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## **Why inclusion programs are beneficial to students with disabilities and how universities can help: perspectives of students with disabilities**

**Ms. Meenakshi Manas Das, Mississippi State University**

Meenakshi Das is a junior computer science student at Mississippi State University and has an active interest in Accessibility in tech.

**Dr. Sarah B. Lee, Mississippi State University**

Sarah Lee joined the faculty at Mississippi State University after a 19 year information technology career at FedEx Corporation. Serving as Assistant Department Head and Director of Undergraduate Studies in Computer Science and Engineering, she works to create awareness and programs that encourage more women to enter the computing pathway and persist into computing majors and careers.

Sarah holds a BS in Business Administration and Computer Information Systems from the Mississippi University for Women and a master's degree in computer science from MSU. She earned her PhD in computer science from the University of Memphis.

**Ms. Litany H Lineberry, Mississippi State University**

**Chase Addison Barr**

# Why Inclusion Programs are Beneficial to Students with Disabilities and how Universities and Companies can Help: *Perspectives of students with disabilities*

Meenakshi Das  
Computer Science & Engineering  
Mississippi State University  
Mississippi State MS, USA  
mmd329@msstate.edu

Sarah Lee  
Computer Science & Engineering  
Mississippi State University  
Mississippi State MS, USA  
sblee@cse.msstate.edu

Litany Lineberry  
Computer Science & Engineering  
Mississippi State University  
Mississippi State MS, USA  
ll1178@msstate.edu

Chase Barr  
Computer Science & Engineering  
Mississippi State University  
Mississippi State MS, USA  
cab934@msstate.edu

**Abstract**—With the disparity in the percentage of persons with disabilities who complete an undergraduate education and persist on a STEM career pathway compared to those without a disability, there is much work to be done to create equitable and inclusive academic and work environments. Disability inclusion practices promote innovation and provide an accessible space where all abilities are embraced. This paper will provide an overview of inclusion programs that enable students with disabilities to thrive, with particular emphasis on the STEM pathway. It will provide anecdotal stories of students and early college graduates who have benefited from intervention programs. Recommendations for universities and companies on how they may engage and enable persons with disabilities to persist on STEM pathways will be presented.

**Keywords**—equity, computer science, disabilities, STEM

## I. INTRODUCTION

Computer Scientist William Wulf once described, “Lacking diversity on an engineering team, we limit the set of solutions that will be considered, and we may not find the best, the *elegant* solution” [1]. This insight demonstrates the need to encourage an increasing number of under-represented persons to pursue careers in science, technology, engineering and mathematics (STEM) fields. If companies want their products and services to succeed in the market, they need to hire a diverse pool of talent in order to gain different perspectives to universalize their products, and ultimately make profits. Not only does it help businesses, it ensures equality and fairness.

Students with disabilities often face challenges in completing STEM degrees, which ultimately leads them to

these careers. Hence, it is our responsibility as a society to encourage people with disabilities to pursue challenging engineering careers, by developing special mentorship activities, and disability inclusion programs.

## II. BACKGROUND

According to the United States (US) Bureau of Labor statistics “among people age 25 and older in 2014, 16.4 percent of people with a disability had completed at least a bachelor’s degree [2].” “By comparison, 34.6 percent of people with no disability had completed at least a bachelor’s degree. About 1 in 5 people with a disability had less than a high school diploma, compared with 1 in 10 people with no disability [2]”. The 2016 Disability Statistics Annual Report states, “34.9% of people with disabilities in the US ages 18-64 living in the community were employed compared to 76.0% for people without disabilities - a gap of 41.1 percentage points in 2015. [3]”

Similar to students without disabilities, students with disabilities choose career pathways partly based on self-efficacy [4]. In the rural southern US, reduced access to STEM role models affects self-efficacy among students [5]. A study by Lee in 2014 found that providing guidance and advising tailored to individual differences among students with disabilities would help increase these students’ self-efficacy in STEM fields [6]. Izzo et. al. reports that students with disabilities report feeling alienated from campus life in college and are often not persistent in requesting accommodations they require. Self-advocacy skills are frequently not developed or exercised in high school before entering college, resulting in a lack of ability to negotiate for

accommodations in college. Student Learning Communities (SLC) are recommended to provide an environment where these self-advocacy skills may be developed [7].

Elizabeth Taub, Executive Vice President of the US Business Leadership Network (USBLN) that provides innovative engagement opportunities to advance the full inclusion of people with disabilities as leaders, employees, suppliers and customers, describes in an interview with the authors: “College students and recent graduates with disabilities face numerous barriers to securing career opportunities. These barriers often prevent individuals with disabilities from attaining careers. In fact, the employment rate for college graduates with disabilities is approximately 30 percent less than their peers without disabilities, particularly in STEM- Science, Technology, Engineering, and Mathematics fields.”

To understand these barriers that students with disabilities face, it is important to understand their experiences and take their feedback for improvement. The authors present those types of experiences here from four students and recent graduates with disabilities regarding the struggles they faced or continue to face, intervention programs that helped, and their personal recommendations for how to strengthen the educational and career pathways for students with disabilities.

### III. PERSPECTIVES

R.P., a recent chemical engineering graduate shares, “Disability inclusion programs have been a huge part of my career, mainly due to the people I have met, the network I have formed, and the opportunities I had to learn/grow. They have allowed me opportunities to connect deeply with individuals in my fields of interest to really learn what I needed to in order to succeed. For example, the USBLN's Rising Leaders Mentoring Program [8] allowed me to connect with multiple individuals within consulting, a field I wanted to get into, which then allowed me to develop a skillset that went on to help me in future interviews landing me an internship, etc. It also allowed me to gain experience that I needed in order to start my professional career with a bang!” He further adds, “There always will be a need for programs, because of the dire need and niche that they fill. I read a bunch of statistics out there that disabled individuals are much more likely to be unemployed than able-bodied individuals, and that programs such as USBLN, Lime Connect [9], and others really do help bridge that gap. I still think that there is a lot of work to do in order to help even more people out there for the better, which is why I always think there should be more programs like such out there. I am working to try to establish a national student-run organization that focuses on disability employment at a college level, which I think is a huge opportunity that needs to be met soon.”

USBLN has two programs to support college students and recent graduates with disabilities. The Rising Leaders Mentoring Program [8] is a six-month career mentoring opportunity for college students and recent graduates with disabilities. It provides industry connections through partner

companies. Since the first pilot in 2012, there have been over 400 mentee/mentor matches, and by the end of the year over 50 percent of mentees from the 2016 program were working full or part time jobs. An average of 85% of all of mentees since the start of the program in 2013 are employed. The Rising Leadership Academy is an intensive two-day networking and career development opportunity that takes place during the USBLN Annual Conference. [8]

Lime Connect is a global nonprofit organization that's rebranding disability through achievement. They prepare high potential university students and professionals with disabilities for scholarships, internships and full-time careers with their corporate partners which include Google, Facebook and Microsoft to name a few. They also have a fellowship program and recruitment receptions to help support students in their professional careers. [9]

A.C., a PhD student studying environmental engineering, elaborated, “Disability inclusion programs in general increases awareness about your potential and capabilities so that it definitely has a positive effect on the career, because then you become aware of how you can use your performance to the fullest by owning your disability, and also by asking for proper, reasonable accommodations. But there is definitely is a need for better outreach and expansion of the current programs. It does not have to be "more" but perhaps the existing programs could be expanded and improved, with better infrastructure and logistics to reach out to more students.”

C.R., a graduate in environmental science reveals, “At the Access Technology Center at the University of Washington, the accessible-computing guru showed me scads of accessible-computing tools, which was comforting because I don't know how I'll use a computer with all the body parts damaged by my arthritis. Most immediately importantly, he helped me find a trackball mouse I could use (9 hand surgeries, 2 of which were during school; I couldn't take notes or type), worked with me on sitting-to-standing desks (neck surgery 2014; I can't afford one, though), and taught me to use voice-recognition software, Dragon Naturally Speaking.”

C.R. shares about AccessSTEM [10], “AccessSTEM especially helped me with was ADHD. They helped me with scheduling, prioritizing, and reading PDFs and other materials. They taught me how to convert PDFs to readable files (now Acrobat has its own reader, but it didn't then) so that the machine could read them out loud while I read along. It tripled my reading rate and doubled my comprehension. As a result, I read more of my assignments (especially scientific papers) because they weren't as aversive.”

AccessSTEM helps students with disabilities succeed in science, technology, engineering, and mathematics (STEM) and reach critical junctures on paths toward college studies and careers in STEM. They also share practices to help K-12 teachers, postsecondary faculty, and employers make classroom and employment opportunities in STEM accessible to individuals with disabilities [10].

C.R. gives advice to companies looking to hire diverse talent and says, “Companies can signify in their job ads that they’re willing to make accommodations for people with disabilities. I commonly find ads, even for dry, clean office, and outreach jobs (a rarity in the mud-and-puddle environmental field) that specify applicants must be able to lift 50 pounds. I think they’re talking about lifting boxes of pamphlets and handouts for presentations. I could be extremely effective in some of these positions, but I’m discouraged by this specification. Sure, I can lift 50 pounds if I want surgery to fuse my lumbar spine. Have these people heard of rolling carts? Do boxes of reading materials really have to weigh 50 pounds, or can you put them in two boxes—or even have the kid from the mailroom put them in your car?”

Computer science student C.C. explains how the AccessComputing [11], an organization that provides opportunities on the computing pathway for students with disabilities, helped him discover his passion for research in assistive technology, “I can’t say enough good things about AccessComputing. First, they exposed me to research in Assistive Technology. I had never considered this field, but it’s perfect for a blind computer scientist. Next, I went to several conferences with them. I’m from a rural area, and had never traveled alone prior to these conferences. The experience of traversing an airport and a new city all alone was daunting. And I always used the handicap assistance at airports to get around. My most recent conference was in October, and I was able to navigate all the airports alone! To me, this is quite an accomplishment, considering my orientation and mobility skills a year ago. Lastly, they put me into contact with a professor at Carnegie Mellon. After we got to know each other, AccessComputing offered to fund a research internship there! I never would have imagined working at a place like CMU, so that was amazing. Also, moving across the country alone and finding ways to get what I need without driving was very empowering.”

AccessComputing serves students with disabilities who are interested in pursuing undergraduate and graduate degrees and employment in computing fields and to increase the capacity of postsecondary institutions, employers, and other organizations to fully include students with disabilities in computing courses, programs, and careers [11]. Some of the services offered include a resume database, grants for conferences, summer research experiences and internship funding.

#### IV. INTERVENTION PROGRAMS

From the anecdotal stories in the previous section, the authors summarize the following main points:

- Inclusion programs and intervention activities at college level are highly important for a student with disability to succeed in personal and professional life. They not only help building self-confidence but also provide advice on crucial things like asking for accommodation in interviews and networking and introducing to potential employers.

- On-campus disability support services and/or accessible technology centers are necessary for students so that the students are provided necessary accommodations such as extra test time, etc. and are introduced to technology that might help them and hence succeed academically.

- There are many successful intervention programs at present but they either need expansion, advertising or just an increase in their number. There is a need for a national student-run disability organization.

- Companies and businesses need to expand their diversity outreach and make every part of their hiring process accessible and accommodating.

#### V. JOB OUTLOOKS

The Workforce Recruitment Program for College Students with Disabilities (WRP) is a recruitment and referral program that connects federal and private sector employers nationwide with highly motivated college students and recent graduates with disabilities. It is managed by the U.S. Department of Labor's Office of Disability Employment Policy (ODEP) and the U.S. Department of Defense's Office of Diversity Management & Equal Opportunity (ODMEO). [12]

Keri Gray, the director of Rising Leaders Initiatives at USBLN states in an interview with the authors: “We use our programs as a pipeline for talent within our corporate partners and we use them as educational experiences for both mentors and mentees. Both parties are able to learn more about diversity and inclusion through a disability lens. Both our partner companies and students feel more confident discussing disability in the workplace. These programs increase the diverse hiring practices of our partner companies.” Many companies have taken significant steps to recruit a diverse workforce and create an inclusive hiring environment.

Microsoft demonstrates an inclusive hiring practice for persons with disabilities. Every applicant is provided with interview accommodations as needed. Additionally, special hiring events are hosted for people with disabilities such as the Autism Hiring Cohort and the Ability Hiring event etc. [13]. Additionally, it also has a *disAbility* Employee Resource Group, which creates awareness of disabilities and ensures accommodations and resources are provided as needed and required [14].

Ernst & Young (EY) has several abilities networks for employees with disabilities which help to create an inclusive environment for employees. One example is the EY AccessAbilities™ Network which aims to give all their employees the environment, tools, resources, information and opportunities needed to succeed and grow in their career [15]. EY also has a Neuro Diversity Program, specifically designed to recruit persons with autism and Asperger’s Syndrome [16].

Jim Sinocchi, Head of Disability Inclusion at JPMorgan Chase, writes, “JPMorgan Chase looks at the whole employee when they join the firm. We look first at what the

individual can contribute to both our firm and clients. The firm makes it clear that we want people for their intellectual capacity and talent and we will do everything we can to accommodate them in a reasonable manner.” [17]

PwC’s *Ability reveals itself* initiative is a multi-year approach which is designed to help attract, retain and develop talented individuals with disabilities. Efforts also include raising awareness of disability inclusion topics among their partners and employees. [18]

Institutions of higher learning can also help with the gap in persons with disabilities on a STEM pathway. Mississippi State University (MSU) has taken additional steps to help students with disabilities, in addition to the disability support services on campus. The Department of Computer Science hires interns with disabilities through AccessComputing to support the CSE department’s K12 computing and cybersecurity outreach program. Goals of this internship program at MSU are: inclusion and support for computing majors with disabilities, increased student confidence, and increased peer communication and relationship building. A total of 5 students have worked in this capacity since 2014.

One of these students, first author on this paper, shares the impact the internship had on her:

I always grew up with the feeling that I am not good enough to teach somebody or to make an influence because of my speech impediment. I would look for people to 'counsel' me but I was never really a counselor to somebody. With this camp, I was able to demonstrate programming concepts and the kids actually understood them. This really increased my confidence and made me realize that just because I suffer from a disability, that does not mean I am incapable of helping others and making a difference in their lives. ....a camp student made a bracelet and gave it to me at the end of the camp. That made my day and elevated my confidence further.

Also, with hiring interns with disabilities, the camp kids feel confident themselves. ....seeing underrepresented groups in leadership positions instills a sense of comfort in the camp kids.

## VI. SUMMARY

The examples presented demonstrate that many companies have established solid disability inclusion pipelines. However, the unemployment rate for people with disabilities is 8.5% as opposed to 3.7% for people without disabilities in 2017 [19]. It is clear that more companies need to initiate these types of programs. It does not take a lot of resources or money to do something as simple as provide accommodations for interviews.

One of the interviewers in the study mentioned, “Instructors are required to put the ADA statement in their Syllabus. I’ve had a couple instructors go above and beyond, by either taking a moment on the first day of class to encourage disabled students to come talk to them or writing a personalized ADA statement.” Thus, even though formal procedures, organizations and rules and regulations to follow do exist, showing empathy and respect is always appreciated and should be done often in the classroom.

## VII. FUTURE PLANS

The authors plan to create a student-run, chapter-based organization for students across the state of Mississippi, to include middle and high school and college levels. The objectives of the student chapter organizations project are to:

- Sustain and deepen students’ interests by increasing co-curricular and mentoring opportunities across levels that will allow students with disabilities to engage with STEM, and in particular computing.
- Provide near-peer mentoring opportunities among chapter participants and provide opportunities for other role models/mentors to visit local chapters, with the goal of increasing student ability for self-advocacy.
- Study the immediate and long-term impact of co-curricular programs that focus on increasing self-efficacy in STEM among students with disabilities.

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