

UC Irvine

2022 Games + Learning + Society Conference Proceedings

Title

Co-Designing a STEM-based VR Game For and With Neurodiverse Learners

Permalink

<https://escholarship.org/uc/item/6s93n92x>

Authors

Edwards, Teon

Larsen, James

Dahlstrom-Hakki, Ibrahim

et al.

Publication Date

2022-09-18

Peer reviewed

Co-Designing a STEM-based VR Game For and With Neurodiverse Learners

Teon Edwards, EdGE at TERC

James Larsen, EdGE at TERC

Ibrahim Dahlstrom-Hakki, EdGE at TERC

Zac Alstad, EdGE at TERC

Gerald Belton, Landmark College

Ian Hagberg, Landmark College

Katherine Hoder, Landmark College

Becky Scheff, Landmark College

David Soltero, Landmark College

Abstract: As part of developing and researching a virtual reality (VR) game intended to increase access to and broaden participation in STEM learning, designers and researchers from EdGE at TERC and interns from Landmark College, a post-secondary institute for learners with ADHD, autism, dyslexia, and other learning differences, have been immersed in an intensive co-design process. Co-design embraces the ‘nothing about us without us’ movement by ensuring stakeholder voices, in this case neurodiverse learners, have a prominent role throughout the design process. We present our co-design process, key lessons learned, important game-design decisions, and the experiences and perspectives of individual co-design participants. And recommendations are provided to help guide others who are interested in implementing a co-design process of their own.

Neurodiversity and Nothing About Us Without Us

In recent years, a new paradigm and rejection of the notion that individuals with neurology outside the norm have a pathology requiring treatment has reclassified neurodevelopmental disabilities as neurodiversity (Kapp, 2020). And within the neurodiversity movement, the message “nothing about us without us” has emerged as a central tenant (Charlton, 1998). Historically, the development of interventions for neurodiverse learners has been largely driven by parents and other advocates rather than by the neurodiverse learners themselves (Acevedo & Nusbaum, 2020). Unfortunately, this means those interventions have often not necessarily reflected the perspectives and goals of the neurodiverse. Full co-design, such as that explored by this project, is intended to ensure stakeholders have equal (or greater) say in the design process.

For this project and poster, the term neurodiversity refers to individuals who may qualify for or be labeled with a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), dyslexia, a Learning Disability, or similar.

Co-Design

For this project, neurodiverse individuals are participating as core members of the design team, constituting more than half the team members and coming from both institutions. The goal is not only to have these stakeholders inform the process, but to empower them to shape it. And this shaping is not limited to the areas of design necessarily thought of as related to the unique strengths and challenges of the neurodiverse, but to the broader nature of the game as a whole.

Furthermore, co-design serves its population both through the final product—a STEM-based learning VR game designed with and for them—and through the process itself—the act of working on a team, learning about game design, and designing the game. The neurodiverse team members gain experience and opportunities around game design not necessarily often afforded to them, while also greatly informing... and transforming... the game being designed.

And of course, the co-design process is a learning experience for all involved. For those members who are not neurodiverse, they are learning how to best work with, support, and serve the target

population. For them, too, the process itself—the act of working with and learning how to get the best from *all* team members—is a learning experience that is not only vital for this project but also transfers to other work and situations. Designing with the neurodiverse highlights the truth that a team is always made up of individuals, and what works well for one member of a team may or may not work well for another.

The Game

The game, which is in the early stages of development with the working title *Europa Prime*, awakens the player on an abandoned space station on Europa, a moon of Jupiter. A fictional—but scientifically plausible—cephalopod-like lifeform inhabits the ocean under the moon’s icy crust (Figure 1). The player must explore, solve puzzles, learn to communicate, and ultimately figure out how to achieve their mission... whatever, exactly, that may be.

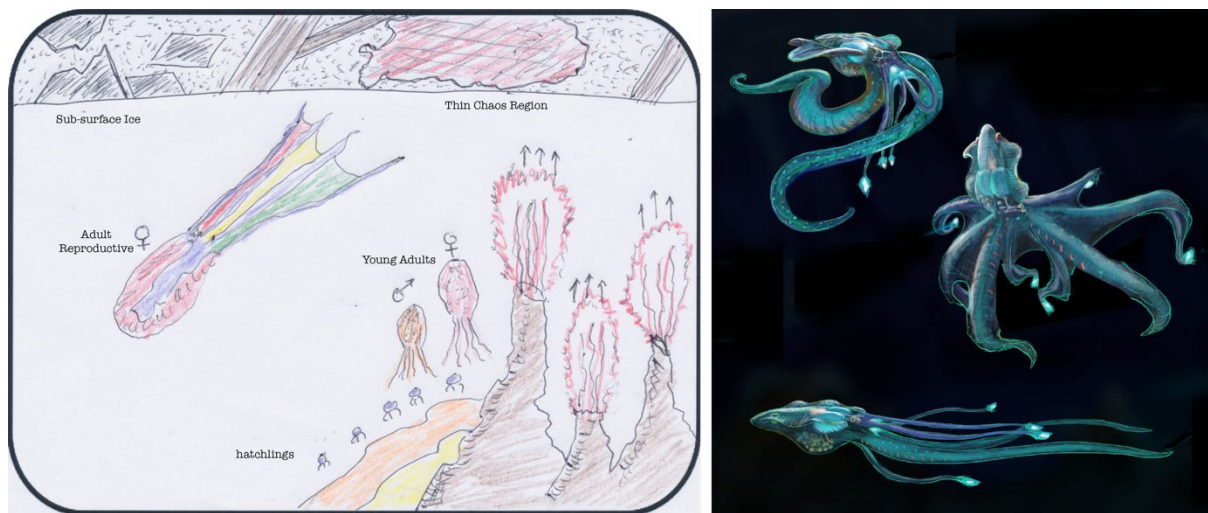


Figure 1
Preliminary Co-Design Team Sketch and then Artist Design for the Main Lifeform in the Game

Funded by NSF’s Advancing Informal STEM Learning (AISL) program, the game conceit, as originally conceived, focused on STEM concepts and skills. Through the co-design process, however, the project’s attention on sensory, attention, and social (anxiety) differences expanded from characteristics of the game — the nature and level of visual and audio inputs, attention-guidance supports, embedded task management and navigation systems, manual and automatic controls and options, etc. — to what the game is about — communication, empathy, different preferences and tolerances, non-overlapping perceptions, and more.

This poster presents lessons learned during, various perspectives on, and recommendations gleaned from the ever-shifting reality of the co-design process, from early shaping of the game to mid-process design commitments.

References

- Acevedo, S. M., & Nusbaum, E. A. (2020). Autism, neurodiversity, and inclusive education. In Oxford Research Encyclopedia of Education.
- Charlton, J. M. (1998). *Nothing about us without us: Disability oppression and empowerment*. Berkeley, Calif: University of California.
- Kapp, Steven. (2020). Autistic Community and the Neurodiversity Movement Stories from the Frontline: Stories from the Frontline. 10.1007/978-981-13-8437-0.