

# EMBODIED

## LEARNING

### LexiLearn

Marie P. P. M. Holm, Kai Pettini, Chris S. Eagar, Wenxin Cao, Nasir J. Grant, Bryson Rudolph, Dan Zahal and Anna C. M. Queiroz

**ABSTRACT:** LexiLearn is an AI-enhanced, multisensory virtual reality (VR) learning environment designed to investigate how embodied interaction and haptic augmentation can support early literacy acquisition. It is more than a VR experience; it is a framework for literacy education and proposes novel ways of combining spatial and sensory learning. Establishing a multisensory learning ecology in which phoneme-grapheme links and spelling tasks are supported by coordinated visual, auditory, and tactile cues, enabled by adaptive AI and vibrotactile haptic gloves. The framework is complemented by a pedagogical dashboard for teachers, extending XR learning into classroom practice. This poster introduces the conceptual grounding, design process, and technological architecture of Lexi Learn, highlighting its contribution to XR for education.

#### HAPTIC INTEGRATION IN LEXILEARN

Haptic feedback in LexiLearn facilitates context-responsive haptic feedback aligned with literacy-oriented tasks within the learning experience. Rather than replicating physical tactile sensations in a one-to-one correspondence, the haptic system is designed to utilise abstracted haptic cues. With this integration, we aim to expand the grapheme and phoneme association with a sensory stimulus. Each phoneme is associated with a specific vibration, and to investigate if these haptic associations will have an impact on learners' spelling skills and phonemic awareness.



DEMO VIDEO

## DESIGN

### 01 Haptic Technology

Wearable haptic gloves enabling tactile feedback and physical interaction within virtual spaces.

### 02 Adaptive AI

Artificial intelligence systems that respond to and support individual learner needs in real-time.

### 03 Immersive Environment

Virtual reality spaces designed specifically for literacy education and multisensory learning.

### 04 Embodied Interaction

Movement-based learning through phonetics, visual association, and interactive engagement.

## HAPTICS

“Touch is the first sense we develop and, often, the last we lose. It anchors us in the world, grounding memory, emotion, and embodied presence. More than a channel for perceiving and responding to our environment, touch is a fundamental mode of knowing - a bridge between the self and the world.

Yet, in our current digital era of modern society, the haptic and tactile dimensions of experience remain underexplored and largely overshadowed by visual and auditory paradigms, placing us at risk of moving toward an increasingly disembodied digital age”

“The world of touch is largely unconscious and forgotten, yet it is the sense that integrates our experience of reality and of ourselves”

*Finnish architect Juhani Pallasmaa 1996*



MARIE HOLM

