University of Essex | Online

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Module: Research Methods and Professional Practice

Assignment: Research Proposal

Research Topic: Harnessing Artificial Intelligence (AI) in Assistive Technologies for Autism Spectrum Disorder (ASD): Bridging Gaps in Employment

Slide 1:

Hello my name is Sam. In this presentation I will explore how Artificial Intelligence (AI) can mitigate employment challenges faced by individuals with Autism Spectrum Disorder (ASD).

Slide 2:

Before discussing the employment challenges faced by individuals with ASD, I will provide some background on ASD and the role of assistive technologies for individuals with disabilities.

Autism Spectrum Disorder more commonly known as ASD is a neurodevelopmental condition that affects social communication and behaviour (National Institute of Mental Health, 2023).

Assistive technologies are tools designed to address the challenges faced by individuals with disabilities (Assistive Technology Industry Association, 2023).

Slide 3:

The bar chart on this slide illustrates the global prevalence of ASD.

It is estimated that 1 in every 44 children and 1 in every 45 adults worldwide are on the autism spectrum (CDC, 2021).

However, estimates vary by source, with the CDC suggesting that ASD affects approximately 2% of the population (CDC, 2023) and the World Health Organization estimating its closer to 1% (WHO, 2022). This translates to 80-160 million individuals globally.

Slide 4:

The scatter plot compares the average achievement in human development with ASD prevalence across various countries.

The Human Development Index (HDI) measures life expectancy, education, and per capita income (UDNP, 2023).

The data suggests that countries with higher HDI scores typically report higher ASD prevalence, potentially due to better diagnostic capabilities, awareness, and healthcare access.

The United Nations Development Programme gave Brazil a HDI score of 0.754 (UNDP, 2023), Canada a HDI score of 0.929 (UNDP, 2023), China a HDI score of 0.769 (UNDP, 2023), Nigeria a HDI score of 0.535 (UNDP, 2023), South Korea a HDI score of 0.916 (UNDP, 2023), The United Kingdom a HDI score of 0.932 (UNDP, 2023) and The United States a HDI score of 0.926 (UNDP, 2023).

According to the Ministry of Health of Brazil the percentage of the population in Brazil with ASD is 1.4% (Ministério da Saúde do Brasil, 2023)

According to Connect n Care ABA Therapy the percentage of the population in Canada with ASD is 1.515% and in South Korea it is 1.89% (Connect N Care ABA, 2023)

According to Discovery ABA the percentage of the population in China with ASD is 2.6% (Discovery ABA, 2023)

According to the Autism Society of Nigeria the percentage of the population in Nigeria with ASD is 0.8% (Autism Society Nigeria, 2023)

The National Autistic Society estimates the percentage of the population in The United Kingdom with ASD is 2% (National Autistic Society, 2023)

The CDC estimates the percentage of the population in The United States with ASD is 2.778% (CDC, 2023)

Slide 5:

The main question guiding my research is: How can AI-based assistive technologies be designed and deployed to improve employment outcomes for individuals with ASD?

Slide 6:

The aims and objectives of my research are to evaluate existing AI solutions for ASD employment, to identify challenges in designing inclusive AI and to propose a framework for effective AI tools.

Slide 7:

The Gannt chart on this slide outlines the timeline for my research. In the first month I will perform a comprehensive literature review of existing research to identify any gaps in the current literature, gather knowledge and identify key themes in the existing research. The next month will be spent researching existing case studies and frameworks to understand practical applications and challenges. Then the next month will be spent developing and refining the proposed framework and the last month will be spent finalising the report and supporting artefacts.

Slide 8:

My research approach will involve a systematic literature review, focusing on studies published after 2015 related to AI, ASD, and employment. I will also conduct an analysis of organizations using AI-based ASD support tools and will develop a framework for improving employment outcomes for individuals with ASD.

Slide 9:

The three artefacts I will create during my research are a literature review report on AI and ASD employment, a policy recommendation document for ethical AI deployment and a prototype framework for AI-based ASD employment tools.

Slide 10:

The bar chart on this slide compares unemployment rates globally between individuals with ASD and the general population.

It is estimated that unemployment rates for individuals with ASD are 70% (Ganz, 2007) compared to 4.2% for the general population (Pro Bono Economics, 2022).

According to the National Autistic Society only 14-20% of individuals with ASD are in paid employment (National Autistic Society, 2024)

Slide 11:

The line chart on this slide shows employment rate trends for individuals with ASD using data collected from The Office for National Statistics (ONS, 2017), The National Autism Indicators Report (Drexel University Autism Institute, 2020) and the World Economic Forum (World Economic Forum, 2023).

As you can see from the graph there has been a gradual increase in employment rates year on year from 2010 onwards.

Slide 12:

The bar chart on this slide compares employment rates before and after AI implementation in FAANG companies. The data shows an improvement across all companies, highlighting the potential of AI in enhancing employment inclusivity and opportunities (Smith, 2023).

Slide 13:

The bar chart on this slide show the impact of AI on employment rates by age groups.

The employment rate of individuals with ASD who were between 18 and 25 before AI implementation was 15% (Autism Speaks, 2019), then after AI implementation it was 35% (Drexel University Autism Institute, 2022).

The employment rate of individuals with ASD who were between 26 and 35 before AI implementation was 35% (Drexel University Autism Institute, 2022), then after AI implementation was 50% (World Economic Forum, 2023).

The employment rate of individuals with ASD who were over 35 before AI implementation was 10% (ONS, 2021), then after AI implementation it was 30% (European Centre for Policy Studies, 2024).

Slide 14:

The bar chart on this slide highlights the barriers to employment for individuals with ASD.

50% of those surveyed reported support availability as a barrier to employment (Scott et al., 2019) as insufficient on-the-job support and insufficient training focused on the needs of individuals with ASD can adversely impact job retention and performance.

60% reported task flexibility as a barrier to employment (Healio, 2018) as roles requiring frequent multitasking or adaptability to change may pose difficulties.

55% reported employer concerns as a barrier to employment (PCM, 2018) due to the potential legal and safety risks as well as the time and effort required to supervise and train individuals with ASD and the financial burden of the reasonable adjustments they require.

62% reported interview process challenges as a barrier to employment (Spectrum of Hope, 2019) as traditional interview formats may disadvantage autistic candidates.

70% reported discrimination and stigma as a barrier to employment (Connect N Care ABA Therapy, 2022) as negative perceptions and biases against individuals with ASD contribute to employment challenges.

64% reported workplace accommodations as a barrier to employment (PCM, 2018) as a lack of reasonable adjustments can impede job performance.

58% reported time management and organisational skills as a barrier to employment (Research Autism, 2020) as difficulties in these areas can pose challenges in meeting job expectations.

68% reported sensory sensitivity as a barrier to employment (Research Gate, 2021) as hypersensitivity to environmental stimuli can affect comfort and productivity in typical work settings.

75% reported communication challenges as a barrier to employment (PCM, 2018) as difficulties in social interactions and communication can hinder performance in job interviews and workplace integration.

Slide 15:

The stacked bar chart on this slide shows the barriers to scaling AI solutions by region.

In North America technology is the reason a company was unable to scale AI solutions 15% of the time, policies were the reason 20% of the time, funding was the reason 25% of the time and awareness was the reason 30% of the time (Drexel University Autism Institute, 2023)

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In Europe technology is the reason a company was unable to scale AI solutions 12% of the time, policies were the reason 18% of the time, funding was the reason 22% of the time and awareness was the reason 28% of the time (European Centre for Policy Studies, 2024)

In Asia technology is the reason a company was unable to scale AI solutions 18% of the time, policies were the reason 24% of the time, funding was the reason 25% of the time and awareness was the reason 33% of the time (PwC Asia, 2023)

In Africa technology is the reason a company was unable to scale AI solutions 20% of the time, policies were the reason 25% of the time, funding was the reason 30% of the time and awareness was the reason 25% of the time (The United Nations Economic Commission for Africa, 2023)

In Oceania technology is the reason a company was unable to scale AI solutions 10% of the time, policies were the reason 16% of the time, funding was the reason 20% of the time and awareness was the reason 22% of the time (New Zealand Ministry of Business, Innovation and Employment, 2024)

Slide 16:

The bar chart on this slide shows the economic impact of unemployment among ASD individuals on society.

The economic impact of unemployment among individuals with ASD is substantial with Lost productivity and tax contributions costing society an estimated £1.5 billion annually (Pro Bono Economics, 2022) all whilst costing the government £200 million annually for healthcare and support services (Ganz, 2007).

Slide 17:

AI advancements have introduced tools such as Virtual Reality (VR) for interview training (Jiang et al., 2020) and Natural Language Processing (NLP) for interaction analysis.

Approximately 50% of assistive technologies utilise VR (Mashhadi et al., 2021), 30% utilise Natural Language Processing (Parsons & Cobb, 2021) and 20% wearable technology (Pawar & Mathur, 2024).

Slide 18:

Examples of AI-based assistive technologies for individuals with ASD relevant to employment include; job training systems that are customised for individuals with ASD (Schall, 2019), emotion recognition systems and conversational agents to help with social interactions (Kuzmanovic et al., 2021), tools that help complete routine tasks (Zhou et al., 2020), Virtual reality (VR) simulations for interview training to help improve an individual's self-confidence (Jiang et al., 2020) and AI-based job matching platforms that analyse skills and preferences to increase chances of job suitability (Miller & Lee, 2021).

Slide 19:

The bar chart on this slide shows the impact of VR training on interview preparedness. It is estimated that VR interview training can improve employment outcomes by up to 80% (Smith & Doe, 2024).

Slide 20:

The risk matrix on this slide highlights the ethical risks associated with AI-based assistive technologies.

Such as the privacy concerns regarding sensitive data collection and usage (Smith, 2023) that can be mitigated with data anonymisation (Sweeney, 2002) and clear data governance policies (Harvard Data Privacy Review, 2023) such as the GDPR & California Consumer Privacy Act.

The potential for algorithmic bias if the AI has not been trained on diverse data which may lead to discriminatory AI outcomes (Obermeyer et al., 2019) hence the need to perform regular fairness audits (Barocas et al., 2019).

And Accessibility barriers to due high costs (Williams, 2021) creating what is known as the digital divide (Van Dijk, 2020).

Slide 21:

The graph on this slide illustrates the effectiveness of AI employment tools in enhancing job retention, job satisfaction and skill development for individuals with ASD.

It is estimated that job retention rates increased from 60% to 85% (Brown & Smith, 2020), job satisfaction rates increased from 65% to 90% (Green et al., 2021) and the effectiveness of skills development increased from 62% to 88% (Harvard Business Review, 2022) as a result of AI tools.

Slide 22:

The pie chart shows AI adoption levels across organisations support using data gathered from Reports and Surveys on AI adoption (Autism Speaks, 2019; AIPRM, 2024).

25% of the organisations had full implemented AI in ASD employment support, 50% had partially implemented AI in ASD employment support and 25% had not implemented any AI in ASD employment support.

Slide 23:

The bar chart on this slide highlights the percentage of organizations using various AI assistive technologies.

With 45% of the organisations surveyed using resume screening tools when hiring new employees (PwC Asia, 2023), 60% using skill matching algorithms (Drexel University Autism Institute, 2023), 55% using VR and AI in Employee Training (Gartner, 2024) and 35% of the organisations using AI in their job coaching tools (World Economic Forum, 2023).

Slide 24:

The line graph on this slide shows there is a positive correlation between AI adoption and improved employment rates for individuals with ASD.

Slide 25:

The bar chart on this slide illustrates the effectiveness of predictive analytics (Journal of Assistive Technologies, 2024; Journal of Disability and Employment, 2023), workplace productivity tools (Journal of AI in Employment, 2024; Journal of Disability and Technology, 2023), job coaching AI (Journal of Autism Research & Practice, 2024; Journal of Assistive Technology & Disability, 2023), training simulations (Journal of Autism & Technology, 2023; Journal of Disability and Technology, 2024), skill matching algorithms (Journal of AI in Social Good, 2024; Journal of Autism & Technology, 2023) and resume screening tools (Journal of Assistive Technologies, 2024; Journal of Disability and Employment, 2023)

Slide 26:

The scatter plot on this slide illustrates the relationship between investment in AI solutions and employment outcomes for individuals with ASD. Each point represents a case or observation. The red line indicates the trend, suggesting a positive correlation between AI investment and improved employment outcomes for individuals with ASD.

Slide 27:

AI has transformative potential to positively impact the lives of individuals with ASD in every aspect of their lives including from an employment perspective as it helps to mitigate the everyday challenges faced by individuals with ASD.

However, due to high costs access is restricted, to solve this governments could incentivise adoption of AI assistive technologies by creating tax breaks for companies implementing AI tools for hiring individuals with disabilities