

GAMING, ASSISTIVE TECHNOLOGIES, AND NEURODIVERSITY

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Abstract

In light of the significant influence of games within contemporary society, it is crucial to examine the processes via which they include or marginalise people with diverse characteristics, in order to promote inclusivity on a broad scale. The primary objective of this chapter is to analyse Assistive Technologies (AT) in order to explore the potential benefits of gaming for those who are neurodivergent, particularly those diagnosed with Autism Spectrum Disorder (ASD). In order to achieve this objective, an examination is conducted on several current ATs designed to facilitate gaming, with particular attention given to the cognitive accessibility requirements commonly encountered by these individuals. The objective of this research is to spark a discussion on the utilisation of accessible gaming and AT as ways to empower individuals on the autism spectrum, foster social inclusion, and facilitate self-representation.

Keywords: Autism; Neurodiversity; Assistive Technologies; Gaming; Diversity.

Introduction

Video games constitute a significant component of the cultural and creative landscape, contributing more than 50% of the added value within the broader European Union audiovisual market. In key European markets, approximately half of the population aged between six and 64 has engaged in gaming activity within the past year. Furthermore, a significant majority of this group, specifically 76%, dedicate a minimum of one hour per week to playing video games. These statistics indicate that game playing can no longer be regarded as a niche form of entertainment. Therefore, the cultural impact of gaming extends to various domains, including artistic expressions, aesthetics, and popular culture (European Video Games Society [EVGS], 2021).

Given the prominent role of games in modern society, it is imperative to consider the processes by which they include or exclude individuals with diverse characteristics, with the aim of ensuring widespread accessibility. This chapter focuses mainly on the examination of assistive technology as a means to explore the potential benefits of gaming for individuals who are neurodivergent, specifically those with Autism Spectrum Disorder (ASD).

Gaming Assistive Technologies

Since the launching of the hand free controller for Nintendo Entertainment System (NES), in 1986 (Takeda, 2020) – frequently seen as the first artefact of mainstream gaming assistive technology – the existing hardwares to support this activity have been crucially evolved. The contemporary approaches have the XBOX adaptive controller (Figure 1) as a central figure, due to its adaptability to different games, accommodation needs, and even platforms – see “Using the XBOX Adaptive Controller on Playstation 5” (<https://www.youtube.com/watch?v=AToh5B2prYM>).



Figure 1 - XBOX adaptive controller being used (Source: <https://www.xbox.com/>)

Other hardware pieces frequently used include the Hori Flex Controller, the Praetorian Game on One, the Azeron Gaming Keypad, the Logitech G Adaptive Gaming Kit, and/or Titan Two. Even if we can consider that there is a lot of work to be done, most – if not all – of these technologies are based on control remapping methods to ensure accessibility, which emphasises a certain person-centred design notion, instead of an hardware-driven view. Regarding assistive software, mainstream approaches seem to remain centred around eye gaze gaming and related technologies (see Figure 2), as well as the use of voice control systems or the Microsoft’s Copilot system.



Figure 2 - Eye Gaze Gaming (Source: <https://www.specialeffect.org.uk/>)

Approaching Neurodiversity

Although there seems to be a relatively structured and people-centred path for the evolution of assistive technologies for gaming, the concrete examples that exist still seem very much focused on motor accessibility needs, sometimes sensory, but not on neurodiversity/cognitive accessibility aspects. In this regard, customizable settings seem to assume a central role (Jaramillo-Alcázar et al., 2022; Sousa et al., 2022a). Such options provide users with the ability to personalise various settings, enabling them to modify elements such as the level of challenge, sensory stimuli (e.g., visual and auditory elements), and the arrangement of the user interface. The flexibility inherent in this approach allows for the accommodation of the unique requirements and sensitivities of individuals with autism who engage in gaming activities.

Another essential element pertains to the presence of text-based communication features within games (Manninen, 2003), which offer a convenient and regulated avenue for interaction, particularly for individuals who encounter difficulties with verbal communication or social engagements. This might enable individuals to actively participate with

fellow players based on their own preferences, thereby promoting a gaming environment that is more inclusive.

An additional crucial factor to be taken into account is the incorporation of sensory integration features within games (Li et al., 2012). These features enable users to exert control over or mitigate excessive sensory stimuli, such as rapid light changes or high decibel levels, thereby accommodating the sensitivities of individuals with sensory sensitivities.

Games that adhere to predictable patterns and provide structured gameplay can have the potential to yield significant advantages for individuals with autism, if we consider the premises of design for learning (Carrington et al., 2020), and the identified relevance of predictability (Jaramillo-Alcázar et al., 2022). The presence of a structured and coherent framework in these games can offer a sense of security, enabling players to effectively navigate and engage with the virtual environment.

For those individuals who have a preference for engaging in gaming activities on their own, the availability of a comprehensive single-player mode or the option to play offline holds significant value (Jaramillo-Alcázar et al., 2022). These characteristics afford players the opportunity to engage in games at their preferred speed, free from the demands typically associated with real-time multiplayer engagements, thereby facilitating a more serene and gratifying gaming encounter.

In order to mitigate stress and anxiety, game developers have the capacity to incorporate elements that circumvent the imposition of time constraints (Leite et al., 2019; Orme, 2021). For certain individuals with autism, the imposition of time constraints can elicit a sense of overwhelming pressure, thereby impeding their capacity to derive complete enjoyment from the game.

Furthermore, the inclusion of comprehensive progress tracking mechanisms and visually appealing representations of achievements (Leite et al., 2019) can serve as a crucial factor in fostering motivation among individuals diagnosed with autism.

For analogue games – and even though the board gaming community is considered particularly inclusive (Booth, 2021) – little has been explored about the ways in which assistive technologies can facilitate this activity. Besides the usage of alternative and augmentative communication, as in other social or playful situations (Pelosi et al., 2017), assistive technologies such as augmented reality are also being approached as paths to support

board game playing for individuals in the spectrum (Hsu & Lee, 2020). Another noteworthy perspective to consider is conceptualising games as assistive technologies due to their unique characteristics, as they possess the capacity to support the daily activities of individuals on the autism spectrum. Ringland et al. (2016) emphasised the potential of Minecraft as a tool to facilitate social interaction among children with ASD and their peers.

Empowerment, Inclusion, and Activism

As in other areas of assistive technologies and critical disability studies, activism and self-representation have proven central to the evolution of more accessible and inclusive gaming (Anderson & Schrier, 2022; Guo & Ellis, 2023; Sousa, 2020).

AbleGamers and SpecialEffect are two well-known instances of these groups, both of which significantly contribute to the advancement of inclusivity and the improvement of the gaming experiences for players with disabilities (Sousa, 2020).

In 2004, Mark Barlet and Stephanie Walker established the nonprofit organisation AbleGamers, which has been in the forefront of promoting accessibility in the gaming sector. Their goal is to remove any obstacles that prevent people with disabilities from fully appreciating video games. By working together, AbleGamers teaches game developers about accessibility best practices and guidelines, promoting the development of games that are inclusive from the start. A wider range of players will benefit from the seamless integration of accessibility elements into game design thanks to this proactive approach (The Able Gamers Charity, n.d.; Barlet, 2020 July 14; Barlet & Spohn, 2012).

In addition, AbleGamers offers vital resources and assistance to gamers with disabilities, including funding for the purchase of specialised gaming gear and assistive technology made specifically for their need. By bridging the accessibility technology and gaming divide, AbleGamers enables people to actively participate in gaming while overcoming the constraints put on them by their disability (The Able Gamers Charity, n.d.).

The goal of SpecialEffect, a UK-based nonprofit established by Mick Donegan in 2007, is to make gaming accessible to everyone. They concentrate on developing specialised solutions for those with significant physical limitations so that they can play video games with the help of

adaptive technologies. SpecialEffect pioneers ground-breaking solutions that address the unique issues faced by gamers with disabilities by collaborating directly with developers and technical experts (SpecialEffect Charity, n.d.).

These self-advocacy groups have an impact that goes well beyond just one player. Their initiatives have increased awareness of the value of taking accessibility and inclusion into account when designing games within the gaming industry. Because of this, many game designers are now more aware of accessibility features and have begun to include them in their games on a regular basis.

Furthermore, discussing best practices and defining gaming accessibility guidelines have been important contributions made by both AbleGamers and SpecialEffect (Barlet & Spohn, 2012; SpecialEffect Charity, 2023). Their advice has grown to be an invaluable resource for game designers looking to make their creations more inclusive, fostering a sense of belonging and support for gamers with disabilities. These organisations offer places where people may interact, share experiences, and help one another through workshops, events, and online platforms, eventually promoting community building and a sense of belonging (Carey, 2011).

More generally, and bringing a type of intersectional accessibility to accessible and technology-supported gaming (Sousa et al., 2022b), the work of other activist organisations, such as Women in Games (<https://www.womeningames.org/>), Women in Games International - WIGI (<https://www.getwigi.com/>), UKBlackTech (<https://ukblacktech.com/>), or Qweerty Gamers (<https://www.qweertygamers.org/>) has also been fundamental. As an example, in July 2023, WIGI highlighted on its weekly newsletter – through the image on Figure 3 – the celebration of Disability Pride Month, through a collaboration between ES Gaming and Oxygen Esports to enhance inclusion and accessibility for 46 million people with disabilities in the United States.



Figure 3 - Activist image shared in the WIGI newsletter on the 26th of July 2023 (Source: <http://giphy.com/>)

Moreover, assistive technologies and other strategies to foster accessible gaming seem even more crucial if we consider the recent evidence of the potential role of both digital and analogue games in the promotion of a set of constructs related to empowerment and well-being, in neurodivergent individuals.

Regarding ASD, serious games have been shown to have a significant role in the promotion of social and emotional intelligence (Hassan et al., 2021), while some studies also emphasise the importance of entertainment (commercial) games to foster social skills (Silva et al., 2021). Specifically, analogue games have also been shown to foster rich in-person interactions, seen as central to meaningful interventions with some individuals with ASD (Atherton & Cross, 2021). Furthermore, game design has been progressively seen as a strategy to promote inclusive research, by including individuals with autism in knowledge production and, consequently, promoting their empowerment (Carlier et al., 2020; Waardenburg et al., 2022).

Conclusion and Future Directions

In conclusion, the evolution of gaming assistive technology has seen significant advancements in hardware, and also in software. Although advancements have been made, it remains imperative to prioritise the considerations of neurodiversity and cognitive accessibility. The incorporation of customizable settings is of the utmost significance in addressing the distinct needs of individuals with autism. The incorporation of text-based communication features within games serves as a regulated platform for interaction, thereby fostering inclusivity. The inclusion of sensory integration features enables users to effectively manage or reduce overwhelming sensory stimuli, thereby providing support for individuals with sensory sensitivities. The incorporation of structured gameplay,

inclusive single-player modes, and the elimination of time constraints can potentially augment the gaming experience for this group. Moreover, the examination of the utilisation of assistive technologies in analogue games and the conceptualization of games as assistive technologies can provide additional avenues to individuals who are on the autism spectrum.

Moreover, activism and self-representation have played a crucial role in advancing accessibility and inclusivity in gaming for players with disabilities. Organisations like AbleGamers and SpecialEffect have made significant contributions by promoting accessibility best practices, providing resources and assistance, and collaborating with developers to create adaptive technologies. These initiatives have increased awareness within the gaming industry about the importance of considering accessibility features and guidelines. Additionally, the work of other activist organisations, such as Women in Games and Qweerty Gamers, has also been instrumental in promoting intersectional accessibility and representation in gaming. The use of assistive technologies and inclusive game design has shown potential in promoting empowerment and well-being for neurodivergent individuals, particularly those in the autism spectrum.

Ultimately, the utilisation of assistive technologies and inclusive game design has proven to have the capacity to enhance empowerment and well-being among individuals who are neurodivergent, specifically those who are on the autism spectrum. In order to further expand the limits of accessibility, it is imperative for future research endeavours to prioritise the comprehension of the psychological and social ramifications associated with gaming assistive technologies. The inclusion of these players in the design process and the collection of their feedback can be of great significance in the development of assistive technologies that are both efficient and meaningful.

In addition, conducting an examination of the effects of policy initiatives and accessibility standards driven by the industry on the acceptance and execution of assistive technologies in gaming can yield significant knowledge on strategies to advance this domain. Through the cultivation of collaborative efforts among researchers, game developers, disability advocates, and user communities, a future can be envisioned wherein gaming becomes more accessible and enjoyable for all different individuals.

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