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Hello, World

Building Accessibility in Game Design

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Abstract

There are over 5.6 million students with disabilities in special education services. These students vary in disability type, learning preferences and educational needs. For many, games-based learning and educational apps awaken untapped abilities. More schools, recognizing technology as a tool for learning, are rapidly adopting tablets, computers and other devices into the classroom setting. But what does access truly mean? The purpose of this session is to deconstruct the word 'access' in game design. In particular, how principles of universal design for learning can be applied at the forefront of game development. I close with a look at how front-loading design to accommodate learners of diverse needs will ultimately benefit user and developer alike.

Introduction

The Individuals with Disabilities Education Act (IDEA) currently serves over 5.6 million students in the United States. Under this federal document, IDEA is required to identify, locate and evaluate children with disabilities. No child with a disability can be denied an appropriate program. For many students, these appropriate programs include academic accommodations and legal assurances of a Fair and Appropriate Public Education (FAPE). Today, 13 disability categories are officially recognized under IDEA (2004): autism, deaf-blindness, deafness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury and visual impairment. These disability categories serve as an umbrella for evaluation and play one of several key roles in the development of a student's Individualized Education Plan (IEP). The objective behind IEPs is to ensure students with disabilities not only gain equal access and opportunity to material (Mead, 1999; Yell, 1998), but are provided the necessary supports to further their education in postgraduate life.

This paper briefly describes disability services and how game developers can increase accessible features in game design. I begin with a look at assistive technology programs and supports. From there, I connect technology use to Universal Design for Learning (UDL) practices. I close with recommendations on building accessible features into all games – not just games for students with disabilities – in order to create more successful products.

Disability and Assistive Technology Services

IEPs are designed to accommodate a child's specific academic needs. For example, a student may receive extra time on math exams due to a learning disability. Alternatively, a child with a visual impairment may be granted assistive technology software in order to interpret information on a computer screen. There is no standardized "check box" when it comes to what technology is most appropriate to assign. Instead, IEP teams determine the best technological equipment based on numerous factors, including disability type, cost and resource availability. Importantly, assistive technology is becoming a popular tool for students with disabilities, particularly as more schools shift to 1:1 computers and tablets. Recognizing the importance of technology and its benefits to access, IDEA has since included assistive technology as a standard assessment for every child with an IEP. Assistive technology is defined under IDEA (1997) as: "Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customize, that is used to increase, maintain, or improve functional capabilities of a child with a disability." This definition is purposefully vague in order to allow educators and students to identify tools most appropriate for supporting each individual's unique learning needs.

UDL practices are becoming more common as mainstream teachers use technology to accommodate student needs. More specifically, the framework is helping teachers build multiple means of representation, engagement and expression in lesson plans. As a result, teachers can design a curriculum that accommodates student needs based on personal preferences, abilities and skills. In short, UDL practices are designed for students of all backgrounds (Rose & Meyer, 2002), leading to the hopeful promise of more inclusive learning environments.

Disability and Games

Games-based learning covers various content areas, including science education, math education, environmental awareness and social change. For many special education teachers, games are now a way to engage children in core subjects and implement social or behavioral interventions (Baranowski et. al, 2008; Finke, Hickerson & McLaughlin, 2015; Blum-Dimaya et. al, 2010; Sarokoff, et. al, 2011). Unfortunately, games designed to accommodate specific disability types do not always promote inclusive learning spaces. This creates a major problem for both teacher and user, especially when apps are created for a single population or disability type. Suddenly, the consumer world is bombarded with an uptick of poorly designed educational games to support students with disabilities, or Cr(apps). Such applications create a false pretense of what games should be (Dalsen, 2016).

Under the premise that specific games should be exclusively designed to accommodate disability needs, students with disabilities are acquiring educational materials that unintentionally restrict peer interaction and single out differences (Bierre et. al, 2005; Yuan, Folmer, & Harris Jr, 2011). Given this, students with disabilities risk isolation in the classroom setting during games-based activities. An alternative way of viewing games and disability is through an inclusive lens, where accessibility is a natural part of the design process. By removing disability from the forefront of design in exchange for creating dialogues on digital access and literacies, student achievement will increase across the board.

Simple Guidelines

Here and throughout the rest of this paper, the word access is defined as interacting with an educational app or game. This definition is important as too often the word access in technology is misinterpreted as gaining a physical resource. Table I represents some preliminary guidelines to access in design.

	Questions	Example Practices
Text	Is the text too heavy? Are phrases universal? What is the reading level of users playing the game?	Text-to-Speech Compatibility Visual and Audio Directions Language Option (e.g. Spanish, Hmong)
Resource Availability	What platforms do users own or have access to? How expensive is your software to buy?	2+ platform options Student or Teacher Discount
Website Access	How easy can users with assistive technology access the software on your site?	Make sure your website follows the ADA guidelines and has a text-only option. Do not embed text inside of images as assistive technology software (e.g. JAWS) will not recognize the words.
Movement	How much dexterity is needed in order to accomplish a goal?	Have students with limited mobility or assistive technology (e.g. computer switches) play test software. Make sure a keyboard option is available for item selection / character movement.

Table 1. Guidelines to access.

Further Recommendations

1. **Be mindful of assistive technology.** Not every device is compatible with assistive technology services. For example, an individual with limited dexterity cannot easily manipulate game items on a tablet device. However, this same individual can use assistive technology on a desktop to complete the same game levels. Game developers should test their devices against assistive technology products in order to verify compatibility. Importantly, having access to different assistive technology models during beta testing is crucial as school owned devices are not frequently updated. Thus, one student may have an assistive technology device that is 2 years old, whereas another has a device that is over 5 years old.

2. **Designers should always plan for varied literacy rates.** Students in the same grade level will have varied reading abilities. Narratives with more complex and unexplained definitions can frustrate and/or create anxiety for some players. Thus, it is crucial to create a flexible narrative that students with lower reading levels can engage in. Alternatively, having an almanac or reference guide as a way to highlight keywords.

3. **Every designer must become familiar with disability law**. More school districts are under pressure to ensure assistive and educational technologies have accessible features built into their program. While the designer may not have a formal degree in disability law, they should connect

with personnel who can serve as valuable consultants to this framework.

4. **Ask students, parents, grandparents, educators and special education assistants for feedback.** Many students with significant disabilities need assistance with application access and games-based learning. By understanding what challenges parents and caregivers encounter when students access material, developers can plan for smoother, more accessible products.

5. Most importantly, **make accessibility features appear as fluid and natural as possible**. The goal of games-based learning for students with disabilities is not to create a separate game. Instead, to make a game that allows students to participate in the mainstream setting.

Conclusion

Games-based learning for students with disabilities is a promising avenue to explore. Importantly, designing games with disability in mind requires attention to multiple means of representation, an understanding of educational law and remembering to include accessible features throughout the entire design process. In the future, game developers should collaborate with educators, community leaders and individuals with disabilities to create inclusive game environments. Finally, game developers and educators need to reconsider the definition of access. Access is not merely gaining a physical resource. Instead, access is meaningful interaction with the game or app.

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