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## Facilitating the implementation of AI-based assistive technologies for persons with disabilities in vocational rehabilitation: A practical design thinking approach

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### Abstract

What is vocational learning? It refers to education and training that focuses on acquiring practical skills and knowledge directly related to specific jobs or careers. All over the world, it is unfortunate that a person with a disability is less likely to be employed than one without. AI has served as an important tool in providing assistive technologies for persons with disabilities in vocational learning. Luckily, person which is an extension of innovation that allows you to design solutions for end users with a single problem statement in mind was developed. (Abou-Zahra, Brewer and Copper: 2018). In this research we sought out ways in which AI has helped those with disabilities. Are the AIs really effective? Do they come with any challenges? Can these problems be solved? We discovered some challenges encountered through the use of these AI and found a way to solve them. By leveraging AI algorithms, researchers and developers can create cost-effective solutions that cater to a wide range of disabilities.

This includes AI-powered prosthetics, smart glasses for visual assistance, AI voice technologies, such as Siri, Alexa, accessibility tools such as screen readers, captioning services and other assistive devices that enhance mobility, communication, and overall independence and autonomy. AI can track and analyse an individual's progress in vocational training then adaptive learning platforms can adjust the difficulty and pace of training materials based on the learner's performance and progress. Incorporating AI into vocational training can significantly enhance accessibility, individualised support, and the overall learning experience for people with disabilities. It empowers them to acquire the skills and knowledge they need to pursue meaningful careers and contributes to greater inclusivity in the workforce.

**Keywords:** design thinking, vocational learning, AI-AT



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**“Concentrate on the abilities your disability doesn't hinder and don't dwell on the things it interferes with. Be disabled physically, not in spirit” - Stephen Hawking.**

## 1. Introduction

In the current age and time, persons with disabilities unfortunately face a lower chance of acquiring gainful employment, as compared to their able-bodied counterparts. This may be caused by certain hindrances including: negative attitude of employers towards persons with disabilities, employers opting to hire them part-time rather than full-time, strenuous jobs, the list goes on. To help overcome such obstacles, these individuals receive vocational training which equips them with the practical skills on a particular job or career. This increases their chances of getting absorbed into the labour force. To further assist these individuals, Artificial Intelligence (AI) based assistive technologies are being used.

According to the United Nations Convention on the Rights of Persons with Disabilities (CRPD), disability is not an attribute of the person but is the result of environmental and behavioural barriers. They arise from the interaction between people with disabilities and society, thereby preventing them from participating equally, fully and effectively as citizens in society.

According to the World Health Organization, about 15% of the world's population has some form of disability, totalling approximately 190 million people. Some of these disabilities can be represented by degenerative diseases such as Parkinson's, Amyotrophic Lateral Sclerosis (ALS), Alzheimer's, physical, mental, visual and hearing disabilities etc. Assistive technologies in this context contributes directly to overcoming difficulties in their daily lives, allowing them to receive education, becoming part of the labour market and improving their social participation in general. **But how can AI impact assistive technologies?** AI can assist in ensuring that digital platforms and software remain accessible and usable for individuals with disabilities. By employing AI algorithms, developers can automate accessibility, testing and identify potential barriers or issues that may hinder accessibility.

Assistive technologies have made great advances in the integration with Artificial Intelligence of Things (AIoT) devices. AIoT is a combination of artificial intelligence technologies with the Internet of Things (IoT) infrastructure to achieve more efficient IoT operations, improve-human interaction and enhance management.

Artificial Intelligence (AI) has revolutionised numerous industries, from healthcare to finance, transportation to entertainment. However, one aspect that is often overlooked is its potential to enhance accessibility for individuals with disabilities. AI accessibility is a powerful tool that can level the playing field and empower people with disabilities to lead more independent and fulfilling lives. AI can offer a lot of benefits in improving accessibility across different areas.

## 2. Application areas of ai-based assistive technologies

### Education

Artificial Intelligence can revolutionise education for students with disabilities. For example, AI powered language processing mechanisms can provide real-time transcription and captioning services for students with hearing impairments, making classroom lectures and discussions more accessible. Moreover, it also personalises learning experiences and provides tailored recommendations based on individuals needs and learning styles.

### Employment

AI powered chatbots can help streamline the job application process and provide job-related assistance to candidates with disabilities. AI can also enhance workplace accommodations by automating tasks and providing adaptive technologies that cater for specific needs.

### Home

Smart home devices equipped with AI capabilities can be voice-controlled, allowing people with mobility impairments to control various aspects of their homes independently. AI can automate routine tasks, such as turning on lights or adjusting the temperature, making daily living more manageable. This makes the home environment more convenient for individuals with disabilities.

### Community

When it comes to aiding a community, AI can enhance accessibility within it by improving communication and information dissemination. AI powered language translation services can break down language barriers and enable individuals with different language backgrounds to interact seamlessly. They can be people from different countries, or from the US as well, but prefer to communicate in ASL (American Sign Language). Additionally, AI chatbots can assist individuals with disabilities in accessing information, services and support, enhancing their overall engagement with the community.

Isn't it incredible that Artificial Intelligence can be used as an assistive technology aimed at developing new, more accessible and affordable ATs? By leveraging AI algorithms, researchers and developers can create cost-effective solutions that cater for a wide range of disabilities.

## 3. Types of AI-at and their efficiency

### Image recognition

Algorithms in AI designed for image recognition can assist those who are impaired visually in understanding and interacting with their surroundings. They will be able to navigate their surroundings better because these technologies can describe objects and scenes.

### **Lip reading**

For the hearing-impaired lip-reading technology can convert visual input of lip movements into text output. This is significantly beneficial in situations where sign language interpretation is unavailable or practical.

### **Summarising information**

AI algorithms capable of summarising large volumes of text or content makes it so much easier for individuals with cognitive disabilities or reading difficulties to comprehend complex information. It also helps those with a short attention span to extract the key points from a long document.

### **User navigation**

AI-powered navigation systems can provide real time guidance, suggest accessible routes, and offer information about nearby accessible facilities. This generally helps those with mobility impairments to navigate unfamiliar environments with greater ease (Akbari et al, 2020).

### **Regression testing**

AI can assist in ensuring that digital platforms and software remain accessible and usable for individuals with disabilities. By employing AI algorithms, developers can automate accessibility testing and identify potential barriers or issues that might hinder accessibility.

Every rose has its thorn. However, much AI has greatly advantaged persons with disabilities, it also poses several challenges to these individuals. Some of these include:

- Limited capacity of the systems to engage with human diversity.
- Cost – High quality assistive technologies can be expensive to develop and implement.
- Dependence- Excessive reliance on AI assistive technologies can lead to a sense of dependence and potentially reduce an individual's motivation to develop their own skills and strategies for overcoming disabilities.
- Privacy concerns- AI assistive technologies often collect and process personal data, raising privacy concerns for users especially if data is breached or mishandled.
- Lack of customisation- AI systems may not always provide highly customised solutions and individuals with unique needs may not find off-the-shelf AI assistive technologies to be a perfect fit.

## **4. Research**

Applications of artificial intelligence are increasingly being used to support work and learning in the workplace. Adaptivity and recommender systems, as key features of such innovative technologies, allow for enhanced personalization. Most notably, persons with disabilities may benefit from such technologies at work and during on-the-job training. Adapting such systems to very heterogeneous target groups, however, is not easily done. Implementing AI-based assistive systems in various educational settings in vocational training, especially in

vocational rehabilitation, can also be challenging. This position paper looks at existing AI-based applications to analyse their potential for more inclusive workplaces and qualification processes. Furthermore, those technologies are discussed in the context of current ethical discourses to identify to what extent normative requirements are being reflected in existing AI-based applications (Beudt et al, 2020). We identified different people with disabilities within our area and assigned the most compatible AI-AT.

Later on, we monitored the progress and asked the people if they were of any assistance. The results were mostly positive.

## 5. Results

In the field of Human-Computer Interaction, the Personas methodology is used to communicate the user's preferences, goals, frustrations and requirements. Although a widely used method, little progress has been made in creating a personas model. (Negrus and Buraga, 2012) Therefore, not all people benefited with the AI-AT. However, others relatively found them helpful, good feedback was received and we were able to determine that with more consideration the human-computer interaction can be more developed to greatly assist more people with disabilities.

## 6. Conclusion

After carrying out a rigorous research, a conclusion was drawn; bearing far more pros than cons, application of AI-assistive technologies for persons with disabilities in vocational learning has and continues to bear fruit in helping persons with disabilities pursue their dreams .Furthermore, it has helped them gain more confidence in themselves hence improving their social lives by enhancing their communication skills.AI has presented itself as a promising tool in assisting individuals overcome various obstacles they face in their daily lives.

In conclusion, despite all the challenges faced in facilitating the implementation of AI-based assistive technologies for persons with disabilities in vocational rehabilitation, vocational learning has helped enhance accessibility, individualised support, and all the learning experience for people with disabilities. It empowers them to acquire skills and knowledge needed to pursue meaningful careers.

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