Chapter 51
An Effective Pedagogy Toolkit for Learning in an Intelligent Virtual Environment

R. S. Kamath
Chhatrapati Shahu Institute of Business Education and Research, India

R. K. Kamat
Shivaji University, India

ABSTRACT

Throughout the progression of the pedagogy, educators are striving hard to bring up the systems centering on effective learning. This omnipresent trend has led to the ontogeny of innovative and culmination of many congregation technologies such as virtual reality (VR), artificial intelligence (AI), and natural language processing (NLP) ensuing as intelligent virtual learning environment (IVLE). Technology-enhanced encyclopedism can facilitate pupils with influential and high-quality learning experiences as compared to the traditional learning approach. This chapter portrays learning in intelligent virtual environment as an effective pedagogy approach. The pedagogic tool developed by the authors captures text written in English as an input and creates the envisioned virtual setting. The ability of natural language interface (NLI) for VR-based learning systems is the most significant attainment of the present work, which brings a novel perspective in the field pedagogy.

INTRODUCTION: INTELLIGENT VIRTUAL LEARNING ENVIRONMENT

The formal notion of the Intelligent Virtual Learning Environment (IVLE) as per the reported research divulges the uniting of Artificial Intelligence and Virtual Reality for technology enhanced learning. Technology-enhanced learning which has become a reality with the pervasive penetration of Information and Communication Technology (ICT) in almost all the walks of higher learning is by now not a new concept, but is still quite new in many educational institutions and settings. The simulation itself is not sufficient to ensure effectiveness in pedagogy. This explores the need for more advanced technologies

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in edict to improve learning (Kamath & Kamat, 2015). Technology can be an influential tool for transforming learning. The outgrowth of diverse areas such Computer-Assisted Learning, Mobile-Assisted Learning, and Technology-Enhanced Learning are warmly welcomed the application of technology in pedagogy (Rahimi et al., 2014). Thus the education and technology are seemingly interconnected. Moreover, intermingle of VR and AI technology has unwrapped new possibilities for education (Lugrin et. al., 2006). The virtual learning environments support learning effectiveness through the intelligent behavior and functional richness. In order to assimilate smart learning environments into the educational systems, new pedagogical approaches and innovations need to be implemented. Pedagogic experts believe that merely theoretical explanation without actual implementation makes learning experience invaluable. Instead of listening only to lectures, if students get real experience in a virtual wrapper can achieve the learning outcomes. In this context, the VR technology has found numerous applications in the field of education (Kamath & Kamat, 2018). It provides a visually appealing technique for presentation of teaching material. It motivates student community by encouraging active participation rather than passivity.

The proposed learning model presented here is an amalgamation of VR and AI. The combination of these two diverse domains creates a successful synergy effect, where different entities cooperate advantageously for effective pedagogical outcome. The evolution of the intelligent virtual environment from the simulation and animation techniques explicated through NLI for VR based learning is attributed to progression in pedagogy using sophisticated technology and thereby a tightly coupled interwoven association has seen emerging between the Education and Technology. This chapter presents the design and development of pedagogical toolkit that provides natural language interface for VR based learning system. The main challenge of VR technology is the costs coupled which have been expensive for educational institutes. With an aim bring down the cost, authors propose an amalgamation of natural language interface, inexpensive hardware and simple-to-use software, through which students can enjoy the excitement of learning through the eye-popping three-dimensional (3D) visualizations. This chapter elaborates how educational system based on virtual reality and natural language processing can accomplish creative learning without using sophisticated tools. The aforesaid convergence bridges the gap between pedagogy and technologies. The prime objective of the research presented here is to report the development of an IVLE tool for VR based learning. This toolkit is a text driven system to visually simulate the modeled operation in virtual space. The toolkit presented in this chapter is developed in Visual C Plus Plus (VC++) using OpenGL.

The rest of the chapter is organized as follows: After introducing the theme, the progression in from simulation, virtual reality to IVLE has been explained. A short theoretical retainer of amalgamation of NLP and VR for augmenting pedagogy is presented in third section. Sections four and five elaborate the framework of pedagogy toolkit and its implementation details with results. Conclusion at the end reveals the suitability of the VR based intelligent learning environment for pedagogy.

BACKGROUND: PROGRESSION IN PEDAGOGY FROM SIMULATION, VIRTUAL REALITY TO IVLE

Progress in technologies has changed traditional methods of teaching. With the emerging digital age, there has been passionate discussion all over the globe, about the use of technology in pedagogy. An interesting account of all these developments at the global level has been summarized in this section. Second Life is a virtual world environs emerging convergence of technologies (Jarmon, 2008). Educators