Some results of new training contents based on VR and 3D/360

Batshagai Baatar *, Bayar-Erdene Lkhagvasuren**, Erdenebayar Lamjav***

* Department of Communication at SICT of MUST.

** SICT of MUST.

*** Department of Communication at SICT of MUST.

batshagai@must.edu.mn*, bayar@must.edu.mn, erdenebayar.l@must.edu.mn*****

***(Pt9)Abstract*— In the era of knowledge-based development, the quality of education plays a pivotal role in shaping national progress. Among the numerous factors influencing educational quality, access to instructional resources, technological infrastructure, and laboratory environments is particularly significant. This paper presents the development and integration of interactive digital learning materials, including non-immersive and fully immersive Virtual Reality (VR) simulations, as part of virtual laboratory solutions.**

The proposed educational tools incorporate 2D and 3D models, 360-degree panoramic images, instructional videos, augmented and virtual environments, and 3D animations. These contents deliver theoretical explanations, equipment demonstrations, and guided instructional materials, enabling learners to perform simulations, hands-on activities, and laboratory exercises using VR-based technologies. In fully immersive environments, learners gain a heightened sense of presence, which enhances engagement and improves learning outcomes.

The study explores the application of the developed materials across education, healthcare, and other scientific domains. By employing 360-degree domes, interactive 3D content, and VR simulations, the research investigates the potential to replace complex physical laboratories with accessible, cost-effective virtual alternatives. The core objective of this work is to offer an innovative instructional approach by virtualizing traditionally resource-intensive learning environments. The paper outlines our technical framework and development process for designing and deploying these digital educational resources and virtual laboratories.

***(Pt9)Keyword*— Information Technology, virtual reality (VR), virtual environment, 360 image, video, web content, 3D interactive animation**

BATSHAGAI Baatar graduated from the Mongolian State University of Education in 2004 with a Bachelor's degree. In 2007, he earned his Master's degree (M.Sc.) with a thesis titled "Computer Technology Service Post Code."
He is currently working as a Senior Lecturer at the Department of Communication, School of Information and Communication Technology, Mongolian University of Science and Technology (MUST).

BAYAR-ERDENE Lkhagvasuren received his bachelor's degree from the Mongolian University of Science and Technology in 2001. He earned his Master of Science (M.Sc.) degree from the School of Information and Communication Technology in 2003 and a Master's degree in Business Administration (MBA) in 2020. In 2019, he was awarded his Ph.D. degree with the dissertation titled "Evaluation System Based on Logical Structure and Its Modeling." He is a certified consulting engineer of Mongolia.
Currently, he serves as the Director of the School of Information and Communication Technology at the Mongolian University of Science and Technology and also holds the position of Associate Professor.

ERDENEBAYAR Lamjav, in 2010 graduated from the Mongolian University of Science and Technology, Bachelor degree thesis: — The Study of Artificial Line. Master degree thesis (M.Sc.) in 2011: The study of link level simulation for Wimax. PhD degree thesis in 2018: The Study of Resource allocation in LTE networks. I am working an Associate Professor at Department of Communication at SICT of MUST.