Applications of Virtual Worlds in education, healthcare, and tourism globally and the opportunity in Pakistan

Ebtihaj

Abstract:

Virtual worlds are three-dimensional simulated environments where people can collaborate virtually while keeping the interaction as real as possible. In the past decade, the applications of the virtual worlds have been used in nearly every field ranging from education, medical sciences, social science, research, entertainment, businesses, and much more. Recognizing the significance and implementation of virtual worlds across the globe, in this article, we list down the major applications of virtual worlds and explore the landscape of Pakistan and the potential of utilizing virtual worlds as a platform to develop interventions that can be beneficial for the masses.

Keywords: Virtual Worlds, Pakistan, Technology, Virtual Environment, Health, Education, Tourism

Introduction:

Virtual worlds are simulated 3D environments that can be accessed by multiple users at a single instance using their avatars. The users can explore these virtual worlds or perform an activity individually or as a part of a group[1]. Through their avatars the users can interact with other users (avatars) or non-playing characters (NPC) and to exchange information, messages, audio notes and even monetary transactions can be made using these avatars. These avatars can be highly interactive with the ability to perform different actions like walking, running, picking, dropping and similar actions. These avatars can also be customized as per the users needs where where they can change the way avatar looks, its appearance, and its actions[2].

These virtual worlds are being used as an application to enable geographically isolated people to access numerous innovation & learning-based opportunities. One of the main and the biggest implementation of these virtual worlds is the gaming industry which is currently valued at over

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[1] Aichner, T. and Jacob, F. (March 2015). "Measuring the Degree of Corporate Social Media Use". International Journal of Market Research. 57 (2): 257–275. doi:10.2501/IJMR-2015-018.

[2] Messinger, P.R., Stroulia, E., Lyons, K., Bone, M., Niu, R.H., Smirnov, K. and Perelgut, S., 2009. Virtual worlds—past, present, and future: New directions in social computing. Decision support systems, 47(3), pp.204-228.

$93billion[3]. However gaming industry is only one of the many applications of utilizing this form of social computing where a user can do much more than to play or interact in a linear environment.

Due to the diversity and anonymity, many researchers are also considering these virtual worlds as playgrounds where different unbiased social experiments can also be performed. These environments provide a rich real-time form of social and economic interaction with numerous applications and subsequent implications[2]. In this paper we explore some of the available applications of the virtual worlds and how they can be modified or used as is to improve the current infrastructure in Pakistan.

Applications of the Virtual Worlds

Education:

Research in the areas of Virtual Reality(VR) has been rapidly increasing over the last decade. But even before that time, Christine Youngblut in 1998 cited approximately fifty VR applications meant for learning purposes[4]. Education is one of the areas in which virtual worlds are being used the most. Due to the continuous innovation and the lack of resources (physical space and human resources) in the educational sector, many organizations have started considering virtual worlds as an alternative medium to impart education. Virtual worlds are also transforming the learning process of the students from being experiential to a more immersive experience without incurring a significant cost.

Students nowadays would rather participate in online gaming events rather than any physical events[5]. Virtual worlds allow students to actively participate in the subjects they are learning about, rather than passively absorb information[6]. This clearly shows students will be more comfortable and interested in a history class where a teacher shares a 3D environment showing the history or even parts of it instead of teaching it from the books.

For example, ActiveWorlds, among the oldest worlds, released in 1995, is very realistic, with high detail (reflecting particular real-world environments to enable education through augmentation of standard real-world, in-class activities) and is appropriate for learning design along with a variety of tools also for importing elements developed in various graphic formats. Forterra virtual worlds, originally developed by There.com, are designed to support training-through-simulation (both in augmentation and immersive styles) for e-learning, military, healthcare, and entertainment industries based on the Online Interactive Virtual Environment (OLIVE) platform.

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[3] van der Meulen, Rob. "Gartner Says Worldwide Video Game Market to Total $93 Billion in 2013". Gartner. Retrieved October 30, 2014.
[4] Christine Youngblut. Educational uses of virtual reality technology. 1998.
[5] Marc Prensky. Digital game-based learning. 2001.
[6] https://cs.stanford.edu/people/eroberts/courses/cs181/projects/2010-11/VirtualWorlds/styled-4/page4.html

Sharing Powerpoint and video in a virtual world collaboration room

In Pakistan, Government, nonprofits and private organizations have been attempting to promote the use of ICT in education but due to lack of technology and infrastructure, efforts remain less productive. Recently the concept of e-learning has been introduced in Pakistan which is just another way to impart traditional content through electronic means. Educational organizations like Virtual university and Allama Iqbal Open University are leading the distant learning programs but little is being done in terms of imparting interactive and immersive education.

A study shows that to promote interactive learning, the educators have found it difficult to implement such initiatives due to the lack of cooperation between the higher authorities who want to run the school on a low cost and teachers, unavailability of resources, and outdated content which prevents innovation in this area[7]. By using virtual worlds, this entire sector can be transformed making it easier and effective for the students to learn modern day concepts.

Healthcare

The idea of peer learning has been widely used in the field of medicine and healthcare where supervisors are continuously guiding their trainees to specialize in their respective fields. At the same time simulations are also being used as a medium to promote learning-by-doing for the trainees to improve their skills in addition to the in person training.

Eder-Van Hook has classified medical simulations into five categories including Low-tech simulators, Simulated/standardized patients, Screen-based computer simulators, Complex task trainers and lastly as Realistic patient simulators[8]. A simulation-based training system in a virtual world can provide the student with a safe, realistic environment in which to practice, while

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[7] Dayan, U. and Bano, A., 2018. Creating Interactive Classrooms: Barriers for the Teachers in Pakistan. *PUTAJ-Humanities and Social Sciences*, *25*(2), pp.51-60.
[8] Eder-Van Hook, J. 2004. Building a National Agenda for Simulation-based Medical Education. Retrieved from http://www.medsim.org/articles/AIMS_2004_Report_Simula tion-based_Medical_Training.pdf in February, 2009. Published in 2004

requiring less resources than real-life techniques such as standard patient-based training or running scenarios with actors[9].

As an example, researchers have developed a virtual world within which students can interact with a virtual character, nicknamed "Mr. Toma," and teach them about hematomas[10]. Similarly the Second Health[11] a project by Imperial College, London simulates several key points of care in a proposed model for the British healthcare system, including a hospital and a clinic. This project includes many medical equipment that the trainees or students can interact with to gain experience while interacting with the patients as well. Lastly, another virtual world focuses on providing a well-established meeting place for medical educators and students, in order to facilitate educational sessions in a virtual environment[12].

In Pakistan the key health indicators have seen only slow progress over the years. But due to the recent introduction of technology, the healthcare sector is also being digitized and with emerging startups visible innovation can be observed in this sector. These upgradations include the telehealth service that the government introduced during the Covid-19 pandemic[13], pilot programs to launch telemedicine services[14] and e-health[15] services to the public. Startups like Marham, SehatKahani and MyDoctor.pk have also been revolutionizing the healthcare delivery system but there is still much more that can be done.

By using virtual worlds in the healthcare sector in Pakistan, not only can the virtual consultations between the patient and the doctor be improved but at the same time it can largely reduce the risk of the doctor getting infected with highly communicable diseases. This will also benefit the patients who will not have to physically travel to the hospital/clinic saving cost, time and effort of the patient and the caretakers. Also by using virtual worlds these doctors can be upskilled by giving them simulation environments where they are able to perform medical procedures for practice and learn from each other while being physically isolated.

Tourism

The proliferation of the internet and other technological innovations has transformed the structure of the tourism industry as well as affected how tourism destinations are perceived and

[9]Chodos, D., Stroulia, E., Boechler, P., King, S., Kuras, P., Carbonaro, M. and de Jong, E., 2010, May. Healthcare education with virtual-world simulations. In *Proceedings of the 2010 ICSE Workshop on Software Engineering in Health Care* (pp. 89-99).
[10] Stroulia, E., Chodos, D., Boers, N. M., Huang, J., Gburzynski, P., and Nikolaidis, I. 2009. Software Engineering for Health Education and Care Delivery Systems: The Smart Condo Project. Software Engineering and Healthcare workshop (at ICSE 2009), May 18-19, 2009, Vancouver, B.C., Canada.
[11] Second Health. 2009. Website, retrieved September 3, 2009, http://secondhealth.wordpress.com
[12] Advanced Distribution Learning. 2010. SCORM 2004, 4th Edition, Version 1.1. Website, retrieved March 2, 2010 from http://www.adlnet.gov/Technologies/scorm/SCORMSDocum ents/2004%204th%20Edition/Documentation.aspx
[13]https://pk.mashable.com/tech/2862/pakistan-launches-covid-19-telehealth-portal-doctors-ready-to-volunt eer
[14] https://www.kpitb.gov.pk/content/kpitbs-e-ilaj-center
[15] http://www.suparco.gov.pk/pages/tele-medicine.asp?telelinksid=2

consumed[16]. The use of ICT tools like social media, digital maps, online booking system, blogs, paid advertisements have changed the way the tourists used to travel and are now not reliant on any travel agent to help them with their travel plans and bookings. An important step for the next future - it is already named Web 3.0 - is likely to be in the direction of online 3D Virtual Worlds (VWs)[17]. To improve the tourism sector many governments and private organizations are working on building immersive experiences for tourists where they can virtually observe and see the major tourist spots. These virtual worlds are also being used to preserve heritage and culture of many different societies and civilizations that have existed in the past.

In 2007, the School of Hotel and Tourism Management (SHTM) at The Hong Kong Polytechnic University (PolyU), created a virtual campus in Second Life called Polyusotel[18]. This campus was developed to support the University's outcome-based education initiative by offering "real-world" scenarios for teaching and learning in hospitality and tourism subjects[19]. Similarly, hotels and resorts have been using virtual worlds for reaching out to their visitors and getting feedback on how to improve the interior of their hotels. 3D Chichen-Itza was also developed to showcase the culture and heritage of Mexico[20]. Tourism Ireland is another example of the government creating virtual worlds to promote and market the tourism sector.

Pakistan is one of the very few countries in the world which has a rich history, culture, ethnically diverse people and at the same time having a landscape that is home to the second largest mountain, K2, in the world as well as the Thar desert which is the seventh largest desert on the planet and the third largest in Asia. Given the improving security situation, support of the government and improved infrastructure, Pakistan has been termed as a the best holiday destination for 2020[21]. It is fair to say that the government as well as startups have been focusing on promoting and facilitating both local and international tourists. The Government recently announced online visa services for 175 countries and 50 countries were offered Visa on arrival which is a step towards digitization and better public services.Though much has been done to promote tourism in Pakistan, there is still a long way to go. According to the Travel & Tourism Competitiveness Index 2019[22], Pakistan is still way behind its neighbouring countries in terms of ICT Readiness and tourist service infrastructure.

[16]Huang, Y.C., Backman, K.F., Backman, S.J. and Chang, L.L., 2016. Exploring the implications of virtual reality technology in tourism marketing: An integrated research framework. *International Journal of Tourism Research*, *18*(2), pp.116-128.

[17] Bellotti, F., Berta, R., De Gloria, A. and Primavera, L., 2009. Designing online virtual worlds for cultural heritage. In *Information and Communication Technologies in Tourism 2009* (pp. 199-209). Springer, Vienna.

[18]http://virtel.shtm.polyu.edu.hk/sotel/

[19] Penfold, P., 2009. Learning through the world of second life—A hospitality and tourism experience. *Journal of Teaching in Travel & Tourism*, *8*(2-3), pp.139-160.

[20] Huang, Y.C., Backman, S.J., McGuire, F.A., Backman, K.F. and Chang, L.L., 2013. Second life: The potential of 3D virtual worlds in travel and tourism industry. *Tourism Analysis*, *18*(4), pp.471-477.

[21]Desk, EurAsian Times. "Pakistan Ranked 'The Best Holiday Destination' For 2020 By Leading Travel Magazine". eurasiantimes.com. Retrieved 29 May 2020.

[22] https://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/regional-profiles/asia/

In addition to providing better ICT services to the international visitors, using virtual environments to enable the tourists to virtually preview the area that they are planning to visit as well as exploring the heritage and culture of the area can be a huge area for Pakistan to tap into. By doing so they can not only increase their GDP, preserve the rich cultural heritage but also use tourism as a tool for economic development.

Conclusion:

Globally the application of virtual worlds are numerous and are being used to promote research in various fields. The unique opportunities of creating an interactive environment occupied by avatars with advanced communication abilities have opened up new avenues in almost every sector. Pakistan being a third world country can also utilize the power of the virtual world to promote socio-economic development of the country. In this paper I have discussed the potential of virtual worlds in health, education and the tourism industry but there are many more areas like social empowerment, entertainment, business which can be revitalized using the power of virtual worlds. Hence, this document provides various practical implications for those interested in exploring the capabilities of virtual world environments, as well as provides suggestions for future research

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