


# Using 360-Video Virtual Reality to Influence Caregiver Emotions and Behaviors for Childhood Literacy

Iulian Radu, Harvard University, USA

Chris Dede, Harvard University, USA

Mohamed Raouf Seyam, Harvard University, USA

 <https://orcid.org/0000-0002-8883-3255>

Tianyi Feng, Harvard University, USA

Michelle Chung, Harvard University, USA

## ABSTRACT

Through the design and exploratory evaluation of a narrative-based 360-video virtual reality experience, the authors aimed at building empathy in adults towards children who experience challenges in early literacy. This contributes to a limited literature on VR empathetic design by specifically studying caregivers in relation to reading difficulties and utilizing a low-cost immersive medium. This research performed a quasi-experimental pilot study following a pretest-posttest design with 27 participants, collecting measures such as participant empathy, anxiety, immersion, and emotional reactions. This paper explored changes in pre-post measures, correlations between variables, and possible explanations for the observed results. The VR experience increased positive caregiver attitudes towards struggling readers. Participants who reported a high degree of emotional reactions showed increased willingness to donate to help reading difficulties. Participants with teaching experience or with lower starting empathy scores were less likely to be affected.

## KEYWORDS

360 Video, Dyslexia, Empathy, Immersion, Literacy, Presence, Virtual Reality, VR

## INTRODUCTION

This study is part of an ongoing program of research that intends to identify what barriers are preventing adults from effectively building childhood early literacy, and subsequently to design experiences that can mitigate those factors via upskilling. One important barrier is the lack of empathy. Adults (parents, teachers, and other caregivers) who have high literacy often cannot relate to the experience of a struggling reader (Psychogiou et al. 2008; Gondoli & Silverberg, 1997). They often do not identify with how hard it is when one is starting out reading, or what it feels like to have certain reading difficulties. Through narrative-based 360-video virtual reality experiences, we aim to build

DOI: 10.4018/IJGCMS.20210101.0a2

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

empathy in adults for the children in their lives, helping them to be more patient and understanding about the challenges of early literacy. This specific study involved constructing a pilot VR experience designed to induce emotions related to empathy, then studying its effects on caregiver participants who were parents and teachers. This experience is a first step towards creating larger-scale interventions designed to make participants more empathetic.

Scholars have studied the power of immersive media to aid with “unlearning”: letting go of a routinely practiced, emotionally rooted identity to achieve transformational change to a different, more effective set of behaviors. Brook, Pedler, Abbott, and Burgoyne (2016) argue that the result of unlearning may be moving from knowing to not-knowing and from action to non-action, as a transitional step towards developing some transformed form of knowing and acting. Studies in virtual reality show that unlearning can be based on a series of powerful experiences that influence the mind/brain cognitively and affectively, intrapersonally and interpersonally (Bailenson, 2018; Slater & Sanchez-Vives, 2016). In particular, studies have documented the effectiveness of immersive authentic simulations for improving teacher effectiveness (Christiansen, Knezek, Tyler-Wood, & Gibson, 2011; Seidel, Blomberg, & Renkl, 2013; Badiee & Kaufman, 2014; Straub, Dieker, Hynes, & Hughes, 2014).

Empathy, the ability to detect, feel, and respond to another person’s emotional states, is critical to developing social relationships. For parents, this ability can help sensitively guide parenting behaviors, especially in situations where children are not capable of communicating their internal emotional states (Fonagy, Gergely, & Target, 2007). Research has shown that empathy can be developed through playing PC based video games (Bachen, Hernández-Ramos, & Raphael, 2012; Greitemeyer, Osswald, & Brauer, 2010), and recent work on 360 video narratives and VR shows that increased immersion can induce higher levels of empathy (Archer & Finger, 2018; Shin, 2018). Mediums such as full-body-tracking VR can allow a user to embody another gender or race and have been shown to reduce racial bias (Peck et. al., 2013; Banakou, Hanumanthu, & Slater, 2016) and to increase empathy towards users with physical disabilities (Väyrynen, Colley, & Häkkinä, 2016). In VR studies where users embody a child, there are effects of distorted spatial perception (Banakou, Groten, & Slater, 2013) and increases in empathy for situations where a parent negatively treats a child (Hamilton-Giachritsis, 2018). These are all forms of unlearning.

This study builds on this body of research and investigates whether factors that can influence caregivers’ empathy can be increased by experiencing a typical situation in a struggling reader’s life. Rather than full-body tracking VR immersion, this research uses the popular medium of 360 video, in a 3-degree-of-freedom VR experience (via Oculus Go head-mounted display). Establishing the effectiveness of a simpler and less expensive immersive medium than previous work is important in increasing scalability using lower-cost media and hardware. Studying the design of this alternative medium is crucial to ensuring its potential impact is realized.

## RELATED WORK

Ongoing reciprocal social interactions between children and caregivers are critical components of child development, including early literacy development (Pellegrini & Galda, 2003; Farrant & Zubrick, 2012), which is a main predictor of academic success (Hoff, 2003). Caregivers who are attentive to their children provide sustained back-and-forth interactions which develop and shape children’s mastery of language, by helping early readers to understand words they may be unfamiliar with, and to perform reading tasks they may be struggling with (Hirsh-Pasek et al., 2015; Rowe et al. 2017). The empathetic abilities of caregivers influence children’s language and socioemotional development. As children observe and internalize the caregiver’s tone of voice, touch, facial expressions, they learn to communicate and self regulate (Kohn, 1998). Research shows that parents who are more empathetic are more effective at perceiving their child’s state and responding appropriately to child’s needs (Psychogiou et al. 2008; Gondoli & Silverberg, 1997). Based on this research, we hypothesize that

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/article/using-360-video-virtual-reality-to-influence-caregiver-emotions-and-behaviors-for-childhood-literacy/272588](http://www.igi-global.com/article/using-360-video-virtual-reality-to-influence-caregiver-emotions-and-behaviors-for-childhood-literacy/272588)

## Related Content

---

### Gamification and Household Energy Saving: Insights From the EnerGAware Project

Miquel Casals, Marta Gangoellés, Marcel Macarulla and Núria Forcada (2022). *Handbook of Research on Gamification Dynamics and User Experience Design* (pp. 298-323).

[www.irma-international.org/chapter/gamification-and-household-energy-saving/311141](http://www.irma-international.org/chapter/gamification-and-household-energy-saving/311141)

### On Insufficient Documentation of a Virtual World's Economic Development: A Retrospective of Second Life From 2003-2008

Sandra Boric (2021). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 1-15).

[www.irma-international.org/article/on-insufficient-documentation-of-a-virtual-worlds-economic-development/290825](http://www.irma-international.org/article/on-insufficient-documentation-of-a-virtual-worlds-economic-development/290825)

### A Study of the Moderating Effect of Social Distance on the Relationship Between Motivators and Game Engagement

Youngkeun Choi (2019). *International Journal of Gaming and Computer-Mediated Simulations* (pp. 1-14).

[www.irma-international.org/article/a-study-of-the-moderating-effect-of-social-distance-on-the-relationship-between-motivators-and-game-engagement/242916](http://www.irma-international.org/article/a-study-of-the-moderating-effect-of-social-distance-on-the-relationship-between-motivators-and-game-engagement/242916)

### Cognitive Load and Empathy in Serious Games : A Conceptual Framework

Wen-Hao David Huang and Sharon Tettegah (2010). *Gaming and Cognition: Theories and Practice from the Learning Sciences* (pp. 137-151).

[www.irma-international.org/chapter/cognitive-load-empathy-serious-games/41470](http://www.irma-international.org/chapter/cognitive-load-empathy-serious-games/41470)

## Promoting Agroforestry Using Geo-Spatially Enabled Serious Gaming

Nadeem Ahmed Khan, Arun Khosla, Girish S. Pujar and Parampreet Singh (2022).

*Handbook of Research on Promoting Economic and Social Development Through Serious Games* (pp. 420-445).

[www.irma-international.org/chapter/promoting-agroforestry-using-geo-spatially-enabled-serious-gaming/300638](http://www.irma-international.org/chapter/promoting-agroforestry-using-geo-spatially-enabled-serious-gaming/300638)