the opinion of this researcher, now, Architectural fields shall be forced to review their design processes to develop teaching and working methods that enable them to adapt to the current situation of architectural communication (2020G.C). Technology has repeatedly transformed especially how architects and other stakeholders are communicating.

Conclusions

In the future of architectural e-learning, particularly during COVID 19 (2020–2021G.C.), VR technology will play a significant role. It can also result in the destruction of a historical site, which is risky, expensive, and time-consuming to do. In addition, it let users to interact with items physically, for as by touching them. Normally. With development of VR education tools, we need to exploration of

why and how to improve it and make the best use in architectural field of education and industry both. There are various reasons for lack in adaptability for use of VR education tools as lack of an effective attitude, lacking an effective mindset due to a fear of technology and the current state of rapid technological change. Secondly the complete beginners with no previous experience with virtual reality. Thirdly conclusion that virtual reality-supported technology is not cost-effective due to a lack of knowledge.

Recommendations- Future Scope

The world of virtual reality is just getting started. According to the study's findings, there are still limitations on the availability of VR educational tools at architecture schools. Virtual reality (VR) may still have certain limitations in architecture education for a number of reasons. Future research studies may be used to determine how to execute architectural pedagogy and what subjects to use. According to the authors, the following subjects might help with architectural education and create avenues for future study while also enabling us to adapt to the contemporary digitalized environment (Virtual Reality).

- More research is needed to assess the effectiveness of VR tools and how to use them in actual Ethiopia architectural classrooms and real-world settings.
- Based on the outcome of the studies indicates Ethiopia architectural schools They are complete beginners with no previous experience with virtual reality in order to that Ethiopia architectural education curriculum review to power in individuals forced to use VR technology with training.
- Various architecture schools agreed that virtual reality-supported technology is not cost-effective in light of the study's findings.
  The reason given for such is a lack of understanding of the technology in comparison to convent ional instruments. And also, the majority of respondents accepted that VR causes discrimination and produces specific student groups, that is missed information. those all-architectural schools have to be analyzed the technology based on scientific study’s regarding to cost-effectiveness and discrimination and produces specific student groups.
- All institutions teaching architecture, the VR teaching tools should be designed and evaluated with adaptable features for diverse users with various learning preferences.
- The VR technology application and hardware company have to be adverted their products for architectural schools and facilitate to commonly available the needed software and development tools.

References-

1. Abdelhameed, W. A. J. P. C. S. (2013). Virtual Reality Use in Architectural Design Studios: A case of studying structure and construction. 25, 220-230.
2. Cruz-Neira, C. (1993). Virtual reality overview. Paper presented at the SIGGRAPH.
3. Felder, R. M., & Silverman, L. K. J. E. e. (1988). Learning and teaching styles in engineering education. 78(7), 674-681.
4. Fuchs, H., & Bishop, G. (1992). Research directions in virtual environments.
5. Gheisari, M., & Irizarry, J. J. F. (2016). Investigating human and technological requirements for successful implementation of a BIM-based mobile augmented reality environment in facility management practices.
6. Gigante, M. A. (1993). Virtual reality: definitions, history and applications. In Virtual reality

systems (pp. 3-14): Elsevier.
7. Jerald, J. (2015). The VR book: Human-centered design for virtual reality: Morgan & Claypool.
8. Maghool, S. A. H., Moeini, S. H. I., & Arefazar, Y. J. A.-I. I. J. o. A. R. (2018). An educational application based on virtual reality technology for learning architectural details: challenges and benefits. 12(3), 246.
9. Mazuryk, T., & Gervautz, M. (1996). Virtual reality-history, applications, technology and future.
10. Nicol, D., & Pilling, S. (2005). Changing architectural education: Towards a new professionalism: Taylor & Francis.
11. Park, C. S., Le, Q. T., Pedro, A., Lim, C. R. J. J. o. P. I. i. E. E., & Practice. (2016). Interactive building anatomy modeling for experiential building construction education. 142(3), 04015019.
12. Rahimian, F. P., Ibrahim, R., Wang, J., Wang, X., Shou, W., & Xu, B. J. C. I. (2014). Integrating BIM and augmented reality for interactive architectural visualisation.
13. Sim, J., Saunders, B., Waterfield, J., & Kingstone, T. J. I. J. o. S. R. M. (2018). Can sample size in qualitative research be determined a priori? , 21(5), 619-634.
14. Song, Y., Tan, Y., Song, Y., Wu, P., Cheng, J. C., Kim, M. J., . . . sensing, r. (2018). Spatial and temporal variations of spatial population accessibility to public hospitals: A case study of rural–urban comparison. 55(5), 718-744.
15. Stec, J., & Shanmugam, S. K. (2020). A Study and Implementation of Virtual Reality and its Capabilities. Paper presented at the Proceedings of the 2020 the 4th International Conference on Compute and Data Analysis.
16. Stone, V. E. J. P. T., & Environments, V. (1993). Social interaction and social development in virtual environments. 2(2), 153-161.
17. Wang, P., Wu, P., Wang, J., Chi, H.-L., Wang, X. J. I. j. o. e. r., & health, p. (2018). A critical review of the use of virtual reality in construction engineering education and training. 15(6), 1204.
18. Whalley, L. (1993). Ethical issues in the application of virtual reality to the treatment of mental disorders. In Virtual reality systems (pp. 273-287): Elsevier.
19. Woodward, C., & Hakkarainen, M. J. A. R.-S. E. A. A. (2011). Mobile mixed reality system for architectural and construction site visualization. 115-130.
20. Xie, H., Shi, W., & Issa, R. R. J. J. o. I. T. i. C. (2011). Using rfid and real-time virtual reality simulation for optimization in steel construction. 16(19), 291-308.