

Assistive technology in gaming: A survey of gamers with disabilities

Pauliina Baltzar^{1,2}, Lobna Hassan² and Markku Turunen¹

¹ Tampere University, Kanslerinrinne 1, 33014, Tampere, Finland

² LUT University, Mikkulankatu 19, 15210, Lahti, Finland

Abstract

Assistive technology (AT), i.e. products to assist people with disabilities (among others), can enhance accessibility, yet we know little about their use in gaming. This study aims to answer the following research questions: 1. Do people with disabilities use assistive technology for gaming? 2. What assistive technology do people with disabilities use for gaming? 3. Why people with disabilities do not use assistive technology for gaming? The questions are addressed with survey data of 92 gamers with disabilities. The findings suggest that people with disabilities use different ATs for gaming. The most mentioned products were screen readers and custom controllers. However, the analysis has shown that people who are not currently using assistive technology could benefit from them, but barriers, such as price and lack of knowledge impede this use.

Keywords

Game accessibility, assistive products, assistive technology

1. Introduction

There are over three billion gamers in the world [1]. Moreover, 98,3% play at least some type of games, and 80,3% play digital games in Finland [2]. Further, it is estimated that 1% have a visual disability [3], 2% have a brain injury (a type of cognitive disability) [4], and 14% have a hearing disability [5] in Finland. With these estimates, at least 764000 gamers in Finland could be expected to have a disability. When taking all disabilities into account in addition to the mentioned ones, the number of gamers with disabilities could be much higher. Globally, 1,3 billion people have a disability [6] and for example, in the USA there are 400 million gamers with disability [7].

There are multiple types of disabilities, e.g., sensory (e.g., auditory, and visual disabilities), physical (e.g., mobility and motor disabilities), cognitive (e.g., learning, reading, and emotional

disabilities), and neuropsychiatric (e.g., autism and ADHD). The level and severity of disability vary, e.g., a person with a visual disability can be legally blind, have tunnel vision, or be colorblind. Therefore, belonging to the same disability group does not imply that people would have the same experience of disability. There is no one “disability experience” we can talk about since every disability, as every person, is different [8]. In this study, all disabilities are considered regardless of their severity and form.

Games can be made accessible typically in two ways: either by making a mainstream game with a variety of accessibility options (e.g., subtitles, audio cues, and adjustable game speed) or by making a game that is purposely designed for people with disabilities, such as audio games [9, 10]. In addition to making the game accessible, the use of different assistive technology can make the whole gaming session more accessible (e.g., offering different input and output methods).

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EMAIL: pauliina.baltzar@tuni.fi (A. 1); lobna.hassan@lut.fi (A.

2); markku@turunen.tuni.fi (A. 3)

ORCID: 0000-0002-1662-813X (A. 1); 0000-0002-6201-9159 (A.

2); 0000-0001-7395-0769 (A. 3)



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Assistive technology (AT) is utilizing the existing knowledge and skills of assistive products in real environments [11]. Assistive product (AP) can be any product from software to different devices which are used by people with disabilities for participating in different activities [12], in this case, gaming. Besides, assistive technology is used not only by people with disabilities but also, e.g., by the elderly, and people with chronic illnesses and mental health problems [13]. In this paper, we mainly refer to AT, since it is a more commonly used term, furthermore the participants used mostly assistive technology rather than products.

In some cases, assistive technology is necessary so that a person can play, in other occasions AT can make gaming easier and more comfortable. Overall AT helps overcome barriers and enable participation in society [13]. There are different products targeted at especially gamers with disabilities such as the Xbox Adaptive Controller [14], Tobii Eye Tracker [15], and mouth-controlled Quadstick [16]. However, these products, like any ATs, can be used by anyone and not only by people with disabilities.

This study addresses the following research questions based on the collected survey data: RQ1. Do people with disabilities use assistive technology for gaming? RQ2. What assistive technology do people with disabilities use for gaming? RQ3. Why people with disabilities do not use assistive technology for gaming?

2. Methodology

This paper is based on a collected survey data, which focuses on playing games with a disability, hence, assistive products are only a part of its contributions. The survey was conducted in English and Finnish between February 25th and April 25th, 2022, using Microsoft Forms. The survey had 34 questions consisting of multiple-choice and open-ended questions. Questions focused on background information (e.g., age, country, type of disability), playing habits (e.g., playing experience, platforms), and game accessibility (e.g., accessibility settings, assistive products, how games could be more accessible) and the participants were asked to “Describe your disability especially from viewpoint how it affects your playing”.

The study was distributed to various disability organizations especially in Finland via email, on Twitter, and in different accessibility-related

Facebook groups. The survey relied on the snowball method for gathering answers. In total 95 responses were collected of which three were excluded since the participants did not play games or were not disabled. The final data set consists therefore of 92 responses.

The analysis was conducted by the first author who speaks both English and Finnish using ATLAS.ti (version 22). The data analysis process started by combining the data from both survey versions, English (n=30) and Finnish (n=62). After close-reading the data twice the next step was data-driven, inductive, coding.

For this study, additional coding was done on top of the existing codes from a previous study [17] based on the research questions. The coding was done separately for people who used and did not use AP based on the question “Do you use assistive products while playing?” followed with “What assistive products do you use while playing?” First, the coding was done with data from people who use AP, to specify what kind of products they use. For this study, the coded assistive products were now coded under larger themes (e.g., the original code “Xbox Adaptive Controller” was now under the theme “Controllers”). Next, the data from gamers who do not use AP was analyzed to discover if they could benefit from using AT and if there are reasons why they are not using them, since this was not considered in the first coding rounds.

3. Findings

First, this section presents relevant background information. Next, the focus is on using assistive technology in gaming, and finally, on not using AT.

3.1. Background information

The most present age group in the survey was 25-34 years old (n=30), detailed information is available in Table 1. 48% (n=44) of the participants identified as men, 38% (n=35) as women, 11% (n=10) as non-binary and 3% (n=3) preferred not to answer the question. Most participants were from Finland (n= 65), all present countries are listed in Table 2.

Table 1

Age (n=92)

Age	Frequency
Under 18	8
18-24	16
25-34	30
35-44	25
45-54	8
55-65	4
Over 65	1

Table 2

Country (n=92)

Country	Frequency
Finland	65
USA	9
UK	4
Germany	4
Canada	2
France	2
Sweden	2
Malaysia	1
Netherlands	1
Spain	1
Austria	1

Of the participants 68% (n=63) had one disability, 19% (n=19) had two disabilities and 14% (n=10) had more than two disabilities. The present disability groups are listed in Table 3.

Table 3

Disability (n=92)

Disability	Frequency
Physical	49
Vision	32
Neuropsychiatric	26
Hearing	13
Cognitive	7

The most popular gaming platform was PC, including Mac, (n=73) and the most popular console was Nintendo Switch (n=27), all platform information can be found in Table 4. Most respondents played on more than two platforms (n=42).

Table 4

Platform (n=92)

Platform	Frequency
PC	73
Phone	50

Nintendo Switch	27
PlayStation 4	21
Xbox One	14
PlayStation 5	13
Nintendo Wii/WiiU	10
Xbox series X	7
Tablet	5
PlayStation 3	4
PlayStation 2	2
NES	2

3.2. Using AT in gaming

According to the survey, 42% (n=39) use assistive products while gaming, however, the majority, 58% (n=53), do not use APs. Out of 39 participants who used APs 37 specified the products they were using. 59% (n=22/37) of the respondents were using one assistive product and 41% (n=15) were using two or more APs.

The most used AT was related to different controllers (n=15/37) and screen readers (n=12). Only some of the respondents specified the exact devices they were using, such as Xbox Adaptive Controller, Quadstick, and Tobii. Likewise, some software solutions were mentioned, such as Cheat Engine and different accessibility add-ins or mods. In addition to AT related to gaming, the respondents mentioned products such as stool chairs, blankets, and noise-canceling headphones.

Since the participants were using multiple platforms for gaming, there are no clear results on how many used specific AT on which platform. However, some limited findings can be reported, since some participants specified what ATs they were using on which platform, and some were playing only on one platform. Different custom controllers were used on every platform, screen readers were used on other platforms than Wii/WiiU and PlayStation 4/5. Quadstick was used on PC, and PlayStation 4/5, Tobii was used on PC, and Xbox Adaptive Controller on Nintendo Switch, PC, and Xbox 360/Series X.

3.3. Gamers not using AT in gaming

As stated, most of the participants (58%, n=53) did not use assistive products. Eight participants who did not use APs said their disability does not affect their gaming, so it is logical that there is no need for any APs.

Most participants did not specify why they are not using assistive products, however, some stated that at least the custom-made controllers are too expensive for them. Another identified reason for not using the devices is a lack of knowledge.

"I have dreamed for many years that someone would make a controller for disabled people whose hands work the same way as mine do, so that by turning your head you could perform at least some functions."

*(Participant 77, male, physical and neuropsychiatric disabilities)
[Translated from Finnish]*

Furthermore, some participants stated that they do know some assistive products exist, but it is hard to find any information, especially in Finnish, on them.

Nevertheless, at least 53% (n=24/45) of respondents, who do not use APs and whose disability affects their gaming, could benefit from using ATs, such as accessible controllers based on our analysis. For example, many respondents with physical disabilities who did not use AT reported that controllers are too heavy for them, cannot be used with one hand, or cause pain, hence more lightweight customized controllers could be beneficial to the participants. In some identified cases, participants with neuropsychiatric and hearing disabilities report that they do not get all game information if only communicated in audio, so speech-to-text software could be useful for them.

4. Discussion

The discussion section is divided into three subsections. First, the focus is on using assistive technology in gaming, and next, on barriers to using AT. Finally, limitations and future research are discussed.

4.1. Using AT in gaming

The most used assistive products, outside of games, were screen readers, text-to-speech, and magnifying features [18]. Likewise, one of the most used ATs within gaming was screen reader. Overall, 46% (n=43) of the participants in our survey were using assistive products, however, many participants reported that games could be made more accessible for them by allowing using their ATs more freely on all platforms and games. For example, participants reported that their

gaming setup for PlayStation 4 is not supported by PlayStation 5. These are the key barriers needing to be tackled in the future.

Based on the answers people see different products as AP, for example, some mentioned everything they use to make their gaming more comfortable such as blankets and pillows, while most focused on more technical aspects. In addition, some were thinking of eyeglasses and hearing aids as assistive products.

4.2. Barriers for using AT

As stated at least 53% (n=24/45) of the participants who do not currently use assistive technologies could benefit from them. However, even if ATs would be decidedly considered useful, not everyone has access to them. In fact, in 2018 only 10% of the people who would need AT had access to them [19]. Overall, the World Health Organization [19] has identified four reasons blocking assistive technology usage: 1) **Policy**, the technology is not included in health or welfare schemes which leads to people needing to pay for their products. 2) **Products**, the industry is quite limited and lacks funding. 3) **Provision**, depending on the country's income-rate people need to use stand-alone services in multiple locations, products do not exist in national services, or they need to rely on donations and charity services. 4) **Personnel** are not educated enough about different products. [19]. Furthermore, other researchers have identified different barriers to using ATs, such as availability and acceptance [20], funding and costs, lack of awareness, inadequate assessment, attitudes, and stigma [21].

Likewise, we identified a lack of knowledge as one barrier to the usage of AT. In fact, sometimes it might take years for people to find suitable products for them [22]. Overall, it seems people do not know what kind of products exist, if they would be useful, or where to get the products.

Furthermore, even with the knowledge of different ATs, the high price was identified as a barrier. In Finland, people need to pay themselves for the AT they are using for gaming, for example, custom controllers, even if they would need these devices e.g., for studying. ATs can be expensive, for example, the regular Xbox Controller costs around 65€. The most mentioned used AT, the Xbox Adaptive Controller is around 100€, Tobii Eye Tracker 5 costs around 260€, and when it comes to mouth-controlled devices, Quadstick

price is already over 500€, in addition, some adaptors are often needed. Taken altogether, e.g., the Xbox Series X console costs 510€ - so gaming with the newest console with a mouth-controller could cost already over 1000€, doubling the starting cost for a gamer with a disability.

The high prices of AT lead easily to injustice. We are not equal until all people with and without disabilities can study and work in their desired field without the need to consider how they can cover the AT costs. The prices also lead to gamers needing to be really invested in gaming as a hobby to be willing and able to buy the needed products. It is extremely difficult to try out a device and then realize the product is not suitable. However, some of the assistive technology can be affordable such as screen readers and different software-based products.

To conclude it seems that both assistive products and gaming-related ATs have the same barriers to tackle. Luckily it seems that the barriers have been noted and there are attempts to overcome them, such as through the Global Cooperation on Assistive Technology (GATE), which is working towards easier access to assistive products on a global scale [23]. More, however, is needed in the game industry, starting from advocacy groups that educate and push the popularity of ATs forwards to facilitating cross-platform use of ATs and ensuring their compatibility.

4.3. Limitations and future research

The survey question subject of the main analysis here was formulated “Do you use assistive products while playing? For example, screen readers or custom-made controllers.” It is possible that the examples given led the participants to answer with the named products, making them some of the most mentioned. Nevertheless, we see respondents who interpreted the question openly and mentioned all products that assist their gaming, such as pillows and blankets.

While considering who would benefit from AT, the authors relied purely on the collected data, it might be that the information participants have given over emphasized the importance of ATs, but it is also possible that the participants have only given limited information on how their disability affects their gaming and potential need for ATs could not be identified.

This study is also limited by its survey format, offering a limited amount of data and no way to ask more from the participants, hence future studies should focus on the ATs used in gaming in-depth for example via additional surveys or interviews. Likewise, studies could analyze gender and age differences in using AT. In addition, studies should focus on discussing if using AT can be considered as cheating (e.g., using aim bots), and how could we overcome the potential problems related to it.

5. Conclusion

This paper aimed to address the following research questions based on the collected survey data: 1. Do people with disabilities use assistive technology for gaming? 2. What assistive technology do people with disabilities use for gaming? 3. Why do people with disabilities not use assistive technology for gaming?

This study has shown that people with disabilities use different assistive products. The most mentioned products were screen readers and custom controllers. However, the analysis has shown that people who are not currently using ATs could benefit from them, and are not using them due to external barriers, such as price and lack of knowledge.

This study offers a new opening to investigate further AT in the gaming context. To conclude we need to increase awareness of assistive technology in general, improve these products, their compatibility, and pricing, and in addition, improve societies’ awareness of the importance of games if we are aiming to see more equality in gaming.

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