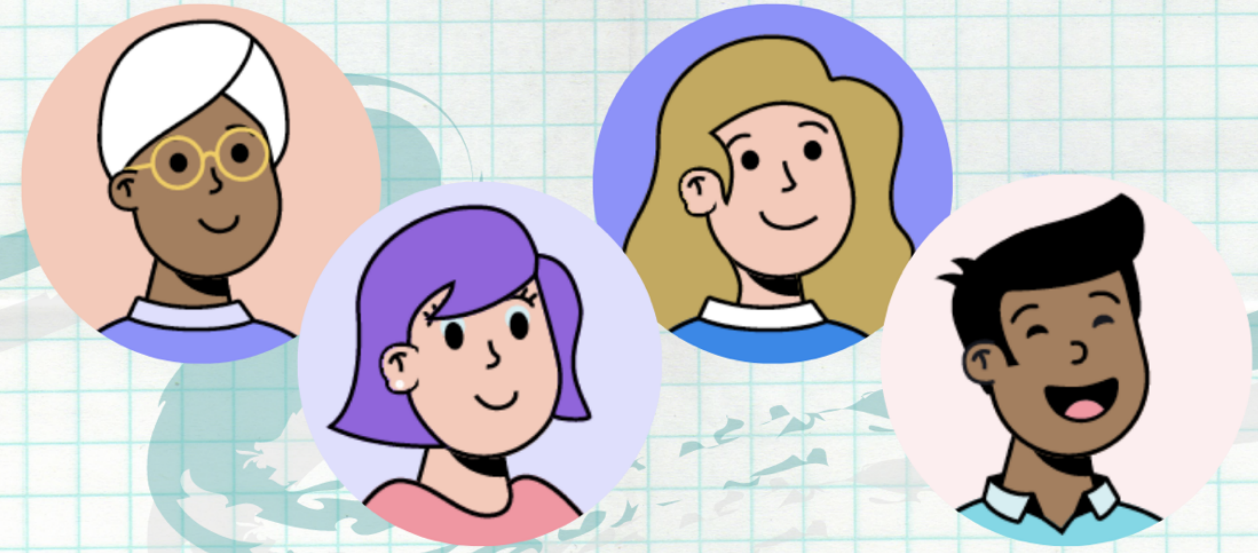
EMERGING TECHNOLOGIES & Neurodiversity



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Introduction

Neurotechnology is any method or instrument that enables a direct connection with the nervous system that may be designed to improve and repair brain functions[1]. Neurotech @ UIUC, the leading neurotechnology student organization at University of Illinois at Urbana-Champaign, strives to facilitate the growth of neurotechnology in our community. The goals of this project are to explore the challenges and stigmas hindering individuals with neurological disabilities in the workplace and academia, present possible solutions to this issue using emerging technologies, and to advocate for the benefits of neurodiversity.

In order to perceive how well the population understands neurodiversity, our team distributed a survey to the public through Facebook groups, Reddit, and other social media channels. Among the 101 responders, 77.2% of them stated that they are students and 15.8% are employed. A little over 52% stated that they were not neurodivergent, while the rest either selected "Yes" or "Prefer not to say." Only 48.5% responded that they know the definition of "neurodiversity" while 28.7% answered "maybe" and 22.8% answered "no". A majority of responders who did not know or are not sure about the meaning of "neurodiversity" interpreted it as a concept that encourages inclusion, yet, less than half of the answers mentioned the connections of the term with neuro-based differences like mental issues, and even less people mentioned autism and ADHD in their interpretations. Overall, the sample we surveyed views neurodiversity as the acceptance of people with differing cognitive processing by neuro-typical individuals. In addition, by analyzing the data, we were able to discover that "in-capable," "different," "stupid," "crazy," "dumb," and "rude" were the most common words people use to describe assumptions made about neurodivergent individuals. This shows that the stigmas surrounding the neurodiverse community in our society consist of prejudice and stereotypes.

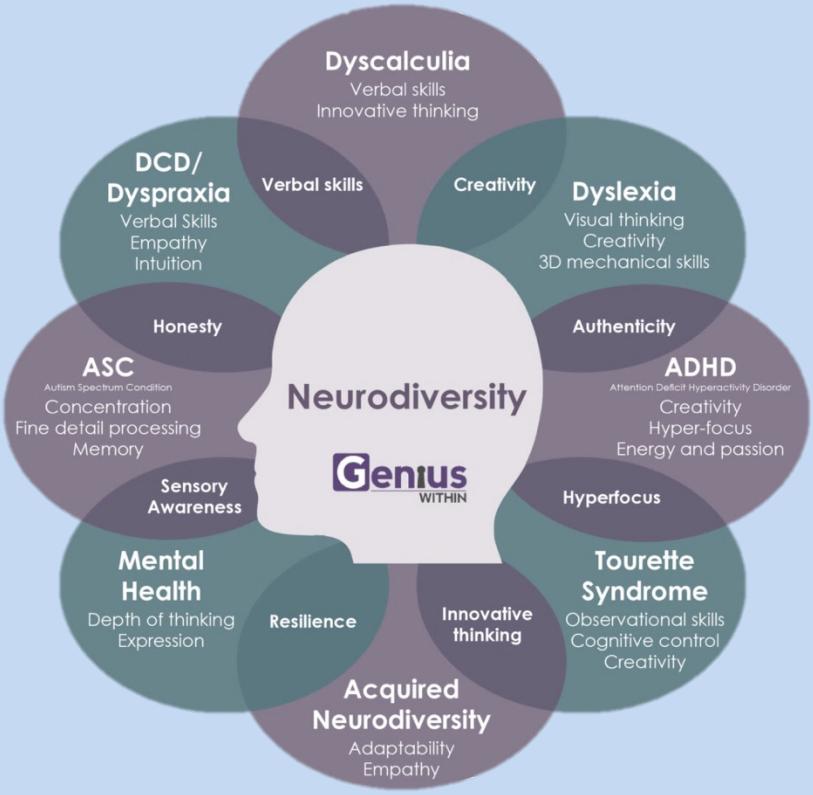
The term "**neurodiversity**" was coined in 1998 by an Australian sociologist, Judy Singer, and was later popularized by her and American journalist Harvey Blume[2]. According to the scholar Dr. Nick Walker, "Neurodiversity is the diversity of human minds, the infinite variation in neurocognitive functioning within our species," and "a neurodiverse group is a group in which multiple neurocognitive styles are represented." In other words, a neurodiverse group includes individuals who are neuro-typical and neurodivergent, and believing in neurodiversity is believing that neurodivergent individuals have the same abilities as everyone else. In addition, Dr. Nick Walker emphasizes that one of the primary principles of the neurodiversity paradigm is "The idea that there is one 'normal" or "healthy"

[1]Müller, O., & Rotter, S. (2017). Neurotechnology: Current Developments and Ethical Issues. Frontiers in systems neuroscience, 11, 93. https://doi.org/10.3389/fnsys.2017.00093

[2]WOTC Benefits for Your Company: Emptech Blog. (2019, July 03). Retrieved August 24, 2020, from https://emptech.com/wotc-benefits-for-your-company/

type of brain or mind, or one "right" style of neurocognitive functioning, is a culturally constructed fiction"[3].

Embracing the neurodiversity paradigm can have a significant proven impact within schools and workplaces as individuals can learn to accept each other and develop a strength based focus, rather than placing emphasis on deficits, therefore, improving collaboration and communication within groups. The image below, based on the work of Mary Colley, was created by Dr. Nancy Doyle, CEO of Genius Within, an organization that assists job seeking neurodivergent individuals. It is an excellent display of a strength based focus, as it displays the skills and overlapping strengths of neurodivergent individuals[4].

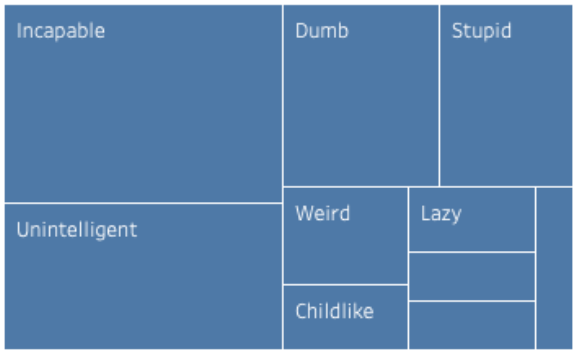


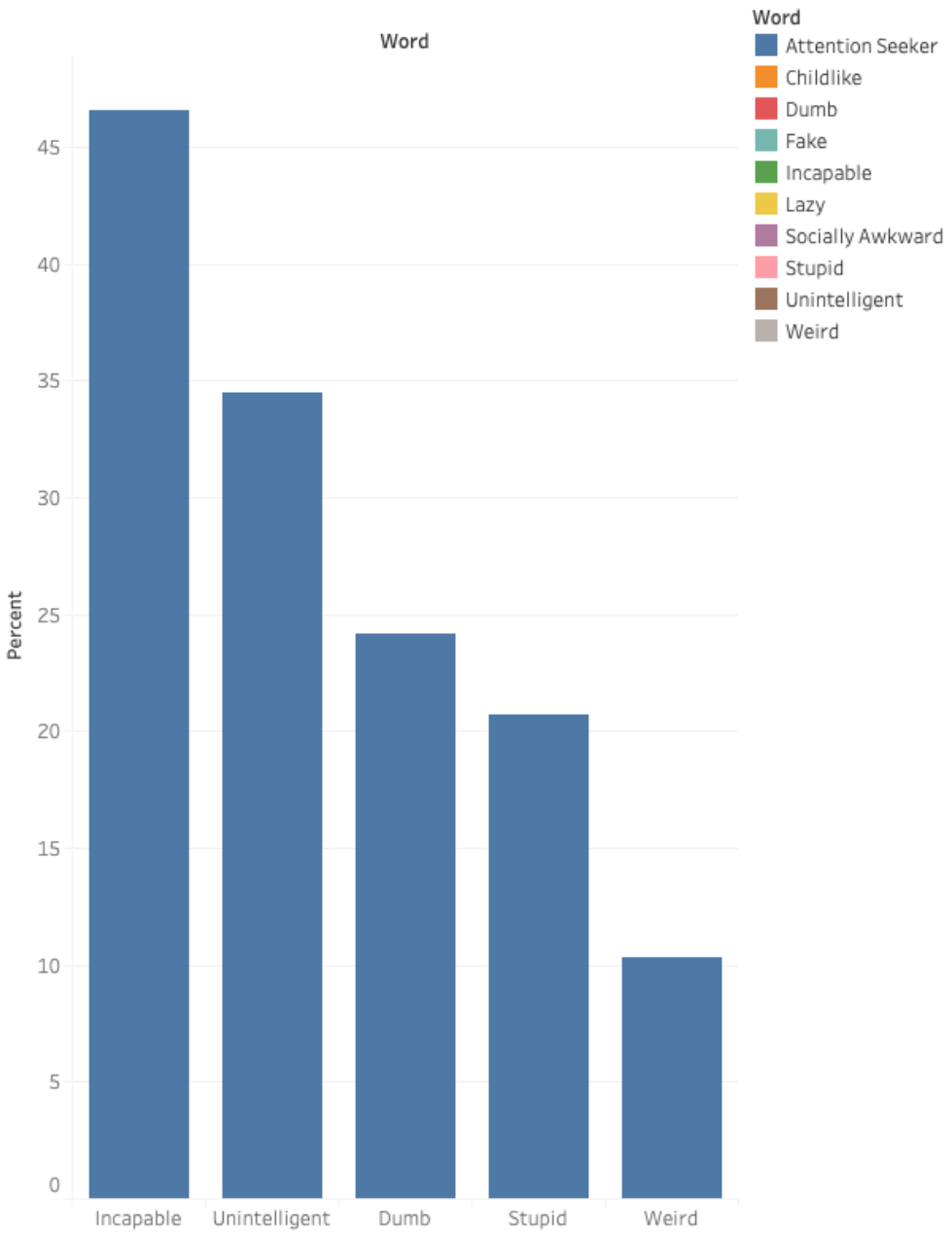
Based on the highly original work of of Mary Colley, DANDA

[3]Walker, N. (2014). Neurodiversity: Some Basic Terms & Definitions. Retrieved August 24, 2020, from https://neurocosmopolitanism.com/neurodiversity-some-basic-terms-definitions/

[4]The Organisational Science of Neurodiversity. (n.d.). Retrieved August 24, 2020, from https://www.geniuswithin.co.uk/neurodiversity-inclusion-programs-occupational-health-and-human-resources/

Survey Analysis





These were the most common words found in our survey that were used to describe the stigmas that people think that neurodivergent individuals face.

Neurodiversity can provide great value within the workplace. According to Andrew Eddy from Untapped, when individuals with disabilities are included, the working environment is increasingly inclusive and engaging. Employees can gain a deeper understanding of the importance of neurodiversity from working with neurodivergent workers. Additionally, hiring individuals with disabilities can bring other benefits to the company like the Work Opportunity Tax Credit, a tax credit offered by the Internal Revenue Service that can provide employers from $2,400 to $9,600 in maximum credit per new hire, in the form of a dollar-for-dollar reduction in their tax liability[5].

In an academic environment, neurodivergent students bring new perspectives to groups, increase creativity, and strengthen productivity. Creating an environment that is inclusive of neurodivergent students can help with building confidence, self-esteem, motivation, resilience, as well as encourage neuro-typical students to think outside the box. Furthermore, students will have the opportunity to step into the shoes of students with disabilities and learn to support and advocate for inclusion from a young age.

Emerging Technologies

To accommodate to neurodivergent employees and students, employers and educators should adopt the practice of actively seeking and integrating **emerging technologies** into their workplaces and classrooms. Emerging technologies are upcoming technological innovations and advancements whose developments and practical applications are still largely unrealized and being looked into, as they promise a big footprint for the future[6]. The specific emerging technologies that will be highlighted throughout this paper are 5G, Artificial Intelligence (AI), and Augmented/Virtual Reality (AR/VR).

5G refers to the fifth generation of mobile network technology that enables 5G compatible devices to connect to the internet. 5G increases data transfer speeds and increases interconnectivity significantly from its forerunner 4G, thereby properly supporting and enabling other emerging technologies such as AI and AR/VR to function ideally and to their full potential. 5G will solve many of 4G's drawbacks including poor coverage in various settings (indoors, rural areas, densely populated areas), limitations to accessing information, and long latency periods. Currently, due to COVID-19, many

[5]WOTC Benefits for Your Company: Emptech Blog. (2019, July 03). Retrieved August 24, 2020, from https://emptech.com/wotc-benefits-for-your-company/

[6]What Is Emerging Technology?: Independence University. (n.d.). Retrieved August 24, 2020, from https://www.independence.edu/blog/what-is-emerging-technology

schools and colleges have resorted to using 4G technology to hold virtual graduations and ceremonies and serves as the primary means for online learning. 5G, with its high reliability, will enhance such situations. Current areas of research surrounding 5G include energy efficiency improvement to match data efficiency improvement, how to create efficient power amplifiers of such high frequencies, and human health considerations.

Artificial Intelligence is a field of Computer Science that is possessed and demonstrated by machines. It consists of building smart applications using various algorithms, to make them capable of performing tasks that would otherwise require human input and the ability to make informed decisions[7]. Via Artificial Intelligence, higher quality and accurate results can be produced at tremendous speeds. AI can be implemented in schools and workplaces to assist with training procedures, recruitment, individualized learning etc. This would improve the quality of these programs along with making applications more efficient for all involved. An example where AI is currently being used in the field of education include online individualized learning programs which use patterns and predictions to tailor a child's learning to his or her individual needs. Similarly, Artificial Intelligence can be used to aid in various other aspects of education and work which have yet to be discovered.

Another field in which AI is being utilized includes speech recognition and prediction. Quill, a company that "provides free writing and grammar activities for middle and high school students," has created a website which assigns students various exercises to language learning[8]. Many students struggle with English grammar and sentence formation, and AI dependent speech recognition technology can help students identify their different areas of struggle and provide real-time feedback. The programs include joining sentences, writing complex sentences, and explaining sentence usage. After each assignment is completed, Quill is able to integrate traditional learning concepts with technology to focus on each student's individual needs and problem areas: all in real time. This optimization of learning programs using AI provides the benefit of a teacher in the comfort of a student's own home.

An additional innovative use of AI is visible in recruitment and hiring processes. When a job-seeking candidate comes across a job opportunity and makes the decision to submit an application, AI software reads and processes the essential data from the application, producing results that enable the employer to make a decision of whether the candidate will move forward in the process or be declined the offer. This AI tool saves employers important time and energy by skipping over resume reading and possible bias in decisions. Several companies use this to make their first cuts for jobs and internships and some companies such as JP Morgan Chase are using AI to streamline the job application process[9].

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[7](n.d.). Retrieved August 24, 2020, from https://www.ibm.com/design/ai/basics/ai/

[8]Smith, E. (2017, November 15). Quill.org: Better writing with machine learning. Retrieved August 24, 2020, from https://www.blog.google/technology/ai/quillorg-better-writing-machine-learning/

[9] Marketing AI recruitment: The next phase in job application and selection. (2018). Retrieved August 24, 2020, from https://www-sciencedirect-com.proxy2.library.illinois.edu/science/article/pii/S0747563218304497?via=ihub

Augmented and Virtual Reality technologies enable people to immerse themselves in engaging, interactive and personal experiences through the use of various simulations. They can assist in enhancing online learning and career development. Virtual Reality replaces your vision, while Augmented Reality superimposes images over live view. Specific examples of where AR and VR are utilized include language immersion and skills training. These technologies allow people to be put into real-life scenarios and conditions to learn languages or skills pertinent to working in a corporate environment more efficiently[10]. Not only does AR/VR enable efficient learning, but it also makes learning fun by creating exciting learning spaces in the forms of virtual field trips and creating more flexible learning environments[11].

AR/VR is leaving a big footprint in the field of Neurosurgery Training. It makes for better training through the use of 3D learning environments and better Pre-Op training. Training with AR/VR prepares surgeons for real-time situations in an almost exact surgical environment. This is very useful to minimize risk and "ensure maintenance of skills." [12]

Another field where AR/VR is making a significant mark is within Music Education. For instance, a visually impaired student could watch a high-contrast depiction or enable a sound description of a movie and a dyslexic child could be administered an alternative score with colored notation.

21st century technology has revolutionized how people approach problems and ultimately solve them. Neurodiversity in education and the workplace should not be an outlier. The following sections have determined that there is a need for newer and better solutions to aid Neurodiverse individuals in their day-to-day lives. Fortunately, with the assistance of the professionals we interviewed and products and applications that currently exist, the future is bright. With extensive research and growth in the fields of AI, AR/VR, and 5G, companies and developers are slowly investing money and resources into creating responsive and fast solutions to the challenges being encountered.

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[10] AR vs. VR: What's the Difference? Plus, How Marketers Use Augmented Reality and Virtual Reality. (2019, December 30). Retrieved August 24, 2020, from https://blog.treasuredata.com/blog/2019/11/14/augmented-vs-virtual-reality-difference/

[11] https://edtechtimes.com/2018/09/27/how-immersive-learning-technology-is-bringing-education-and-training-into-the-future/

[12] Panayiotis E. Pelargos, Daniel T. Nagasawa, Carlito Lagman, Stephen Tenn, Joanna V. Demos, Seung J. Lee, Timothy T. Bui, Natalie E. Barnette, Nikhilesh S. Bhatt, Nolan Ung, Ausaf Bari, Neil A. Martin, Isaac Yang, Utilizing virtual and augmented reality for educational and clinical enhancements in neurosurgery, Journal of Clinical Neuroscience, Volume 35, 2017, Pages 1-4, ISSN 0967-5868, https://doi.org/10.1016/j.jocn.2016.09.002.

Special Education

In the United States, Special Education programs are designed to meet the individual needs of disabled students in schools. To gain eligibility to enroll in to a Special Education program, an individual must undergo an evaluation and fall under at least one of the thirteen categories under IDEA, "a law that makes available a free appropriate public education to eligible children with disabilities throughout the nation and ensures special education and related services to those children"[13]:

- Specific Learning Disability
- Other Health Impairment
- Autism Spectrum Disorder
- Emotional Disturbance
- Speech or Language Impairment
- Visual Impairment
- Deafness
- Hearing Impairment
- Deaf-Blindness
- Orthopedic Impairment
- Intellectual Disability
- Traumatic Brain Injury
- Multiple Disabilities

However, just because a student may have a disability, does not mean a student will qualify to receive a Special Education. The student must not only have a disability that falls under one of the thirteen categories, but their disability must also hinder their learning progress, meaning the individual has a demonstrated need for help.

The number of special education students in the United States has grown over time, with an increase of students (ages 3-21) between 2011-2012 and 2018-2019 by 700,000[14]. During 2018-2019 specifically, there were 7.1 million special education students, making up 14% of public school enrollment[15].

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[13]About IDEA. (n.d.). Retrieved August 24, 2020, from https://sites.ed.gov/idea/about-idea/

[14]The Condition of Education - Preprimary, Elementary, and Secondary Education - Elementary and Secondary Enrollment - Students With Disabilities. (2020). Retrieved August 24, 2020, from https://nces.ed.gov/programs/coe/indicator_cgg.asp

[15]The Condition of Education - Preprimary, Elementary, and Secondary Education - Elementary and Secondary Enrollment - Students With Disabilities. (2020). Retrieved August 24, 2020, from https://nces.ed.gov/programs/coe/indicator_cgg.asp

33% of these students were diagnosed with learning disabilities[16].

Federal Regulations

To gain a better understanding of the challenges being encountered within Special Education programs, it is important to have an overview of two important federal regulations: IEP Plans and 504 Plans. IEP, or Individual Education Plans, are plans required by the Individuals with Disabilities Education Act (IDEA), to provide services for each student's unique experience. An IEP Plan is a legally binding, detailed, written document describing the specifics of a child's performance, goals, services, accommodations, modifications to lesson plans, testing plans, and inclusion into general activities. IEP Plans are a determining factor in how much funding states receive for students. A 504 Plan is a plan for the school to support students with disabilities and integrate them into the classroom. The law that applies to this plan is Section 504 of the Rehabilitation Act of 1973. This plan does not have to be a written document, but includes accommodations, provider of services, and a person to ensure the plan is implemented. States do not receive additional funding for students with 504 plans, however, the federal government can still take existing funding away from programs that don't fulfill their legal duty[17].

One issue encountered with IEP Plans is that they are often of low quality and reused[18]. In addition, IEPs are required to be created by a team of all the people involved, including the parent, a general education teacher, a special education teacher, a school psychologist, and a district representative for special education programs. However, the process of creating IEPs is often lacking in collaboration, with input solely by the special education teacher, due to various factors including insufficient staff to manage all students and lack of care and communication.

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[16]The Condition of Education - Preprimary, Elementary, and Secondary Education - Elementary and Secondary Enrollment - Students With Disabilities. (2020). Retrieved August 24, 2020, from https://nces.ed.gov/programs/coe/indicator_cgg.asp

[17]Team, T. (2020, April 17). The Difference Between IEPs and 504 Plans. Retrieved August 24, 2020, from https://www.understood.org/en/school-learning/special-services/504-plan/the-difference-between-ieps-and-504-plans?_ul=1%2A3p89u%2Adomain_userid%2AYW1wLS1zUGJlSUptbGdqWl9RTjRzcUt4SFE.

[18] Mims, P. J., Dr. (2020, June 3). [Telephone interview].

Current Technologies

Assistive technology is currently being used in special education programs to provide students with the personalized, convenient support that they need. Almost 4,000 types of assistive technologies exist presently[19]. Assistive technologies significantly contribute to aiding persons with special educational needs in learning, building self-confidence, being independent, and achieving a high quality of life. Assistive technologies are a form of emerging technology, and when combined with other technologies such as Artificial Intelligence, Augmented/Virtual Reality, and 5G, they become increasingly powerful. Different types of assistive technology are aimed at assisting students with various skills such as social skills, writing, communication, and mathematics.

Specific technologies include apps, tablets, communication boards, voice-recognition technology, and more. The following situation serves as an example of the significant impact assistive technologies have in the classroom. A third grade student with cerebral palsy named Lily entered her classroom completely non-verbal. After experimenting with an augmentative communication system on a Samsung Galaxy tablet, she was able to successfully communicate and create sentences. This technology allowed Lily's teachers to assess and gain "insight into [her] cognitive abilities"[20].

Barriers to accessibility of assistive technologies include "lack of appropriate staff training and support, negative staff attitudes, inadequate assessment and planning processes, insufficient funding, difficulties procuring and managing equipment, and time constraints"[21]. In addition, it has been observed that there is a lack of family involvement, especially during the process of discussing an IEP, meaning families are not aware of the benefits of assistive technologies[22].

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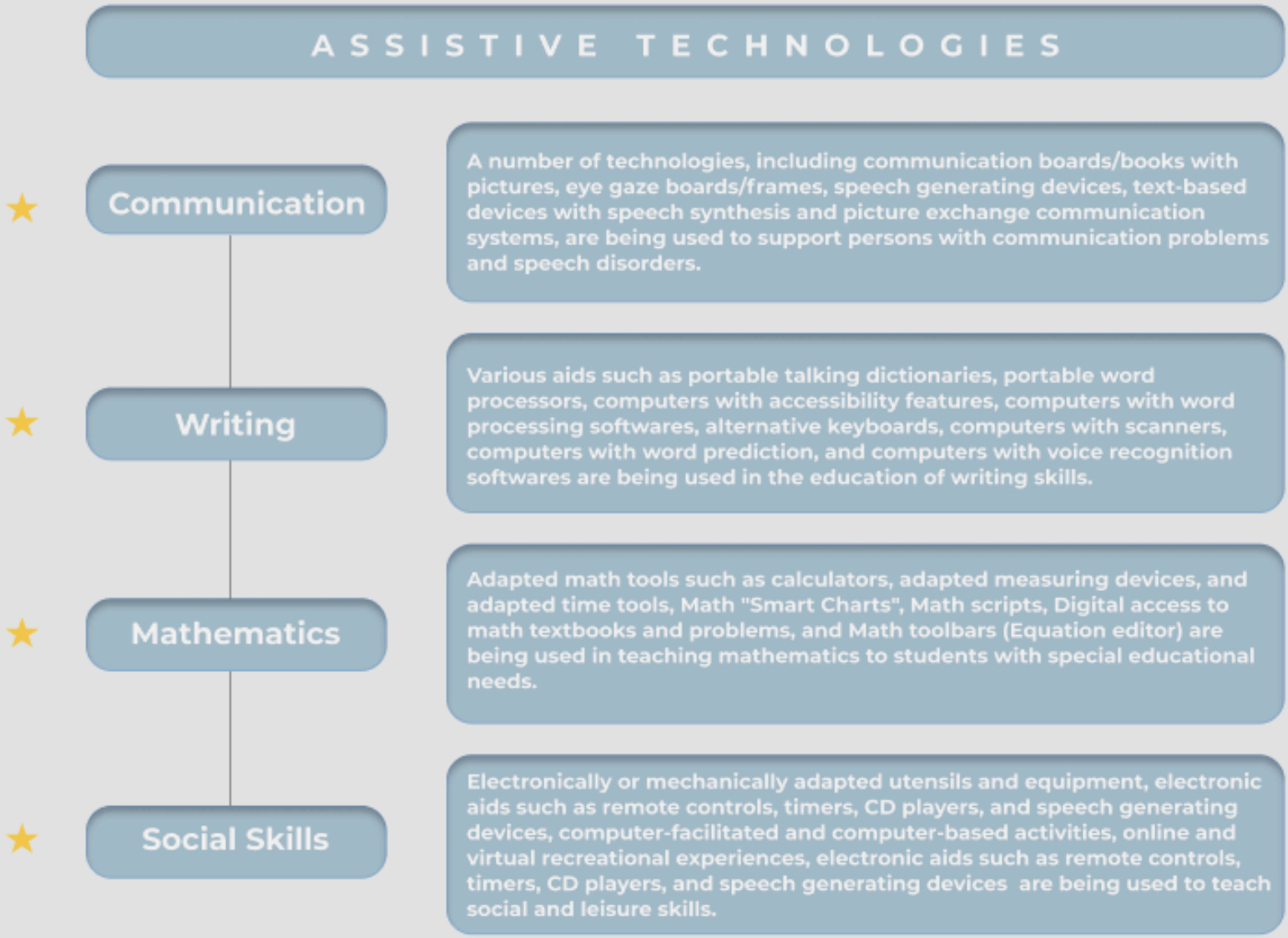
[19] Assistive Technology in the Classroom : Helping Challenged Kids Get the Most from Learning. (n.d.). Retrieved August 24, 2020, from https://www.educationworld.com/a_tech/tech/tech086.shtml

[20] Roland, J. (2015, October 07). How special education technology improves learning. Retrieved August 24, 2020, from https://www.iste.org/explore/Innovator-solutions/How-special-education-technology-improves-learning?articleid=568%2C++https%3A%2F%2Fdegree.utpb.edu%2Farticles%2Feducation%2Ftechnology-in-special-education.aspx

[21] Copley, J., & Ziviani, J. (2004). Barriers to the use of assistive technology for children with multiple disabilities. Occupational therapy international, 11(4), 229–243. https://doi.org/10.1002/oti.213

[22] Sami Alharbi, "Benefits and Barriers: Incorporating Assistive Technology in an Inclusive Setting for Primary School Students with Learning Disabilities in Language Arts". American Research Journal of Humanities and Social Sciences, Volume 2, pp:1-11


ASSISTIVE TECHNOLOGIES
Communication
A number of technologies, including communication boards/books with pictures, eye gaze boards/frames, speech generating devices, text-based devices with speech synthesis and picture exchange communication systems, are being used to support persons with communication problems and speech disorders.
Writing
Various aids such as portable talking dictionaries, portable word processors, computers with accessibility features, computers with word processing softwares, alternative keyboards, computers with scanners, computers with word prediction, and computers with voice recognition softwares are being used in the education of writing skills.
Mathematics
Adapted math tools such as calculators, adapted measuring devices, and adapted time tools, Math "Smart Charts", Math scripts, Digital access to math textbooks and problems, and Math toolbars (Equation editor) are being used in teaching mathematics to students with special educational needs.
Social Skills
Electronically or mechanically adapted utensils and equipment, electronic aids such as remote controls, timers, CD players, and speech generating devices, computer-facilitated and computer-based activities, online and virtual recreational experiences, electronic aids such as remote controls, timers, CD players, and speech generating devices are being used to teach social and leisure skills.

The Role of Emerging Technologies

Developing solutions to combat the variety of problems in Special Education poses its own set of challenges in that teachers may not have the experience and knowledge to understand how to help every student. Each student possesses their own unique set of skills and challenges, which emerging technologies could help mitigate the hardships they face in education.

AI has proven to be the most powerful technology within special education classrooms. For students, AI offers tutoring and support outside of class, individualized learning opportunities, and universal access to education for all students. AI can also assist ESL students with learning disabilities through "features such as speech recognition and analysis, [and] pronunciation correction..."[23]. The app 'Otsimo' is a perfect example of using AI to create an accessible and individualized education for special education students. Otsimo is an educational subscription-based gaming application aimed towards assisting special education students in improving various skills such as speaking, reading, writing, and math[24]. The application consists of two modules, one for the child which consists of over 60 games including puzzles, communication games, etc., and one for families, where they can view statistics on performance and development, which essentially simplifies the process/educational journey for parents and provides assistance by breaking down the data collected. The app utilizes machine learning and data mining techniques to learn about the child based off of their progress in the games they play, and then it optimizes them. In an interview with The Sociable, Zafer Elcik, founder of Otsimo, provides an explanation of this feature. If a child is playing the Color Matching game and is unable to make any progress, the app will adjust the difficulty of the game or suggest that the child attempts the Color game first[25]. This application can be utilized on personal devices at home, or schools can purchase the "School & District Plans"[26].

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[23] Trustworthy artificial intelligence (AI) in education: Promises and challenges. (n.d.). Retrieved August 24, 2020, from http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2020)6&docLanguage=En

[24] Frequently Asked Question - Otsimo: Otsimo. (n.d.). Retrieved October 05, 2020, from https://otsimo.com/en/frequently-asked-questions/

[25] https://sociable.co/mobile/autism-education-otsimo/

[26] https://otsimo.com/en/school/

AR/VR can assist in special education teacher lesson planning, teacher education, classroom management, and independent learning. Special Education teachers are often learning on the job because every new student has a unique set of challenges based on their disability. However, there are teachers across the globe that have experience with different disabilities and could provide one-on-one training using their experience. A discussion with Dr. Mims, a professor at East Tennessee State University, included the idea that a website could be used to pair educators so that teachers who have received a new student can communicate with a teacher who has helped a student with a similar disability. Through AR/VR technology, the experienced teacher can provide hands-on training remotely. This would significantly improve how teachers handle disruptive situations where students may feel overwhelmed and throw a tantrum, such as slamming their fists on a desk[27]. While the idea of using AR/VR to help special education teachers hasn't yet been established, there are many VR programs that aim to help teacher training and education. Examples include Connect To Learn Myanmar and the classvr.com website. For students, research has already shown that learning done through AR/VR systems has the ability to improve cognitive flexibility outside of the digital intervention[28]. This creates a medium for brain plasticity that improves the ability to apply what's been learned while in the virtual world but also allows for those improved skills to be perpetuated outside of it[29].

Another support for Special Education students includes sensory rooms, which are designated rooms meant to de-escalate and develop the senses for students with special needs. They may also be combined with VR into one component. There is mixed support on standard sensory rooms, since there is not a sufficient amount of research supporting the use of the rooms as they are not personalized based on individual student needs[30]. In addition, Special Education programs in rural areas face accessibility concerns, as having an extra classroom is a luxury. To combat these challenges and concerns, Dr. Mims is currently in the early stages of developing computer sensory rooms at the ETSU University High School, in collaboration with LiiNA. LiiNA stands for "Learning through Interactivity Intelligently with Accountability," and is a "sensory learning device used for students with Autism, emotional and behavioral learning disabilities"[31]. It consists of 2 components, SIM, or Sensory Integration Module, technology, and a VR component which acts as a reinforcer. These virtual sensory rooms will provide personalized de-escalation effects and multi-sensory adjustments according to a student's preferences. Not only will it act as a skill enforcer, but it will also assist students with skill acquisition. Students could, for example, learn how to manage various stations in a fast-food restaurant while being in a safe environment[32]. This could greatly assist in bridging the gap between education and job training for neurodivergent individuals.

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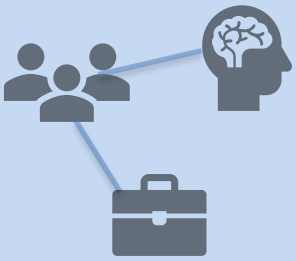
[27] Mims, P. J., Dr. (2020, June 3). [Telephone interview].
[28] Golosovskaya, A. (2020, September 08). How to Use Effectively Virtual Reality in Education? Retrieved October 05, 2020, from https://invisible.toys/virtual-reality-development/virtual-reality-in-education/
[29] Golosovskaya, A. (2020, September 08). How to Use Effectively Virtual Reality in Education? Retrieved October 05, 2020, from https://invisible.toys/virtual-reality-development/virtual-reality-in-education/
[30] Mims, P. J., Dr. (2020, June 3). [Telephone interview].
[31] LiiNA. (2019, June 23). Retrieved October 05, 2020, from http://www.kidslikeuscommunity.org/liina/
[32] Mims, P. J., Dr. (2020, June 3). [Telephone interview].

Special Education teachers have a strong influence in the classroom. Teacher perceptions vary and the approach a teacher takes, whether it is strength based or deficit based, affects the learning environment for students. One conflict that exists in special education classrooms is when teachers refer to students by their developmental age, as this creates a ceiling on the capabilities of students and a "daycare-like" environment. Dr. Mims emphasizes the importance of teachers providing special education students with access to age appropriate content, but at alternate achievement levels and with the appropriate supports and accommodations. The use of virtual manipulatives and apps, can assist in alleviating this issue as they provide a safe learning environment where students can build their confidence, learn at their own pace with less constraints. For this reason, it is crucial that more schools attempt to provide personal devices such as iPads and larger screens such as smart boards in special education classrooms, that make it easy for students to follow along during class sessions. Because personal devices are simple to transport between school and home environments, more opportunities will be created for parents to collaborate with teachers and be immersed in their child's educational journey. This can also prove to be especially helpful in lessening the constraints of distance learning for special education students during the global COVID-19 pandemic.

Overall benefits of these technologies for students include increased opportunities for personalized learning, improvement and ease of communication, student independence, and improvements in peer relationships. Although these technologies have several promising benefits, it is important to begin thinking about the challenges coupled with their implementation. The most difficult obstacle is accessibility. Funding for special education programs is calculated by utilizing different methods in every state within the United States. In addition, rural and private schools have less funding available. Another concern surrounding the implementation of emerging technologies is training. Students and teachers will have to complete training in order to maximize the learning experience and successfully, as well as efficiently, utilize the technologies. How will schools enforce appropriate restrictions to ensure that teachers do not become "babysitters" and students will not get distracted or use the technology for non-educational purposes? A conversation with Lindsey Blevins, Boones Creek Elementary School Pre-Kindergarten Teacher, brought up the concern of how to limit a student's time with technology so that they do not become dependent on it. It is crucial to ensure that the technology is being used in an ethically responsible way.

When infusing technology such as AI into the classroom, schools must ensure to address concerns related to privacy and data collection, as well as technology bias[33].

[33] Southgate, E. (2020, June 10). Artificial intelligence in Schools: An Ethical Storm is Brewing. Retrieved September 28, 2020, from https://www.aare.edu.au/blog/?p=4325



Workplace

One of the biggest issues with the current global workplace is the lack of neurodiversity initiatives.

According to the autism advocacy organization Autism Speaks, autism cost the United States $126 billion per year in 2012 - a number that tripled from the previous cost in 2006. To put this to scale, that figure is about the GDP of many small countries such as Kuwait, Cuba, Luxembourg, and Ukraine to name a few[34]. This is largely due to the fact that 83% of the 1.21 million people. So, why are so many of these individuals unemployed?

Are they just less "competent" than neurotypical people? Are they too "low functioning" to successfully communicate and work in teams, burdens to others? These are some popular stigmas against neurodiverse individuals. Contrary to popular belief there are many talented neurodiverse individuals.

Albert Einstein had Asperger's Syndrome, a high functioning condition on the autism spectrum.[35]

Dr. Vernon Smith (who also has Asperger's) invented experimental economics and earned a Nobel Prize.

Dani Bowman, an animator, founded her animation company Dani-mation at age 11 and has won many awards for her short films and is currently a public speaker trying to inspire/educate others on the spectrum to realize their passions.

Tony DeBlois, who was born blind and autisitic, started learning piano from the age of two and now has mastered 20 instruments and can play about 8,000 different pieces from memory.

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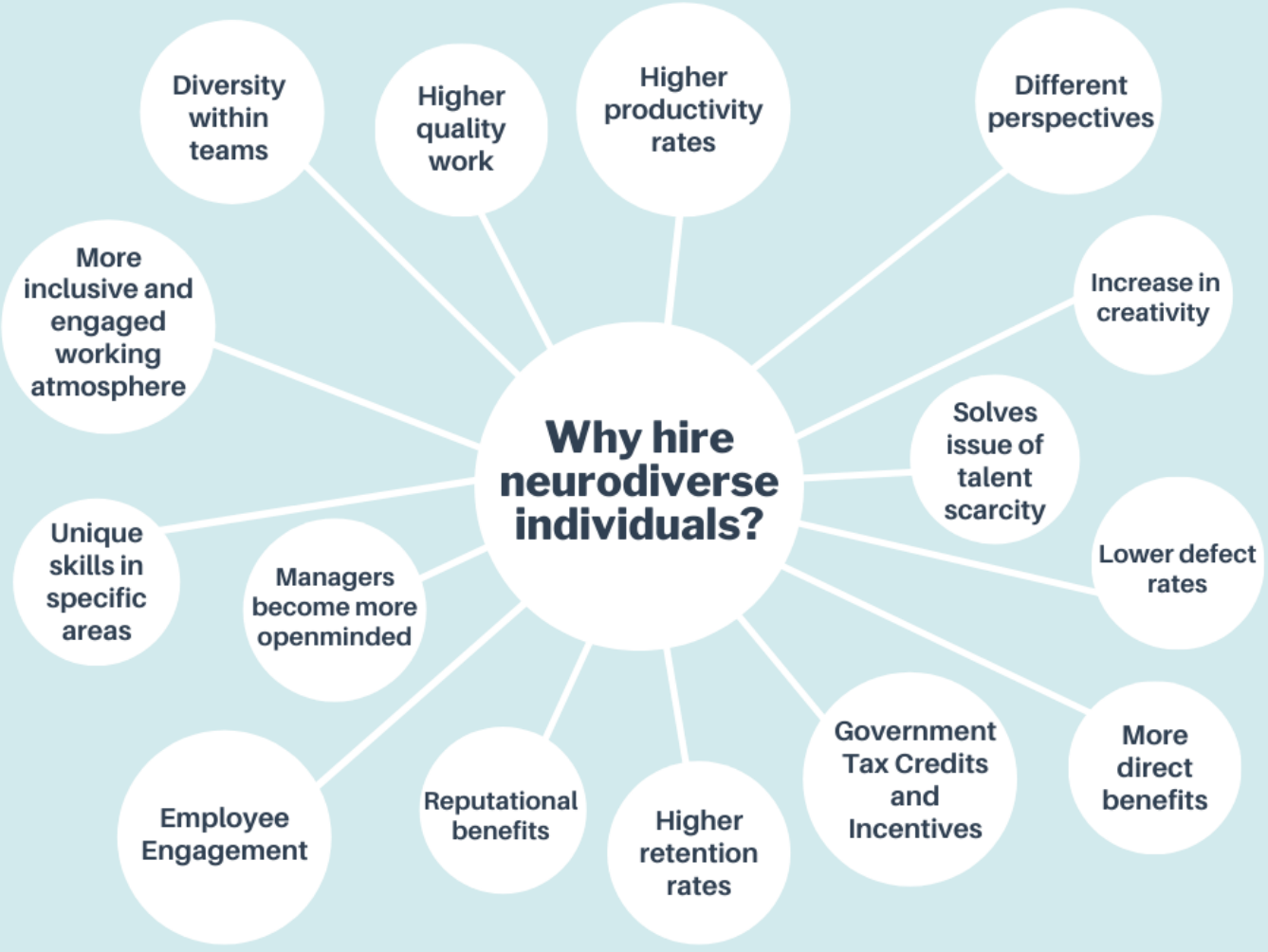
[34] GDP by Country. (2017). Retrieved September 19, 2020, from https://www.worldometers.info/gdp/gdp-by-country/

[35] Skoyles, C. (2018, September 26). 15 Successful People with Autism Who Have Inspired Millions of People. Retrieved September 19, 2020, from https://www.lifehack.org/805825/successful-people-with-autism

Clearly this 1.21 million people demographic is not short on exceptional talent. The firm Ernst & Young's website for their neurodiversity initiative even states that,

> **"Neurodiverse individuals are often technologically inclined and detail-oriented, with strong skills in analytics, mathematics, pattern recognition and information processing — ….the very skills businesses most urgently need."** [36]



[36] Twaronite, K. (2019, May 10). How neurodiversity is driving innovation from unexpected places. Retrieved September 19, 2020, from https://www.ey.com/en_us/diversity-inclusiveness/how-neurodiversity-is-driving-innovation-from-unexpected-places

Furthermore, Robert D. Austin and Gary P. Pisano in their 2017 article in the Harvard Business Review, state the European Union will have a shortage of 800,000 IT workers by 2020 and that

> "..the biggest deficits [in jobs] are expected to be in strategically important and rapidly expanding areas such as data analytics and IT services implementation, whose tasks are a good match with the abilities of some neurodiverse people." [37]

Austin and Pasino further elaborate upon the strengths of neurodiverse talent by mentioning the Australia's Department of Human Services's (DHS) Dandelion Program (*program elaborated on below*) where software testers on the autism spectrum displayed, in preliminary results, that the neurodiverse testing teams were 30% more productive than the other teams[38].

Meet Louisa, a 40 year old woman diagnosed with a form of autism called Asperger Syndrome, featured on the BBC Three television series, Employable Me. She has two degrees in advanced mathematics and an "excellent working memory." During the episode, Louisa takes a series of tests administered by Dr. Nancy Doyle, which will assist her in identifying the right career. Dr. Nancy Dolye determines this to be a job that involves processing large datasets, also stating that 99% of individuals who take the same tests, would get a lower score than Louisa. It has been proven that Louisa has brilliant achievements and is, as Dr. Nancy Doyle states, "incredibly competent," even more so than others. So why does she have over 150 failed job applications? Because of her Asperger Syndrome, Louisa struggles with social skills, specifically, communicating in the workplace and adapting her behavior to what is considered as "normal." These challenges have caused her to be dismissed from three jobs, the reason for her being dismissed from the first job specifically was because she "didn't fit in." This continuous cycle of rejection has led to Louisa becoming traumatized about the workplace and "her own abilities." With eventual coaching on how she can improve her communication skills during interviews and maintaining a positive conversation, Louisa is able to secure an analyst role at the National Grid head office. At the end of the episode Louisa states "I've finally got something to look forward to, that's going to do so much for my confidence…[39]"

Similar to Louisa, many other neurodiverse individuals are very competent and talented and there is a need for their skill sets in the current job market- So, again, the question of why so many of these individuals are unemployed appears.

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[37] Austin and Gary P. Pisano, R. D., & Pisano, G. P. (2017, July 18). Neurodiversity Is a Competitive Advantage. Retrieved September 19, 2020, from https://hbr.org/2017/05/neurodiversity-as-a-competitive-advantage

[38] Austin and Gary P. Pisano, R. D., & Pisano, G. P. (2017, July 18). Neurodiversity Is a Competitive Advantage. Retrieved September 19, 2020, from https://hbr.org/2017/05/neurodiversity-as-a-competitive-advantage

[39] BBC Three. (2016, April 19) Employable Me - Louisa. Retrieved from https://www.youtube.com/watch?v=l-Ev3ignpYE

One of the primary reasons for this waste of talent is the result of societal expectation on what the ideal employee looks like- a confident go-getter who is also a charismatic team player, and these social standards don't often hold for neurodiverse individuals- many suffering from low self-esteem from past rejections or unaware of certain social "etiquettes". In job interviews a candidate is tasked with selling themselves and persuading the interviewer to hire them. This can be difficult for someone with low self-esteem from previous rejections or atypical social skills-like inability to make eye contact, short attention spans, or stutters in speech.

Jhillika Kumar, the founder of Mentra, a firm committed to using AI to connect autistic individuals with neurodiverse employers, explained job interviews for autistic individuals as a "sensory overload", making it difficult for them to focus, as if each question was just a "constant buzzing sound" in their head. This can be attributed to a variety of factors such as environmental distractions(lights, office decor/layout, workplace back noise) or the nature of the questions being asked; for instance the question, "Tell me about yourself." As a result of the vague nature of this question, an individual whose brain interprets it in a literal sense might get overwhelmed with where to start or how to go about answering the task. This can result in a struggle to organize coherent thoughts to present as they grapple with their ideas often resulting in one to seem like they are just rambling blindly.

Autism Employment Initiatives

As mentioned in the previous section the current hiring scheme of interviews puts the neurodiverse at a competitive disadvantage. This sparks a discussion on the crucial need for hiring processes and the field of human resources to be re-evaluated so that firms can create a more inclusive culture. Fortunately, some organizations have been founded on the principle of inclusive employment and helping neurodiverse individuals acquire meaningful employment. One of these organizations is the firm Untapped, whose co-founder Andrew Eddy was kind enough to be interviewed by our team and explained to us Untapped's process of hiring and integrating self-sufficient neurodiverse teams into firms.

Untapped has a holistic focused interview process that does not place emphasis on prior educational experiences. The firm has made efforts to employ individuals with their highest level of education being a high school degree, to individuals with college diploma. In order to overcome the faults of traditional interviewing methods Untapped has displayed adaptability in their hiring and training process. The firm flies out interviewees to their assessment center where they are assessed in a group setting, and their performance is monitored. A method Untapped uses to gauge employee readiness/compatibility is the Pymetrics software. Pymetrics comprises a myriad of neurological games that are used to gauge the abilities of the autistic interviewees based on the game results received from neurotypical holders of the desired position.

After the hiring process has been completed, the new employees are put into cohorts and trained together in a three year program to help them develop in their role assuming no prior knowledge. There is a subject matter expert who trains them in the work needed to be done and an Autism Spectrum coach who helps integrate them into the workplace. The end goal of the program is to create a self-sufficient team and build a sense of comradery between the members. This approach allows for employees to develop their self-confidence and social skills with each other as well as identify their own strengths and weaknesses.

One of the tools Untapped uses to assist autistic employees is the smartphone app Life Sherpa. Life Sherpa is a one stop tool for linking autistic trainees, their support groups, and team leads. Whenever an individual needs help or assistance, they can utilize the app to reach out to subject matter experts and spectrum coaches through the apps built in direct messaging and group messaging functions and is currently adding the option to make video calls. The app also provides guides that they can use in their lives when needed as well like guides on how to prepare for a meeting, how to get to work, or how to do presentations. There is also a feature in the app that allows employers to see how the employees are doing and monitor their progress, strengths, and weaknesses. Untapped also provides training for managers and co-workers to help orient the company and dispel myths about autism with the help of the autism spectrum coach and the eLearning program, Uptimize.

In 2019, LifeSherpa started a partnership with DXC Technologies to start a program called the Dandelion Program, that is a very specific three-year program designed to help users succeed in the workplace. This program is unique as it "focus[es] on high demand technology jobs including cyber security, data analytics and software testing", which today are some of the most sought out careers today[40] [5]. LifeSherpa is supporting the program through its vast communication network to support individuals become more independent.

While companies look to diversify their workplace, they should consider using Life Sherpa to assist in the process. Its countless features and benefits not only help employees with disabilities succeed but also allow them to complete tasks independently and understand that they too can have a fulfilling career. LifeSherpa helps its users understand their strengths and develop their weaknesses so that they can overcome their executive function and mental health challenges.

Untapped along with interns from Carnegie Mellon, autistic individuals and their families have also developed a co-curricular program called the neurodiversity hub in order to link students with Universities and employers that value their unique talents. Currently they are trying to partner with universities in the US, Australia, and the UK to implement their programs. The programs include mentoring programs and training on work readiness, life skills, and transitioning to universities. Andrew explains that it is designed to address three areas where companies are failing to create a pipeline of autistic talent: pathways to universities and college, support for success while in higher education, and lack of work

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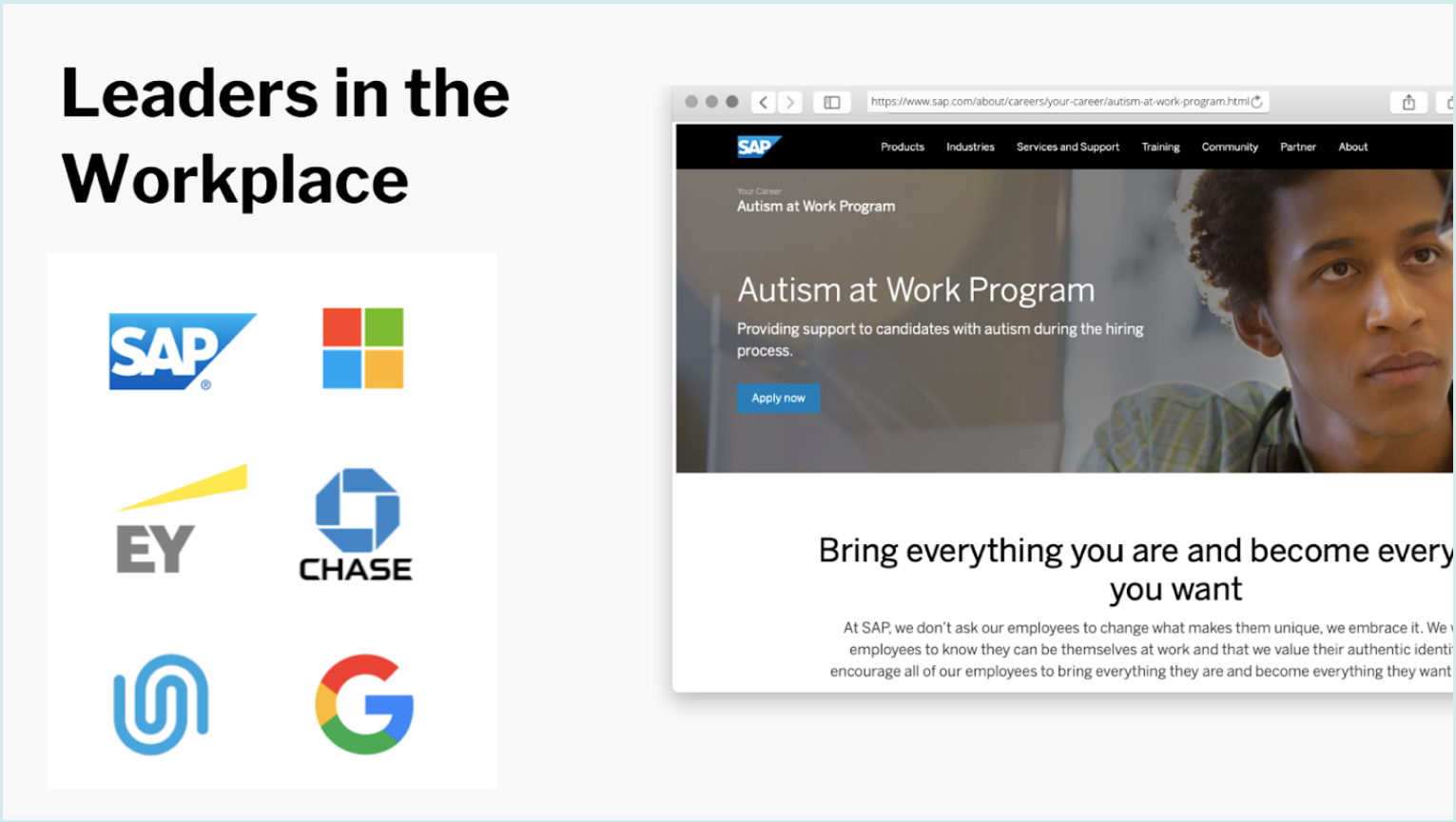
[40]Remote management platform. (2020, April 10). Retrieved September 28, 2020, from https://lifesherpapp.com/

experiences and internships which prevent them from standing out amongst their neurotypical peers.

As mentioned above, Mentra is fighting to combat the high unemployment rate amongst autistic individuals. Mentra is developing a proprietary A.I software that holistically reviews individuals and helps match them with companies looking to hire autistic employees based on their strengths and abilities. Once the Mentra team launches the platform, job seekers will be able to sign up to join Mentra, and are guided to complete a single robust questionnaire that captures data about their environmental preferences, core values, personalities, skills and strengths. This matching algorithm will then evaluate different job postings and find matches based on these factors. Job candidates can also customize their Mentra profile to better represent who they are as a person and share their story with employers. The platform will also guide individuals towards mentorships and training resources to further develop their career pathway, and allow them to overcome the challenges they face in getting hired in today's work landscape. Mentra has a goal to aid 100,000 autistic individuals find meaningful employment by 2025.

There are also many established, well-known firms trying to expand neurodiversity in the workforce including Microsoft, J.P. Morgan Chase, SAP, Ernest & Young, and Ultranauts. Many of the positions offered by these companies are technical or detail oriented in nature.

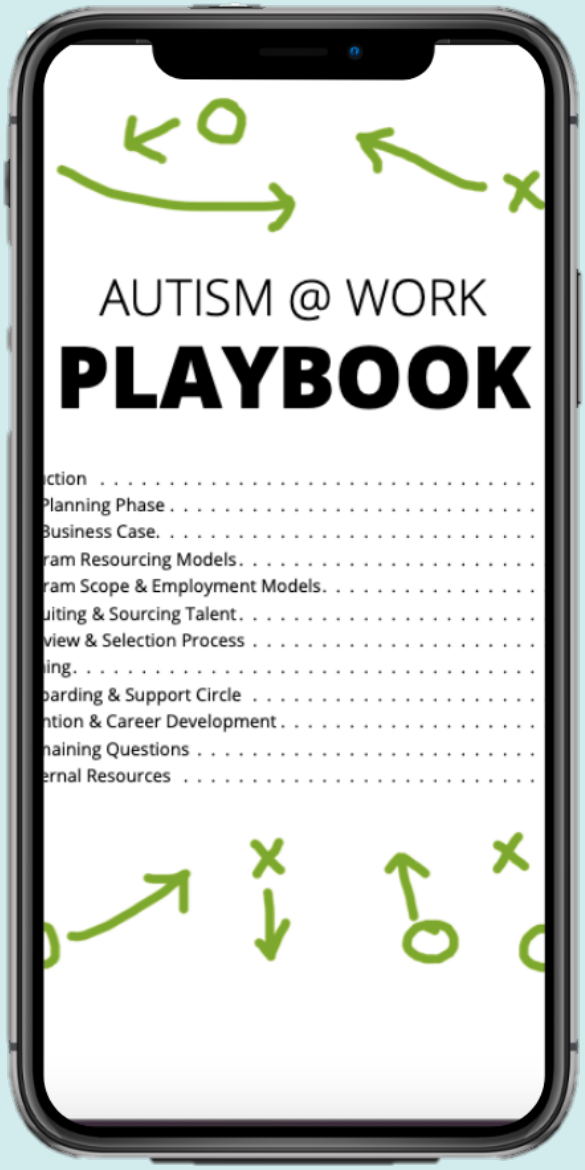


Some of the positions offered at these firms are:

- software engineers.
- data scientist
- human resources
- project management
- quantitative analysis
- robotics
- cybersecurity
- personal bankers,
- fraud analysts

J.P Morgan Chase and SAP are firms that offer the most positions to autistic employees with Chase offering 25 different roles and SAP offering 21 different roles respectively[41]. Many of these firms also plan on expanding their autism programs as well after witnessing their benefits. For example, a neurodiverse team at SAP helped develop a technical fix worth an estimated $40 million in savings[42].

JPM Chase committed to employing 200 autistic individuals by 2020 and SAP intended to make 1% of its workforce neurodiverse by 2020 as well[43]. Together, these leaders in neurodiversity in the workplace have joined to create an **Autism @ Work Playbook** to share how developing a neurodiverse workforce is beneficial and not as sophisticated as it may seem[44].



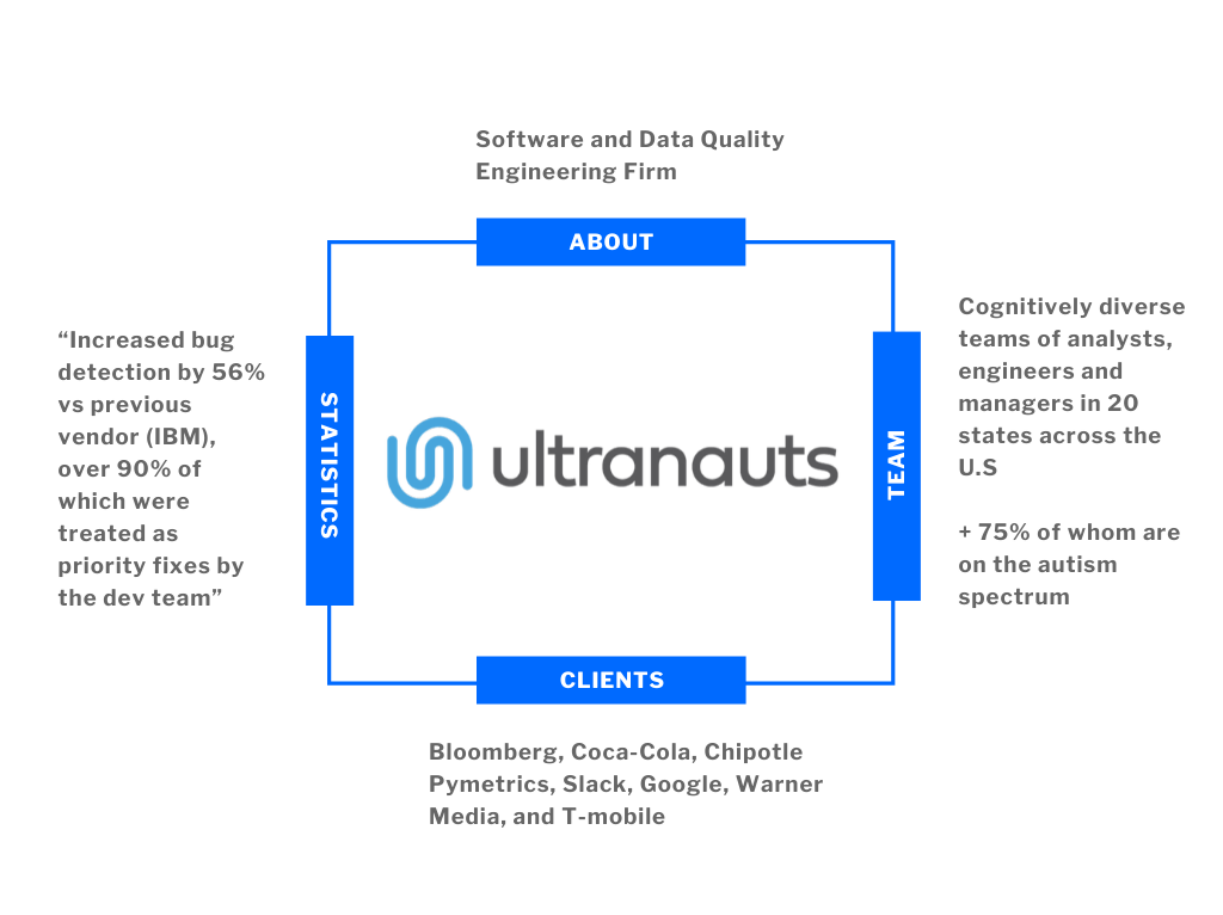
[41] Annabi, H., Dr. (2019). Autism @Work Playbook. Retrieved 2020, from https://s3.amazonaws.com/disabilityin-bulk/2019/Autism_At_Work_Playbook_Final_02112019.pdf

[42] Austin and Gary P. Pisano, R., & Pisano, G. (2017, July 18). Neurodiversity Is a Competitive Advantage. Retrieved September 13, 2020, from https://hbr.org/2017/05/neurodiversity-as-a-competitive-advantage

[43] Annabi, H., Dr. (2019). Autism @Work Playbook. Retrieved 2020, from https://s3.amazonaws.com/disabilityin-bulk/2019/Autism_At_Work_Playbook_Final_02112019.pdf

[44] Annabi, H., Dr. (2019). Autism @Work Playbook. Retrieved 2020, from https://s3.amazonaws.com/disabilityin-bulk/2019/Autism_At_Work_Playbook_Final_02112019.pdf

Another unique firm trying to expand neurodiversity is Ultranauts, a software and data quality engineering firm. According to their website 75% of their employees are on the autistic spectrum and they boast about their success over a very well-known competitor, IBM, stating that they, "increased bug detection by 56% vs previous vendor (IBM) with over 90% [of the bugs they found] were treated as high priority fixes by dev teams."[45]



[45] Ultranauts. (2019, November 23). Top-tier Consultancy. Retrieved September 13, 2020, from https://ultranauts.co/digital-agency/

Mental Health and AR/VR

Mental health poses a severe risk to individuals that suffer with some form of a Neurological disability, however, thanks to 21st century innovation, applications are able to help combat this problem. According to the Hope for Depression Research Foundation, depression in the United States is the leading cause of disability for ages 15-44[46]. Depression and other mental health problems in the workplace causes 490 million disability days from work each year in the U.S and costs the US economy over $51 billion in absenteeism from work and $26 billion in direct cost of treatment[47]. According to the US Center for Workplace of Mental Health, workplace depression costs employers $44 billion annually[48]. As society has begun to pay more attention to this issue, there are many amazing new technologies emerging for the purpose of helping people with mental health. One example is Psious, a Virtual Reality platform for mental health treatment. Therapists and mental health professionals use Psious to help people in the workplace. It offers different therapeutic environments for different mental health problems like Anxiety, Specific Phobias, Eating Disorders, Relaxation, Mindfulness, Pain Distraction, Psycho-Education, ADHD, OCD, and EMDR. The Psious system provides more than 70 VR situations for different conditions like exam-related anxiety or fear of public speaking for workers to experience and practice without having interaction with real people. The monitors of the equipment responses in real-time with biofeedback sensors will collect data for treatment use[49].

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[46] H. (2019, September 24). Facts about Depression. Retrieved September 13, 2020, from https://www.hopefordepression.org/depression-facts/

[47] Can Tech Help Manage Mental Health in the Workplace? (n.d.). Retrieved September 13, 2020, from https://www.corporatewellnessmagazine.com/article/tech-manage-mental-health-workplace

[48] Can Tech Help Manage Mental Health in the Workplace? (n.d.). Retrieved September 13, 2020, from https://www.corporatewellnessmagazine.com/article/tech-manage-mental-health-workplace

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Mental Health and 5G

As mentioned earlier, 5G is one of the newest forms of technology that brings the fastest connectivity, speed, and reliability between devices known to date. People can talk to each other in real-time without experiencing any delay, which used to be scarce in the past. Creating a link between 5G and mental health will soon be of vital importance. One example of this is Cloud 911, an application that can connect public officials (police, paramedics, firefighters) with data from health professionals. Cloud 911 allows people to make on-site decisions and connect those in need with the right professional to help de-escalate and resolve issues at the scene. 5G would very much aid this process by allowing access to live video calls. The power of 5G would not only help those at the scene, but also aid in the decision-making that currently would occur off site[50].

...

While investing in technologies such as Psious can help employers create a safe environment for employees battling mental health disorders, it also requires action from the employers themselves. Rahul Jindal, a Director at Google, emphasizes that creating this safe space begins with the "tone at the top," and discusses the importance of posing your own vulnerabilities, in addition to continuously advocating for and raising awareness of resources available.

Neurodiversity is not just a battle of inclusion but also a competitive advantage as many of these firms are realizing. Advances in 5G technology could foster the rise of more firms like Untapped and Mentra and more software like the Mentra A.I and Life Sherpa that can aid neurodiverse individuals in getting hired and also expand upon existing employment models.

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[50] *Cloud 911 is Making a Difference*. Mental Health First Aid. (2018, May 9). https://www.mentalhealthfirstaid.org/external/2018/05/cloud911-making-difference/.

Discussion

Results

Our findings have shown that the majority of people are unsure on the meaning of Neurodiversity and fail to make the connection between the term and neurological differences like Autism and ADHD. We also learned how ignorance of the capabilities and strengths of neurodiverse individuals cause them to be seen as less capable and looked down upon, preventing them from reaching their full potentials.

For instance, in the case of Special Education Programs, federal regulations such as IEP Plans for students are often of low quality and recycled from student to student, completely blind to individual needs. Many special needs educators lack training on how to use assistive technologies or do not even have access to them Additionally, educators are often spread thin amongst their class hindering their ability to provide each student with the support they need. Since the expectations for neurodiverse students is so low, often enough resources aren't allocated to address and reinforce their needs. This could be alleviated with innovative technological solutions involving more structured and interactive teacher training curriculums.

The results reveal that one of the biggest issues with the current workplace is the lack of widespread neurodiversity initiatives coupled with systemic flaws that unintentionally weed out neurodiverse talent. Many neurodiverse individuals are competent and talented, but are still unemployed. One reason is that the current interviewing-hiring scheme puts neurodiverse individuals at a disadvantage. Companies such as Mentra are working to address this problem. Additionally, Untapped addresses the problem by implementing a holistic interview process where they fly interviewees out to a testing facility and use a computer software called Pymetrics to gauge their readiness/compatibility. Other applications and software utilized by firms to assist autistic individuals include Life Sherpa.

Furthermore, there is a failure to bridge the gap between the school-to-work transition for Special Education students. Untapped is currently partnering with universities to help bridge this gap, as well through its Neurodiversity Hub program. The program aims to provide neurodiverse students with the resources they will need to succeed in higher education and provide them with internships and opportunities to stay competitive in their desired fields. Untapped's ultimate goal is to create a functional pipeline of neurodiverse talent ready to enter the workforce. Another potential solution to this is AI-powered job training and social

skills focused modules specific to individual companies, in which neurodivergent individuals would be provided with feedback and statistics on their progress. An application like such could provide a safe environment for students to progress their social skills, run through practice interviews with multiple attempts, etcetera.

Interpretations:

Although there are a few programs and considerations made for neurodiverse individuals in academic settings and in the workplace, we find that there are still too many obstacles and challenges put in the path toward true equality for neurodiverse individuals. The goal should be to create a society that is accepting and understanding of people of all cognitive abilities. Special Education Programs are in need of improved training for educators that prepares them to effectively teach classes of students who vary in their cognitive functions and learning styles. This careful attention and detail paired with the effective use of assistive technology will make for a better learning experience. Receiving a fulfilling education will inspire confidence in an increased self-esteem, which will make the transition to a higher education or full time employment in the workforce. Holistic hiring practices will ensure that individuals are not discriminated against and put at a competitive disadvantage in the workplace. If there were more programs like Untapped, which can give neurodivergent individuals the tools and opportunities to grow and build their confidence through the friendships made in a cohort and relationships built with SMEs and Spectrum Coaches, then neurodiverse individuals would be able to enter the workforce more frequently. This would result in the number of unemployed neurodivergent individuals to decrease and lead to better awareness and understanding by the society as a whole.

Methods

Much of this article is a culmination of interviews with notable individuals devoted to neurodiversity advocacy such as Dr. Pamela J. Mims (Associate Professor of Special Education at ETSU), Rahul Jindal (Director at Google), Andrew Eddy (Co-founder of Untapped), Dr. Brian K. Partin (ETSU University School Director), Jhillika Kumar (CEO & Founder of Mentra), Mrs. Lindsey Blevins (Boones Creek Elementary School Pre-K Teacher), and Dr. Mallik Tatipamula (CTO of Ericsson). Our team conducted additional research by distributing an informal survey to Reddit communities, our personal social media circles, and amongst our student organization Neurotech @ UIUC. The survey asked the following questions:

Part I

1. What is your current occupation? (Student/Employed/Unemployed)

Part II

1. Have you heard of the term "Neurodiversity?" (Y/N)
1. Do you know what "Neurodiversity" means? (Y/N)
2. If not, what do you think it means? If this does not apply to you, write "N/A." (Long answer response)
3. If so, what do you know about Neurodiversity? If this does not apply to you, write "N/A." (Long answer response)

Part III

Sample definition of Neurodiversity: "Neurodiversity is a concept where neurological differences are to be recognized and respected as any other human variation. These differences can include those labeled with Dyspraxia, Dyslexia, Attention Deficit Hyperactivity Disorder, Dyscalculia, Autistic Spectrum, Tourette Syndrome, and others." (Source: https://www.psychologytoday.com/us/blog/my-life-aspergers/201310/what-is-neurodiversity)

1. Was your definition of Neurodiversity similar to that listed above? (Y/N)
2. Are you neurodivergent? (Y/N/Prefer not to answer)
3. Where do you see Neurodiversity? (School, Work, Home, etc.) (Short answer response)
4. How often have you encountered Neurodiversity in the workplace (or school)? (Never/Occasionally/Often/Always)
5. If you answered Never or Occasionally above, why do you think you have not encountered Neurodiversity within this environment? (Stigmas? Inaccessible workplace? etc.) If this does not apply to you, write "N/A." (Long answer response)
6. Do you believe a stigma exists around individuals who are neurodivergent? (Y/N/Maybe)
7. If yes, what assumptions do you think people make about neurodivergent individuals? (Long answer response)

The results of the survey are summarized in the introduction.
All other information was referenced from peer-reviewed journal articles and other online sources.

Conclusion

Neurodiversity is present in every community and neurodivergent people often bring new perspectives and abilities to any group they are a part of. After gathering data, interviewing experts in the field, and finding examples in which emerging technologies are creating an impact on the lives of neurodivergent people we have put together some recommendations that we think that we think will enhance both schools and the workplace while decreasing stigmas and biases that exist towards the neurodiverse community.

First, and foremost, schools and companies need to re-evaluate the misconceptions, stigmas, and possible biases that exist within their community with regards to neurodiversity. Combating inequality needs to be a multifaceted plan that includes, social awareness training, funding, outreach, recruitment, and in-house support.

Addressing stigmas on neurodiversity in education should be specifically focused on creating awareness and neurodiversity in neurotypical classrooms. Furthermore, Changes need to be made in how special education teachers are trained by creating more inclusive curriculum design, increasing funding, and integrating 5G technologies to increase the reach and efficiency of special education programs.

Debunking biases and misconceptions in the workplace should begin with changes in the hiring process to better evaluate job seeking candidates and be more inclusive. One way that can be done is by integrating technologies such as AI into the job hiring processes and resume reviews to make sure candidates' skills are utilized as efficiently as possible. Finally, partnerships with companies such as Mentra and Untapped should be created as these companies are fully developed and trained in this subject matter and can help improve any neurodiversity program in the workplace.

If implemented, the recommendations we set forth in this paper have the opportunity to create great cultural impact on the lives of neurodivergent individuals. As technologies become more widely accessible these recommendations will be easier to implement in schools and businesses across the country. Finally, with enough social recognition and education on problems facing neurodivergent individuals, there will be more regulations and enforcement of government policies to provide better funding to ensure equal opportunity for all students, workers, and people no matter their differences. In addition, neurodiversity will create new opportunities for neurotypical people to experience neurodiversity throughout their day. These experiences will lead to awareness which will lead to actions being taken to address some of the challenges described above regarding neurodiversity in education and the workplace, therefore creating a domino effect.

Acknowledgements

Mallik Tatipamula

As a CTO at Ericsson, Dr Mallik Tatipamula leads evolution of Ericsson's technology and champion the company's next phase of innovation and growth. Prior to Ericsson, he held several leadership positions at F5 networks, Juniper networks, Cisco, Motorola, Nortel and Indian Institute of Technology (Chennai). During 30 years of his professional career, he has played a very unique leadership role in delivering industry's most powerful innovations, standards contributions, products/solutions, design implementation of early real-world deployments working with telecom operators, and also innovating for the future, working with academia, by anticipating what might happen next, to accelerate the architectural transitions in the telecom industry. He has identified strategic opportunities and implemented programs that have brought world-leading innovations to the telecom sector with a multi-billion dollars impact, launching over 50 products/solutions that are deployed in global telecom networks to enable these major network transitions from 2G to 5G.

Since 2011, he has been a visiting Professor at King's College London. He is a Fellow of The Institution of Engineering and Technology (IET, UK). He has been elected as a Fellow of the Canadian Academy of Engineering (CAE) in 2020, and received Univ. of California, Berkeley's Garwood Center for Corporate Innovation Award in 2019 for his outstanding contributions to the field of Telecommunications. And recently, he has been awarded "CTO of the year" award by Total Telecom World Communications Awards (WCA) for the year 2020 and shortlisted for "IET Achievement medal for the year'2020". He has Ph.D. in Information and Communications Engineering from the Univ. of Tokyo, Japan, Master's in Communication Systems from Indian Institute of Technology, Chennai, India and Bachelor's in Electronics and Communications Engineering from NIT, Warangal, India. He mentored over 150 undergrad/graduate students, delivered 400+ keynote/invited talks/tutorials/lectures around the world, co-authored 2 books, 100+ publications/patents, served on 30+ IEEE conferences committees. He has been involved in developing industry-academia partnerships in Canada, US, UK and India for future technology innovations. He serves on several advisory boards including Global Semiconductor Alliance, Gartner/Evanta CIO Council, Digital India Initiative, London Digital Twin Research Center, and Chair for the Industry Advisory Board for Garwood Center for Corporate Innovation and Center for Growth Markets at UC Berkeley.

Jhillika Kumar, Founder of Mentra

While studying at Georgia Tech, Conner Reinhardt and Jhillika Kumar brought together a group of young innovators to start grassroots movement by leading a team of neurotypicals and neurodiverse individuals to collaborate and innovate to create Mentra. By putting minds and hearts together, they are opening the doors to the employment process that often excludes individuals with disabilities because of the 'invisible barriers' that often plague the system. Mentra aims to get 100,000 neurodiverse individuals into meaningful and lasting careers by 2025. The Mentra platform is the brainchild of passionate disability advocates and autistic self-advocates that are trying to place neurodiversity at the core of recruiting in a way that scales, treating every individual as unique and more than just a resume. The Mentra team believes that the best way for a person to reach their highest potential in their careers is by finding a job that aligns with their work ethic, cultural values, personality, skills and environmental preferences in the workplace. Hence, the Mentra platform is the bridge that connects employers directly with talented neurodiverse individuals, where they are provided with a percentage match based on the unique characteristics of each individual.

You can learn more about Mentra here: https://www.mentra.me

Pamela J. Mims, PhD

Dr. Pamela Mims is the Associate Dean of Research and Grants as well as Associate Professor of Special Education in the College of Education at East Tennessee State University. She received her PhD in Special Education from the University of North Carolina at Charlotte. Her areas of interest/research include students with significant intellectual disability and autism, access to the general curriculum, and systematic instruction. Dr. Mims has numerous publications including peer-reviewed articles, book chapters, and curriculum on the topics of systematic instruction and access to the general curriculum for students with significant disabilities. She has spent extensive time writing extended content standards for state departments of education, as well as training educators and administrators on alternate assessments, access to the general curriculum, and evidence-based practices across the United States and world. She has served as Principal Investigator on IES SBIR Research Grants and other federal and foundation grants. Dr. Mims continues to conduct research, publish, and provide professional development nationally and internationally.

Rahul Jindal

Director @ Google; Neurodiversity and Disability Ally; Lay Buddhist
Blurb: Rahul Jindal is Director of Media Operations at Google and focuses on enablement & transformation in his current role. His career has spanned digital marketing & transformation, intellectual property monetization and legal outsourcing and he has served customers globally across multiple industries and functions. Rahul spends most of his time outside work in mentoring, investing and as a Buddhist leader.

Lindsey Blevins

Boones Creek Elementary School Pre-Kindergarten Teacher

Andrew Eddy, Director of Untapped

Our mission is to build high-performing teams from groups of highly-skilled individuals. We are passionate about identifying commercially-compelling opportunities in organizations for neurodiverse teams and uncovering extraordinary individuals to form those teams. The identification of this untapped talent will be achieved via the growing Neurodiversity Hub community of practice and other partnerships and, in conjunction with world-leading partners, by applying cutting-edge testing and assessment techniques.

You can learn more about Untapped here: https://www.untapped-group.com

Brian K. Partin, Ed.D., Director, University School

University School is a K-12 laboratory school for ETSU Clemmer College of Education in Johnson City, TN.

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