

Editors' Notes

Today, the benefits that the virtual reality (VR) technology can offer to education have gained worldwide recognition. The vast amount of research and development work done in this area has turned this byproduct of the VR technology into a matured field. Our intention in this special issue of *Themes in Science and Technology Education* on 'VR in Education' is to compile the various significant theoretical and practical findings revealed by the researchers in the field. This special volume features articles by researchers from the United States, the United Kingdom, Greece, Spain, Germany, Israel, France, Austria and Malaysia. The fact that we received contributions from different parts of the world further confirms the worldwide agreement on the adoption of this technology for teaching and learning purposes.

Generally, the articles are sequenced from those focused on the general aspects of the VR technology to the theoretical bases of VR learning and types of educational virtual environments, and finally, the educational applications of the technology in various disciplines. The article by Chris Dede highlights the actional, symbolic and sensory factors that affect the immersion induced by the simulated learning experiences created by the VR technology. Woodrow Barfield draws attention to the use of haptic devices to assist in the learning process by increasing the realism of simulations through the force or tactile feedback given to the learners. Melissa E. Markaridian Selverian and Matthew Lombard detail the factors associated with 'presence', a subjective perception of non-mediation, which is particularly relevant to the illusions in the Virtual Learning Environment (VLE). They create and test presence technology guidelines, measures, and learning assessments to enhance illusions, learning and satisfaction in the VLE.

The two articles on the theoretical bases of VR learning are contributed by us, the editors. Chwen J. Chen's article introduces VRID, a model for instructional design and development that offers explicit guidance on how to produce an educational virtual environment. Veronica Pantelidis has proposed a practical model that can be used to determine when to use VR in an education or training course. The use of three-dimensional immersive virtual environments for collaborative learning is emphasized by Amelia W. Cheney and her fellow researchers. They use this type of learning

environment in AETZone, which is reported to offer participants a sense of presence, immediacy, movement, and access to artifacts and communications unavailable within traditional web-based learning environments. Abbie Brown and William Sugar elaborate on Second Life, a three-dimensional, multi-user virtual environment (MUVE), and explore the benefits and challenges of using it for teaching and learning.

The next seven articles of the volume discuss the educational application of VR in various subject areas: Hannes Kaufmann and Bernd Meyer present an immersive VR application for physics education; Hannes Kaufmann also provides an overview of various, mainly immersive, virtual environments that have been developed in the previous 10 years to support mathematics and geometry education; Eloi Biosca Frontera uses VR for teaching students to build historical buildings; Klaus Schwienhorst focuses on the use of VR for second language acquisition; Daniel Mellet-d'Huart covers the application of VR to training and lifelong learning; Nigel Foreman stresses the development of virtual environments in psychology; and Tara L. Jeffs reviews relevant research that explores the use of VR for individuals with special needs.

Last but not least, David Passig concludes the volume with his article on the future of VR, in which he aims to develop a valid forecast of a *wild future* for VR in education. We hope you will find the collection of articles in this special issue useful. If you have further questions on this special issue, please do not hesitate to contact any one of us.

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