

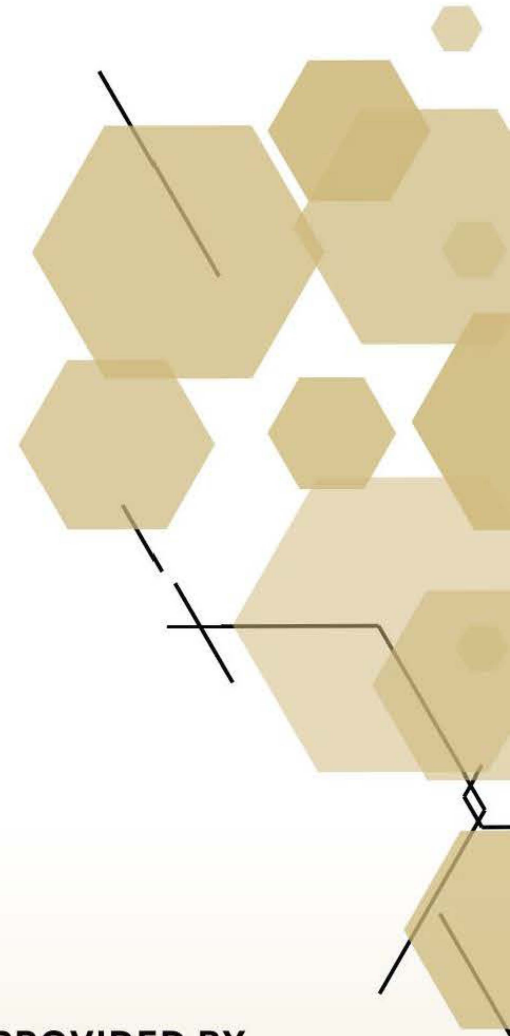


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MEMBER TECH LITERACY LITERATURE REVIEW



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Review of Technology Literacy Landscape for People with Disabilities

Introduction

The issue of technological barriers has been well-explored in the literature over the last three decades. People with disabilities (PWDs), as well as the elderly and those living within a low socioeconomic margin, are at the greatest disadvantage when it comes to digital literacy (Raja, 2016). While the digital world and technological innovations continue to rapidly advance, there are still many hurdles that PWDs face when it comes to successful utilization of information and communication technologies [ICTs] (Tsatsou, 2020). The purpose of this literature review is to explore the current climate as related to the digital divide experienced by PWDs, and to identify potential solutions of best practices for this population.

Methods

We reviewed all available literature to date using the following keywords: adult technological literacy, curriculum design, devices, digital accessibility, digital divide, digital equity, digital literacy, disability, intellectual or developmental disabilities (IDD), Internet, Medicaid, short message service (SMS), social isolation, Telehealth, traumatic brain injury (TBI) and video chat.

We located 21 papers that matched our keywords for the purpose of this literature review. Two reviewers participated in this analysis. Our initial review included scanning each article's abstract or the introduction section to determine relevance to our study, and preliminary grading of the papers on a scale from 1 to 5, from the least relevant (1) to most relevant (5). Articles graded 3 to 5 were moved forward into our second round of review which examined each paper in greater detail. In this second phase, 13 papers were included in our final review. We excluded articles that were over 25 years old due to the progressive nature of technological advancements and potential for obsolete information that no longer holds true. While the objective of this literature review was to explore adult literacy, we did

include a paper by Khanlou et al. (2021) discussing young adults and adolescence in order to gain perspective on barriers and potential solutions for this age group that could apply to the adult population. It is also important to note that most studies available to date are limited to small sample sizes, descriptive statistics and inconsistency in defining disability (Dobransky & Hargittai, 2006). We found almost no literature addressing the issue of digital divide impacts individuals with TBI and those served by Long Term Services and Supports (LTSS), as most papers cover a range of disabilities and a variety of socioeconomic backgrounds. Given our first-hand experience in our own clinical environment largely servicing individuals covered by Medicaid, there appears to be a direct correlation between their socioeconomic background and their medical coverage. This is because PWDs tend to live in the lower income margin compared to people without disabilities (Raja, 2016 & Valdez et al., 2021). Therefore, despite the lack of literature available, we have been able to draw reasonable conclusions and identify the digital literacy landscape as related to members served through LTSS from the research available to date. The following discussion will highlight the various aspects including barriers, limitations, as well as benefits of the digital landscape for PWDs, including those from low socioeconomic backgrounds as well as the elderly.

History

Given the potential impact of the COVID-19 response on the digital landscape for PWDs, we primarily examined literature from 2020 onward. Our research reveals that while the pandemic prompted innovation in technologies such as telehealth, it also brought attention to pre-existing challenges faced by PWDs in accessing technology. By reviewing older articles, we gained insight into the evolution of research on this topic.

In 2010, a technology profile conducted by Pew Research explored the challenges faced by Americans living with disabilities in accessing digital resources. Despite the passage of time and changes in

demographics, this snapshot of the situation remains relevant today. A decade ago, PWDs were more likely to live in lower-income households, have lower levels of education, and be older. They were also less likely to use the internet, with only 54% of adults living with disabilities accessing it, compared to 81% of adults without disabilities. Additionally, internet access was a major issue, with only 41% of American adults with disabilities having broadband at home, compared to 69% of those without disabilities. This lack of access has significant consequences, including limited job opportunities, restricted access to career skills and training, and difficulty obtaining health information (Fox, 2010).

Moving forward, two major trends appear to have shaped the pre-pandemic intersection of disability and technology (Raja, 2016). The first trend is that more institutions, including government agencies, are turning to the internet and Information and Communication Technology (ICT) as channels for delivering information to the people they serve. The article notes that the success of using the internet and ICT for the inclusion of PWDs is heavily impacted by stakeholders' knowledge and awareness of the ICT solutions available, laws and policies, and the capacity of various stakeholders to support accessible ICT services. In addition, the use of the internet and ICT can widen disparities between persons with and without disabilities if they are not designed to be accessible and inclusive. Therefore, policy and practice recommendations are necessary to promote the adoption of accessible ICT services for inclusive development.

The second is the popularity of internet-enabled communication methods. Iterative innovation, driven by popular demand, has led to increased user choices that include accessible apps, features, and devices. People with and without disabilities have been able to customize their devices using features that may or may not have initially been developed for PWDs. A growing number of devices offer built-in assistive technology functions. This trend is likely affected by an increased emphasis on inclusion and universal design (Raja, 2016).

In addition to the technology world leaning toward more inclusive design of digital devices, there have also been shifts in instructional/educational research. The definition of digital literacy has broadened to include more than the skills and knowledge required to complete technical tasks. The concept of self-efficacy, a belief in one's capability to organize and execute tasks, is increasingly seen as fundamental to understanding digital literacy (Tsatsou, 2020).

Current Situation/Climate

The review of existing literature reveals that despite recent improvements in availability and utilization of digital technologies by PWDs, the major barriers that persist include financial cost, lack of training and support, and availability and inefficient design of accessible technology (Casillas et al., 2020; Khanlou et al., 2021; Lussier-Desrochers, et al., 2017; Tanis, 2021; Valdez et al. 2021). Furthermore, the varieties of disabilities diagnosed today differ not only based on their medical terminology, but also on individuals' perceptions, beliefs, and attitudes about their own disability (Tsatsou, 2021). For this reason, each type of disability needs to be considered on an individual basis as related to the topic of digital divide (Kim et al., 2018; McDonald & Clayton, 2013). For instance, someone living with an intellectual disability will have very different needs and goals compared to someone with a mobility impairment. Even still, depending on the severity of the intellectual or mobility impairment, those needs will vary considerably based on the individual's intellectual and physical abilities (Tsatsou, 2020). As such, assessing disability on such an individual basis is beyond the scope of this review; therefore, the focus of our research is on individuals with visual, hearing, speech, cognitive, and mobility impairments in general.

There is no doubt that the digital world and technological advances have brought on many advantages to the society, such as access to information and communication, social media, public and social services, job opportunities, as well as entertainment (Lussier-Desroches et al., 2017; Raja, 2016;

Tsatsou, 2020, 2021). However, not everyone can participate and utilize ICTs the same way; in fact, digital technologies can create even more barriers or hurdles for users living with a disability due to lack of technologies' universal design (Raja, 2016).

Financial cost and resources to aid funding of technology continue to be the biggest challenge for the majority of individuals (Tanis, 2021). While state funding exists and is available, it is only limited to specific technology devices and aids that often fail to meet the specialized needs of individuals (Lussier-Desrochers et al., 2017). Furthermore, these individuals are often in no position to purchase their equipment privately, secondary to their socioeconomic disadvantage. A possible solution to this has been addressed by Microsoft Windows and Mac OS with the development of accessibility settings that are built into one's smartphones or tablets without additional costs (Raja, 2016). These may include voice recognition, text-to-speech, keyboard or mouse navigation, to name a few. There are other software packages that operate on the open-source principle, are available to anyone, and can offer lower cost alternatives for other expensive software (Perrin & Atske, 2021). While these solutions may still be in their infancy, they offer a promising future of more affordable and accessible technology (Tanis, 2021).

Training and support required during the process of technology acquisition and utilization is detrimental to the individual's success and continued use of ICTs (Khanlou et al., 2021). Yet, many PWDs, as well as their caregivers, still lack the basic knowledge and awareness of available technologies, and therefore require guidance or training from a trained professional (Raja, 2016). Not only do these professionals need to possess sufficient knowledge about accessible technology, but they also need to understand one's disability and its implications on the use of ICTs (McDonald & Clayton, 2013). For instance, in the younger population, this can be particularly important during the individual's transition from schooling to workforce (Khanlou et al., 2021). On the other hand, for the elderly, technology may play a more important role for communication with their health care provider and or staying connected

with their family and friends (Lussier-Desrochers et al., 2017). Education and training therefore need to be personalized to everyone's needs and goals to optimize success and independence with use of ICTs (Tanis, 2021).

Insufficient design of digital data and poor accessibility of online resources further limits effective usage of ICTs by PWDs (McDonald & Clayton, 2013). Watling & Crawford (2010) cite this issue as one of the biggest barriers to digital inclusion, as design developers often fail to adapt accessible features into their software. Such an oversight may stem from lack of awareness and acute need for these alternative technologies and their inclusion into all software that is being developed (McDonald & Clayton, 2013). Digital accessibility in terms of universal design should be considered from the very beginning of the product development as it is much more complicated to redesign a product after it has already been made (Dobransky & Hargittai, 2006; Raja, 2016 & Tsatsou, 2021). Inaccessibility can lead to technology rejection or abandonment, as well as further social exclusion and perceived disability stigma (Tanis, 2021).

A recent report with promising findings discussed the variety of devices and their prevalence of use amongst PWDs. Interestingly, it appears as though most individuals, regardless of disability, do have access to high-speed internet in their homes (Perrin & Atske, 2021). Additionally, comparable results were found for ownership of tablets between individuals with and without disabilities. However, the possession of all devices collectively including smartphones, computers and tablets decreases by almost 20% for PWDs. Additionally, having a device available is not directly related to its usage, as there is still a significant difference between PWDs who never go online (15%) or connect to the Internet (75%), in comparison to those without disabilities (5% and 87%, respectively). This finding is most likely related to the lack of education, training and support that is not offered or provided when the device is purchased (McDonald & Clayton, 2013).

Another phenomenon that may further divide the digital equity between the disabled and non-disabled population has emerged as a direct result of the Covid-19 pandemic: the provision of e-medicine, or telehealth services (Valdez et al., 2021). In today's climate, the use of telehealth services appears to play a crucial part for everyone's health care needs. At this point, most of us have experienced the convenience and certain benefits that come with attending our medical appointments remotely. Nevertheless, the system is far from perfect. Theoretically, PWDs would seem to be the ideal group to take advantage of telehealth services over in-person appointments. Telehealth can eliminate inconveniences such as the need to travel to the doctor's office, arrange for a caregiver to accompany them, and navigate public spaces that may not be fully accessible (Valdez et al., 2021). In reality, using technology to substitute in-person medical services circles back to the issue of inaccessible software and lack of comprehension on how to use these digital services for both the individuals and their caregivers (Tanis, 2021). While the use of telehealth may be advantageous over the burden related to physical office visits, to ensure success, multiple factors need to be considered. These include software and hardware compatibility, ease of use of the telemedicine platform, communication in all languages, such as sign language, closed captioning, or use of interpreter, and multiple modes of communication including text and voice. Furthermore, it is important for these services to maintain everyone's privacy and enable multiple user access on behalf of the patients who require several caregivers to assist (Tanis, 2021). Lastly, patient, caregiver as well as provider education should be in place to ensure that all participants are comfortable and understand how to successfully utilize telemedicine to its maximum potential (Khanlou et al, 2021).

Casillas et al. (2020) examined provider's perspective on caregiver access to patient portals for individuals served through the safety net health systems (health care establishments servicing anyone regardless of their ability to pay). Since caregivers play a vital role in the everyday life of PWDs, it is important to determine their understanding of the use of online medical services on behalf of those

who they care for. It was found that while providers support the online model of health care information delivery, similar challenges, such as digital literacy or language barriers are experienced equally by PWDs and their caregivers. Additionally, one of the major concerns caregivers have with the use of online services is privacy of information shared online (Casillas et al., 2020 & Valdez et al., 2021). Another concerning dimension of privacy and security of sensitive information is related to **trust** in obtaining and exchanging health information via online platforms (Kim et al., 2018). The issue of trust is predominantly related to low digital literacy or lack of knowledge of what technology can do for an individual. Also, the novelty of technology and the overwhelming amount of digital information available can be particularly intimidating to the elderly since they were not introduced to the digital world until later in their lives (Dobransky & Hargittai, 2006; Tanis, 2021). Despite the limited research in these areas, the authors' findings highlight the need for targeted training and education on the use of technology not only for the PWDs, but also their caregivers who actively participate in the person's care (Casillas et al., 2020 & Kim et al., 2018).

It is evident that in an ideal world, PWDs would be the ones who would most benefit from digital technology (Khanlou et al., 2021). If utilized to its maximum potential, technology can provide invaluable tools for one's empowerment, autonomy, and independence (Lussier-Desrochers et al., 2017). Nevertheless, digital technologies should not be a form of replacement for in-person interaction or provision of social and medical services, but rather, an enhancement to the person's everyday activities of daily living (Tanis, 2021). Furthermore, today's technology is a form of necessity, especially in the post pandemic world, and should be available to everyone equally.

In any case, all PWDs want to feel included, have a sense of belonging and be integrated into society without prejudice (Khanlou et al., 2021 & Tsatsou, 2020,2021). Inclusive digital technology should be everyone's right, not an exclusive privilege to those who need it most (McDonald & Clayton, 2013).

Conclusion

Our findings suggest that one of the most significant barriers to technology for PWDs is cost. Ownership of up-to-date technology can be expensive and financially non-feasible for many members in this demographic. Additionally, the lack of knowledge, understanding and availability of technology can prevent individuals from being able to use these tools effectively for their own benefit (Tsatsou, 2020). There are also design flaws in ICTs that can impede an individual's ability to take full advantage of technological resources if they are not designed with accessibility in mind (Lussier-Desrochers et al., 2017).

In order to address these issues, governmental initiatives should be established that focus on making technology more accessible and affordable for PWDs (Tanis, 2021). Programs could include reduced rates for specialized software and hardware, or subsidies for digital access fees to help facilitate use of technology by the most disadvantaged (Lussier-Desrochers et al., 2017). Importantly, organizations should consider developing educational programs targeted not only toward PWDs, but also toward their caregivers and service providers in order for them to understand how technology works (Watling & Crawford, 2010). There also needs to be greater awareness among this population about the availability of free resources, such as online courses or tutorials that offer help in gaining digital literacy skills (Raja, 2016).

In summary, PWDs face numerous challenges with relation to digital literacy, as well as knowledge and understanding of available resources or how certain technologies work. In order for these individuals to take full advantage of technological tools available today, initiatives should be developed that focus on making technology more affordable and accessible while providing educational programs tailored towards helping people comprehend the benefits of bringing technology into their

lives. Addressing these issues will help facilitate an equal opportunity for individuals with and without disabilities and help streamline the benefits offered by modern advances in technology today.

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