SDU METAVERSE LAB

Guidelines for Playful Learning Design in VR/AR: Insights from Student Productions

Executive Summary

Virtual Reality (VR) and Augmented Reality (AR) have emerged as powerful educational technologies with the potential to transform the learning experience. This white paper presents three perspectives on VR/AR as educational tools: learning attributes, practical issues, and learning design guidelines. Supported by real-world examples from student-produced XR applications, these perspectives offer valuable insights for students, designers, and researchers interested in leveraging VR/AR for training and learning. The paper explores the potential benefits and challenges of XR technology and provides practical guidelines to create engaging and effective learning experiences.

Introduction

In recent years, VR and AR technologies have rapidly evolved and found their way into various educational domains. As educators and developers seek innovative ways to enhance learning, this paper aims to shed light on three critical aspects of using VR/AR in education: their learning attributes, practical issues, and playful learning design guidelines. Drawing insights from student-produced XR applications, we delve into the implications of these perspectives and discuss their application in creating engaging and impactful learning experiences.

Overview of Learning Attributes of XR

The learning attributes of XR technologies are central to their appeal as educational tools. Immersive experiences offer a unique opportunity to engage learners in a simulated environment, providing an intense feeling of presence. This attribute is particularly valuable for scenarios that involve high-risk training, such as first aid or fire simulation. Furthermore, the combination of simulation and play elements enhances learners' motivation and engagement, making learning a playful and enjoyable experience.

XR's interactive nature enables active participation and experiential learning, wherein learners explore and interact with the subject matter to deepen their understanding. By tailoring learning experiences to individual learners' pace and preferences, XR fosters

personalized learning processes, accommodating different learning styles and promoting self-paced learning.

Additionally, XR technology has the potential to visualize 3D models and reveal hidden information in real-life surroundings, enabling learners to "see the unseen." This attribute opens new possibilities for subjects that involve spatial concepts or abstract ideas.

Overview of Practical Issues Using XR

While XR offers promising learning attributes, practical challenges must be addressed for successful implementation. Cost-effectiveness remains a concern, as the development of high-quality XR content can be time-consuming and expensive. Additionally, XR interfaces are still in their infancy, and new versions of headsets and devices regularly surface, leading to compatibility issues and hardware constraints.

One of the primary challenges is motion sickness, especially in VR, where visual movements may not align with the user's physical sensations. Designers must consider this factor to create comfortable and enjoyable experiences. Technical issues and the requirement for high-performance hardware also pose obstacles, making XR implementation complex and resource-intensive.

Overview of Playful Learning Design Guidelines for XR

Designing playful learning experiences in XR involves striking a delicate balance between education and entertainment. To effectively guide learners, designers should seamlessly integrate tutorials and instructions into the application, using visuals and interactions rather than extensive text-based guidance.

The concept of well-ordered problem-solving should guide the development process, ensuring that learners face challenges appropriate to their skill levels and gradually progress to more complex tasks. Implementing pleasantly frustrating activities can keep learners engaged while avoiding cognitive overload.

The core mechanics of XR applications should closely align with learning goals to create meaningful learning experiences. Moreover, designers should consider social learning elements and provide opportunities for collaborative learning experiences in XR environments.

Illustrative Examples from Student Productions

In this section, we showcase examples of student-produced XR applications, each reflecting different learning attributes and design guidelines. The Fear of Flying application demonstrates the use of immersive and safe learning environments for experiential learning, while Asymmetric Mathematics employs social learning through asymmetric VR.

The H.C. Adventures app showcases playful learning elements, motivating children to read and explore fairytales in AR. The Fire Simulation project emphasizes a safe learning environment for training firefighting skills, while the We Are in Space application uses XR to facilitate dynamic and interactive learning about the solar system.

Summary and Conclusion

VR and AR hold immense potential for revolutionizing education, and creating immersive and engaging learning experiences. By understanding their learning attributes, practical challenges, and playful learning design guidelines, educators and developers can design XR applications that resonate with learners and foster effective learning outcomes.

This white paper serves as a foundation for future exploration in XR education, encouraging further research and development in this exciting and ever-evolving field. As technology continues to advance, VR and AR will undoubtedly play an essential role in shaping the future of education, unlocking new possibilities for learners and educators alike.

To reference this white paper

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Contact: Professor Anders Drachen, Director, adrac@mmmi.sdu.dk