



## VIRTUAL REALITY (VR) SYSTEMS, APPLICATIONS AND EXPERIENCES IN IMPROVEMENT FOR STUDENT LEARNING AND GENERALIZATION OF SKILLS TO THE REAL WORLD – BLENDED LEARNING



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Adoption of immersive virtual reality (I-VR) as an interactive tool in education has challenged the conceptual definition of what constitutes a learning environment. VR learning have allowed students to explore complex subjects in a way that traditional teaching methods cannot. This research is focusing on learning outcomes, intervention characteristics, and assessment measures associated with I-VR use has been sparse.

*The increasing financial feasibility of virtual reality (VR) has allowed for educational institutions to incorporate the technology into their teaching. Virtual reality is a computer-generated, three-dimensional, multimedia environment. Virtual reality is an environment produced by a computer that looks and seems real to the person experiencing it. It means experiencing things through computers when such things did not really exist. It is a simulation of a real or imagined environment that can be experienced visually in the three dimensions of width, height and depth and that may additionally provide an interactive experience visually in full real-time motion with sound and feedback.*

*Virtual reality, therefore, is a computer-simulated, game-based learning environment, which appears real and gives learners the opportunity to interact with the learning materials and share learning*



*experiences with both their teachers and other learners. In virtual reality, human participants can engage and manipulate simulated physical elements in the environment and interact with fictional or simulated components. Virtual reality allows the user to perform actions and observe their consequences but without penalties as experienced in real situations.*

## **EVOLUTION OF VR:**

### *From Sensorama to Oculus Quest and beyond*

- 1956 – Sensorama, considered to be one of the earliest VR systems, was invented.*
- 1968 – The first VR HMD, The Sword of Damocles, was created.*
- 1977 – Developed at MIT, the Aspen Movie Map enabled users to vitake a virtual tour of Aspen, Colorado.*
- 1984 – Jaron Lanier founded VPL Research, one of the first companies to develop and sell VR products.*
- 1991 – The first VR arcade machine, Virtuality, was introduced.*
- 1994 – Sega introduced its VR-1 motion simulator in its SeaWorld arcades.*
- 2007 – Google introduced Street View, which provides panoramic views of locations.*
- 2010 – The first prototype of the Oculus Rift headset was designed.*
- 2014 – Facebook acquired Oculus for \$2bn.*
- 2014 – Sony announced the launch of Project Morpheus, a VR headset for its PS4 console.*
- 2015 – Apple awarded the patent for a head-mounted display apparatus.*
- 2015 – Google launched Cardboard, which uses a head mount to turn a smartphone into a VR device.*
- 2015 – Samsung launched the Gear VR headset.*
- 2015 – The HTC Vive headset, developed by HTC and Valve, was unveiled at Mobile World Congress.*
- 2016 – The first-generation Oculus Rift device was released.*
- 2016 – Sony’s introduced PlayStation VR (PSVR).*
- 2017 – Microsoft launched the Xbox One X, its VR-ready games console and headset.*

*2018 – Facebook revealed camera-loaded glasses optimized for ‘social VR’.*

*2018 – Facebook released its untethered Oculus Go headset.*

*2018 – Lenovo’s Mirage Solo, the first headset running Google Daydream, became available.*

*2019 – Sony announced that it had sold more than four million PSVR headsets.*

*2021 – More than 85 million VR headsets will be in use in China, according to PwC.*

*2023 – Cloud-based VR gaming will be increasingly prominent, supported by 5G networks.*

*2030 – VR will be a \$28bn market, according to Global Data.*

## **APPLICATIONS OF VR AS AN INTERACTIVE TOOL IN EDUCATION:**

### **VIRTUAL REALITY VS TRADITION LEARNING:**

#### **TRADITIONAL LEARNING:**

*Traditional methods of teaching lead to a lack of student engagement. A widespread problem in education is that traditional methods of lecture-based education lead to disengaged students (Delialioglu, 2012). This lack of engagement is considered a major reason for many unfavorable behaviors hindering student success,*

*including dissatisfaction, negative experience and dropping out of school (Delialioglu, 2012). If students’ engagement with academic activities is increased, so does the students’ learning and personal development (Delialioglu, 2012; Winn et al., 1997). In this section, we describe two learning opportunities provided by VR that can complement traditional forms of teaching.*

### **VIRTUAL REALITY:**

*virtual reality leads to increased student engagement. Several characteristics of VR provide an opportunity to boost student engagement. As a hands-on, interactive, immersive experience, it provides a novel way of learning for students, delivering powerful new experiences they may not have encountered before (Bricken, 1991; Crosier et al., 2000; Eschenbrenner et al., 2008; Winn et al., 1997; Johnson and Levine, 2008; Lau and Lee, 2015). For example, Google Expeditions allows teachers to transport students to virtual field trips to Mars, the bottom of the ocean, and many other settings, which can spark new interest in subject matter, provide a shared experience for better classroom discussion, and improve overall engagement (Ferriter, 2016). Experiences like these provide unique*

*and fresh learning moments that draw in students and pique their interest as they actively explore and exercise their curiosity. This increased engagement can be an opportunity for addressing typically boring or low appeal subject areas. For example, Costa and Melotti (2012) found that VR exhibits increased interest in archaeology, especially where interest was low in the past. The novelty and entertainment value of VR can be used strategically to draw in the attention of lost and disinterested students, including in subjects that some students may usually find boring or irrelevant. From there, VR-specific pedagogy, which will be discussed later, can maximize the learning potential of these experiences.*

## **CONCLUSION**

*As educators who teach in the experience age, we must embrace and leverage better methods to deliver the most effective learning experiences. Educators have begun to embrace VR and its wide possibilities for learning as the technology rapidly moves to the mainstream. As discussed above, VR is especially useful for providing several opportunities: increasing student engagement; providing constructivist, authentic experiences to impact student identity; allowing for new perspective taking and empathy; and supporting creativity and the ability to visualize difficult models.*

*A strong reason for utilizing VR as a learning tool is that it meets young students experientially, a way that they prefer (Wadhera, 2016). Our current education system needs engaging, authentic experiences that will drive successful learning. VR can provide this and offers potential to expose students to worlds and people that are normally inaccessible (Dalgarno and Lee, 2010). For example, a deliberate use of the social affordances of VR could connect students with role models, thus encouraging greater participation by students who typically shy away from certain fields, i.e., STEM fields.*

*A pedagogy based on the unique affordances of VR is what is needed. A wrong way of implementing VR in education would be simply to replicate face-to-face, didactic experiences of learning. VR is a medium where limits are still being explored, so likewise, why limit the possibilities of how education can be delivered? With sound pedagogy and innovative experiences, virtual reality is a gateway for educators to enter the Experience Age.*

## **RESOURCES:**

[CNN, "Can Virtual Reality Revolutionize Education?"](#)

[Common Sense, Top Tech for Using Augmented and Virtual Reality](#)

[Common Sense, "Virtual Reality 101: What You Need to Know About Kids and VR"](#)

[Common Sense, "What the Research Says About VR in Classrooms"](#)

[EdTech, "3 Exciting Ways to Use Augmented and Virtual Reality in the K-12 Classroom"](#)

[EdTech, "K-12 Teachers Use Augmented and Virtual Reality Platforms to Teach Biology"](#)

[EdTech, "Survey: Education Among Top Industries for AR/VR Investments"](#)

[EdTech Times, "AR/VR: How Immersive Learning Technology Is Bringing Education and Training Into the Future"](#)

[Education Week, "A Global Perspective: Bringing the World Into Classrooms"](#)

[EdWeek Market Brief, "Education Seen as Strong Market for VR and AR by Industry Insiders"](#)

[Getting Smart, "Building Culturally Responsive Classrooms with Digital Content"](#)

[IMDb, Fantastic Voyage \(1966\)](#)

[International Society for Technology in Education, "25 Resources for Bringing AR and VR to the Classroom"](#)

[Medium, "Augmented Reality and 3D Geometry — Bring Some Magic to Your Classroom"](#)

[THE Journal, "Making Virtual Reality a Reality in Today's Classrooms"](#)

## **REFERENCES:**

Aarseth, E. (2001) 'Virtual worlds, real knowledge: towards a hermeneutics of virtuality', *European Review*, Vol. 9, No. 2, pp.227–232.

Aylett, R. and Louchart, S. (2003) 'Towards a narrative theory of virtual reality', *Virtual Reality*, Vol. 7, No. 1, pp.2–9.

Bailenson, J., Yee, N., Blascovich, J., Beall, A., Lundblad, N. and Jin, M. (2008) 'The use of immersive virtual reality in the learning sciences: digital transformations of teachers, students and social context', *The Journal of the Learning Sciences*, Vol. 17, pp.102–141.

Barnett, M., Yamagata-Lynch, L., Keating, T., Barab, S.A. and Hay, K.E. (2005) 'Using virtual reality computer models to support student understanding of astronomical concepts', *The Journal of Computers in Mathematics and Science Teaching*, Vol. 24, No. 4, pp.333–356.

Bienz, J. (2016) *Microsoft Quietly Releases Three new HoloApps, One is More VR Than MR, Road to Holo*, 27 April, Retrieved from <http://www.roadtoholo.com/2016/04/27/1342/microsoftquietly-releases-three-new-holoapps-one-is-more-vr-than-mr/>

*Boyle, K. (2016) Citi GPS: Virtual and Augmented Reality, Citi: Private Bank, 19 October, Retrieved from <https://www.privatebank.citibank.com/home/fresh-insight/citi-gps-virtual-andaugmented-reality.html>*

*Statista (2017) Number of Smartphone Users in the United States from 2010–2021, Retrieved from <https://www.statista.com/statistics/201182/forecast-of-smartphone-users-in-the-us/>*

*Steinicke, F. (2016) Being Really Virtual: Immersive Natives and the Future of Virtual Reality, Springer, Switzerland.*

*Stoddard, J. (2009) 'Toward a virtual field trip model for the social studies', Contemporary Issues in Technology and Teacher Education, Vol. 9, No. 4, pp.412–438.*

*Sung, Y., Shih, P. and Chang, K. (2015) 'The effects of 3D-representation instruction on composite-solid surface-area learning for elementary school students', Instructional Science, Vol. 43, No. 1, pp.115–145.*

*The Body VR (n.d.) Retrieved from <http://thebodyvr.com/> Tuthill, G. and Klemm, E.B. (2002) 'Virtual field trips: alternatives to actual field trips', International Journal of Instructional Media, Vol. 29, No. 4, pp.453–468.*

*Virtual Speech (2016) Virtual Speech Ltd., Retrieved from <http://virtualspeech.com/>*