

## **Cutting the Curb for Students with Disabilities Transitioning to Higher Education**

### **Seth Vuletich, Colorado School of Mines**


Seth Vuletich is the Scholarly Communications Librarian the Colorado School of Mines. Seth provides specialized support to graduate students through all stages of the research lifecycle. Prior to entering the field of librarianship, Seth was a professional woodworker and earned a bachelor's degree in geology from the University of Colorado, Boulder. Seth earned his Master's in Library and Information Science from the University of Denver in 2021.

### **Brianna B Buljung, Colorado School of Mines**

Brianna is the Teaching and Learning librarian at the Colorado School of Mines. She collaborates with faculty to design and implement information literacy throughout the curriculum. Prior to her work at the School of Mines, she was the Engineering and Computer Science Librarian at the US Naval Academy and a contract Reference Librarian assigned to the National Defense University. She earned her MLIS at the University of Denver in 2011.

### **Ms. Jamie Marie Regan, Colorado School of Mines**

Jamie Regan is an undergraduate student in Electrical Engineering at the Colorado School of Mines. Her academic journey is intertwined with a personal and passionate dedication to advancing accessibility within STEM fields. Inspired by her own experiences after acquiring disabilities during college, Jamie delved into research on the challenges faced by students with disabilities entering higher education.





## Cutting the Curb for Students with Disabilities Transitioning to Higher Education


Seth Vuletich

Brianna Buljung

Jamie Regan



Arthur Lakes Library



Before we begin, we want to acknowledge that accessibility is a broad and expansive field that is constantly changing. Despite best efforts to learn about the field and support accessible resources, we are not aware of all accessibility concerns but are passionate about providing access to education and information. We would also like to note that experiences with accommodation can vary from individual to individual and the generalized experiences we are presenting on today may differ from those of the individual. We invite your feedback and know we still have much to learn.

Our project began in 2018, when our institution first received grant funding from the Colorado Department of Higher Education to develop Open Educational Resources. One of the requirements written into the legislation that founded this program was that funded resources be created in a way that complies with the Americans with Disabilities Act, but the law provided no guidance on how that should be done nor did it provide resources to make that a reality. To begin addressing this gap, we created an open course to provide instructors with some of the tools and knowledge necessary to make their Open Educational Resources accessible and ADA compliant. In spring 2022, we presented a paper on our course at the ASEE North Central Section conference. At that conference we were asked about what we do to support students with disabilities transitioning into higher education. We didn't have a good answer and it became clear that we needed to understand this transition so that we could make strides to ease it.

After that conference we applied to have this project supported by our campus' undergraduate research fellowship program. This collaboration with Jamie, our undergraduate researcher, has

allowed us to expand capacity while also providing invaluable insights into the experiences of undergraduate students. This presentation is about the efforts conducted so far.

The title of our presentation, “Cutting the Curb for Students with Disabilities Transitioning to Higher Education” alludes to sidewalk curb cuts that help folks using wheelchairs more easily access sidewalks. These were first installed in the 1940’s in Kalamazoo, Michigan to help disabled veterans returning from war more easily get around as a pilot project [1]. They have since become commonplace around the world and are symbolic of the benefits of universal design. Beyond wheelchair users, curb cuts make it easier for folks with strollers, on bikes or skateboards, and everyone else who has stumbled or might stumble over a step to get around on sidewalks. While we want to focus on the needs of marginalized students with disabilities, we hope the work we are doing now might have impacts beyond this population. We want to better understand what we can do to make the transition from high school to college as successful, smooth, and seamless as possible for all students of all identities and abilities.

## Challenges Students With Disabilities Face

---

### Regulatory Support

- Individuals with Disabilities Education Act (IDEA) and Individualized Education Programs (IEPs)
- Americans with Disabilities Act (ADA)
- Section 504 of the Rehabilitation Act

### Independence

- Familial support networks
- Self-advocacy

### Institutional barriers

- Inaccessible material
- Under-trained instructors
- Lack of staff/dedicated personnel
- Poor representation

To begin our project, we reviewed the literature to understand the problem better. A 2020 survey conducted by the Office of Special Education Programs in the Department of Education found 23% of responding students with disabilities reported planned enrollment in higher education [2] compared to a study conducted in 2021 which found that 38% of the general population of 18–24-year-olds were enrolled [3]. Additionally, students with disabilities complete degrees at a lower rate than their peers [4], [5]. This gap in achievement is even more pronounced in STEM disciplines where only 3% of the workforce reports having a disability compared to 13.5% of the general population [5]–[7]. As a STEM institution, this is cause for concern.

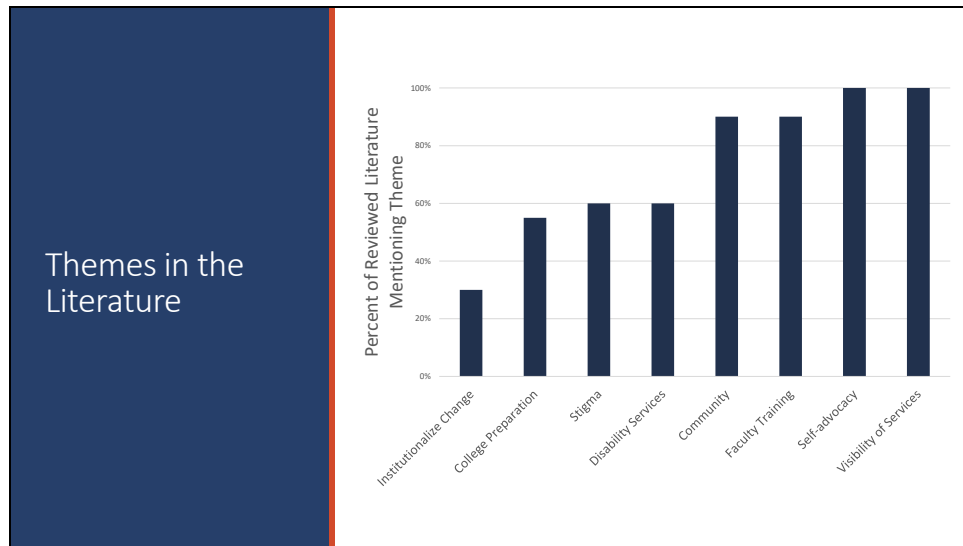
We wanted to understand what was influencing these gaps in achievement. We found several compounding factors; first, legal frameworks are different for higher education than they are for primary and secondary education. All people are guaranteed certain rights under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act [8], [9]. In the context of education, Section 504 guarantees that otherwise qualified individuals are not excluded from educational opportunities at publicly funded institutions [9]. ADA guarantees that reasonable accommodations be made both physically on campus and in educational materials [8]. In addition to these laws, in primary and secondary education, students are guaranteed certain additional protections under the Individuals with Disabilities Education Act or IDEA including Individualized Education Programs or IEPs [10]. IEPs ensure accommodations and consistency in services across primary and secondary education, but IEPs are no longer available once students enter college leaving only Section 504 and ADA to protect their educational rights. The

ambiguity in the terms of Section 504 and ADA allows some room for interpretation, and they are certainly less robust in their guarantees than IDEA.

Beyond Section 504, the Rehabilitation Act also ensures vocational rehabilitation as a continuation of IDEA services which can include specialized support for post-secondary education, where applicable (e.g., students who are likely able to complete a degree and would have improved employment prospects from doing so) [11]. While vocational rehabilitation can include financial support for higher education, there is little support to ease the transition in educational accommodations due to the changes in legal frameworks.

Not only do students lose IDEA support upon entering higher education, they also have to adjust to new levels of independence. Many students are away from familial support for the first time in higher education settings. This can result in a stark change in support and advocacy. Such students must become familiar with advocating for themselves while navigating freedoms and expectations different from what they may have become accustomed to. Finally, there are institutional barriers that students with disabilities must contend with. Materials are not always accessible, this includes lecture materials, textbooks, notes, and lab work. Physical spaces may also be poorly designed in such ways that they fail to ensure all students have access. Some courses require fieldwork as well, which is a notably difficult area to provide accommodation for certain disabilities.

Many of the challenges students with disabilities face when transitioning to higher education stem from awareness and support. In our experience, instructors are frequently unaware of best practices and institutions may not go above the basic requirements of “reasonable accommodations” set forth by the Americans with Disabilities Act and Section 504, if they are meeting those requirements at all. Lastly, students with disabilities are frequently poorly represented in curricula. There is great value in having diversity represented in coursework; when students see examples of themselves represented in their coursework, they may be more likely to believe in their own potential to succeed. Interventions involving representation in instructor roles and course curricula have shown this to be the case with other marginalized identities [12], [13].



Our undergraduate research fellow assembled this graph showing some of the themes that were present throughout the literature. As you can see some of the most significant changes students must contend with are community, faculty training, self-advocacy, and visibility of services [4]–[6], [14]–[36]. Even if a service is available, poor visibility and lack of student awareness can limit its impact.

## Existing Programs that Promote Successful Transitions

### High School Level

- Training and preparatory coursework as part of IEPs
- Vocational Rehabilitation

### College Level

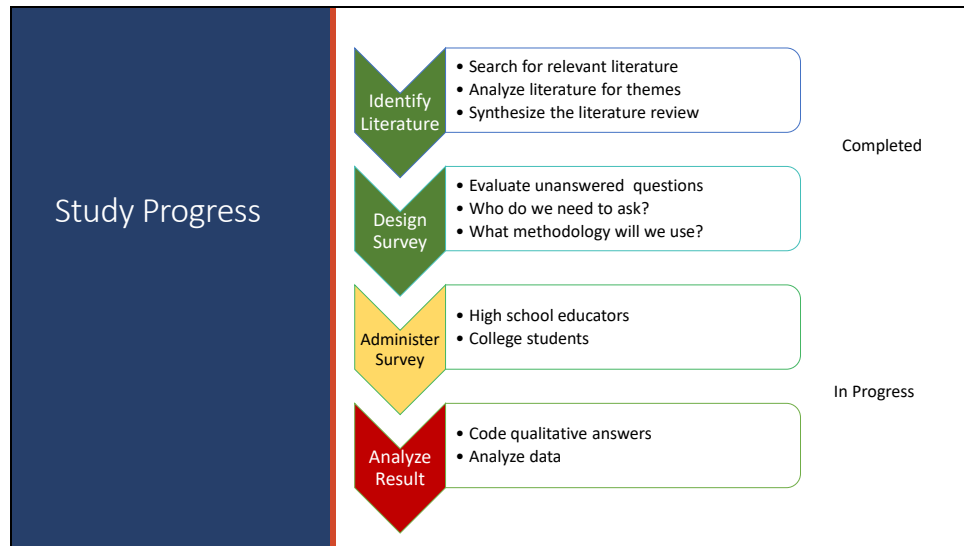
- Disability Support Services
- Training instructors
- Student support groups
- Highlighting diversity

So, what is being done to help address these gaps? The Office of Special Education and Rehabilitation Services (OSERS) provides guidance on transition services which include ensuring students understand their rights under ADA and Section 504 [11]. Beyond ensuring students understand their rights, high school educators can prepare students in other ways including supporting enrollment in college courses and college preparatory curricula in their IEPs. OSERS stresses the importance of coordinating efforts between special educators and vocational rehabilitation specialists to ensure the transition into life after secondary education is as smooth as possible [11].

At the college level there are also a variety of services and supports that are offered to students to help them adjust to the norms and expectations of higher education. Disability Support Services, or similar offices, offer students help in getting the accommodations they need. It is not enough to have centralized support for disability accommodations, each instructor must understand what they can and are expected to be doing to build courses that are inclusive. It is far more challenging to remediate materials to make them adherent to the principles of Universal Design for Learning than to build accessible materials from the outset. That was the whole purpose of the course we created that started us on this path. Many instructors wait until they have a student with disabilities enrolled to address the problems with their materials; such strategies not only result in poor accessibility of materials, but they are also not adherent to ADA requirements because disclosure of disabilities is only required to receive academic adjustments not access to resources [37].

For students, navigating their rights and the issues with campus-wide accessibility can be challenging alone, but student support groups can help to build a sense of community. A *Stat* article came out a couple years ago about a room at UC Berkeley that was there for students with visual disabilities to use [38]. Just having a room, built a strong sense of community and belonging, students could compare notes on professors, work together on problems, and share about good and bad experiences. Many of the folks who used that room not only completed their educations but have gone on to have extraordinarily successful careers by any standard. This is just one of many examples of peer support. Community can have a significant impact on academic outcomes, especially when some of the support from family is no longer present.





On to what we're doing with Jamie, we began with the literature review over the first year of her fellowship. We looked for literature on the transition to higher education, identified themes and combined all of that material to understand the current state of transition services. Next, we designed a survey, we'll get into the details of that on the next slide, but basically, we want to understand what remains unanswered, at least within the context of our institution. Some of these questions include:

- Did students have positive or negative experiences transitioning to higher education?
- Where did they learn how to pursue accommodations?
- What was their experience with accommodation in high school?
- What are high school educators doing to prepare students?
- Do students feel adequately supported?
- Do they feel they belong to a community?
- Do they feel responsible for their own preparation for college?
- Do high school educators feel responsible for this preparation?
- What could improve the transition?
- What do students wish they knew going into college?
- Have student experiences changed over the last few years?
- Are certain disabilities better supported than others?

Survey Design	
<b>Survey High School Teachers</b>	<b>Survey College Students</b>
What are they doing to prepare students for the transition?	What are their pain points with the transition and the campus?
What significant challenges do they see students facing upon entering college?	What do they think would help ease the transition to college?
What do they think colleges do well?	What advise would they provide students with disabilities prior to entering college?
What do they think colleges could do better?	What campus resources are they using?

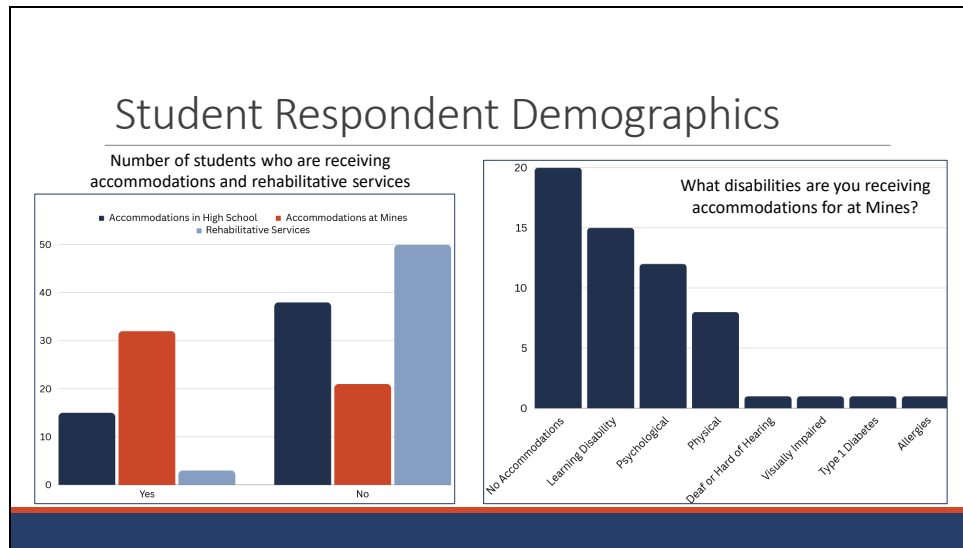
To answer these questions, we conducted a mixed methods survey. We surveyed local high school educators who work with disabled students and current students who self-identify as having a disability at our institution. Students who end up at our institution will know best what support they have received and what more they might need. Future work may include interviews with high school populations, inclusion beyond students with disabilities, and college-level educators, but for now we are trying to understand the transition within the confines of this project. Beyond uncertainty of whether it would be valuable to our study, we avoided surveying students with disabilities in high school as we would have required IRB approval as opposed to an IRB exemption which we received. As a STEM institution, human subject research is somewhat uncommon, so Mines does not have a full review board in house, they outsource full reviews to The University of Colorado. The time for a full IRB approval would have almost certainly taken longer than we would have had with our undergraduate research fellow and we didn't feel it was necessary to answer our questions at this time.

The survey is being conducted using SpringShare LibWizard. This platform allows us to ensure data privacy as it is behind a firewall. The questions for the student and faculty surveys mirrored each other so that we could see if there was alignment between the perceptions of students and teachers.

At Mines, we distributed the survey through the Orediggers Disability Activism and Community student organization and Daily Blast which is our daily email announcement. We had a greater response to this than anticipated, 53 students completed the survey. Externally, we reached out to several school districts having identified administrators who are working in special education.

The faculty survey was less fruitful than we initially hoped, with only 14 responses so far. We were getting a little pushback regarding internal district approvals for survey distribution. Through some of this pushback, we learned that there is a committee within the Colorado Department of Education who approves surveys, but primarily they work with mandatory data collection. Regardless, we voluntarily went through the Education Data Advisory Committee process, even though they made it clear this was not a requirement to distribute and collect data. We're hoping this additional stamp of approval helps us receive higher response rates going forward.

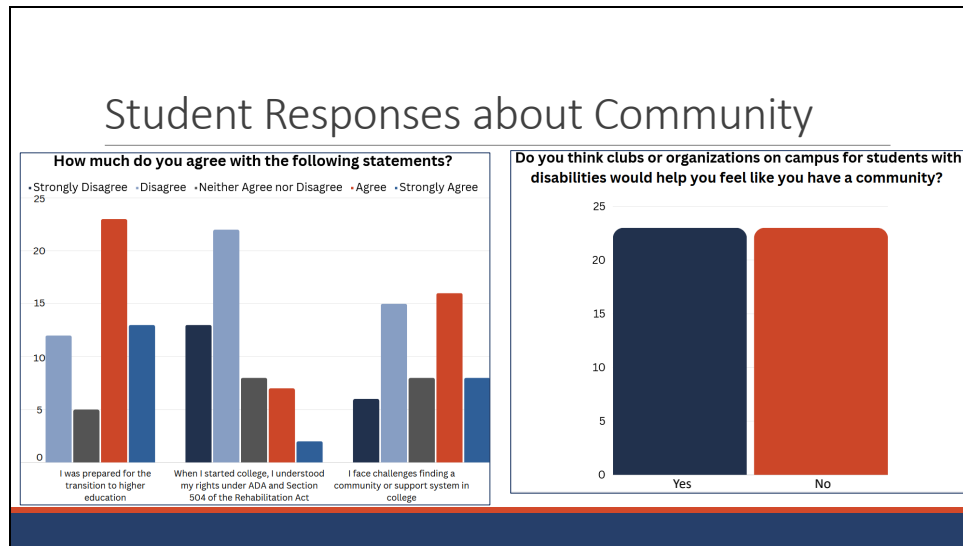
The surveys are completely voluntary and anonymized. We want to understand broadly what is being done in aggregate. Though we know there is much to be gleaned from individual experiences, we want to identify and address broader trends. We will use the feedback obtained to update and improve the course that started us on this path [39] and hopefully enable our campus to improve accessibility of resources and better meet the needs of students with disabilities transitioning into higher education.



As we mentioned, we are still in the process of collecting responses to the surveys, particularly the faculty survey. We have begun preliminary analysis of the data received so far and the following slides will describe what we've learned from the closed-ended questions on both surveys. First, let's begin by looking at some of the student respondent demographics.

On the left you can see the number of respondents who have received accommodations of some sort - 2 had accommodations in high school but not at Mines. 19 have accommodations at Mines but not in high school. 1 did not have accommodations in high school or Mines but uses rehabilitative services.

To understand if certain disabilities were being better supported than others, we asked students what disabilities they were receiving support for at Mines. We made it clear that all questions were optional, including this one. The graph on the right provides an overview of their responses – as you can see, the largest single group are students who don't receive accommodations at all. We will need to review the open ended response questions to gather more details as to why they are not receiving accommodations and assess whether there is correlation between certain disabilities and how well students feel supported.



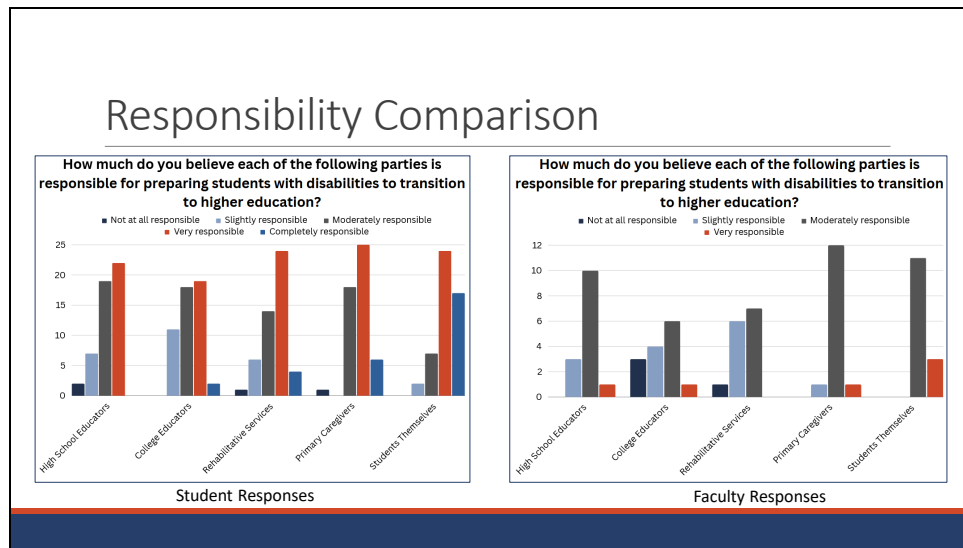
Now that we have a better understanding of the students who have responded to our survey, we can look at their feelings about community at Mines.

The first figure asked students to rate their level of agreement with three questions. They were asked to rate 1) how prepared they were for the transition to higher education, 2) their understanding of their rights under ADA and Section 504, and 3) if they felt they faced challenges finding a community or support system in college. As shown in the graph on the left, a majority of students felt prepared for college but a similarly large majority weren't aware of their legal rights.

Finding a support system/community was pretty evenly distributed although many said they faced challenges.

The second figure shows that students were equally split on whether clubs and organizations would help with their sense of community. This distribution was a bit of a surprise and left us with some additional questions: What are other ways that we can help form a community? Did the students have bad experiences with clubs/organizations? Or, perhaps they already have a community and that influenced their responses?

We are curious about the correlation between these 2 figures. We will need to further evaluate the data to determine if individual respondents' answers were correlated – for example, were students who felt they faced challenges finding a community more likely to feel that clubs or organizations would help form community?



Finally, we asked both sets of respondents the same Likert-style question regarding who should be responsible for preparing students with disabilities to transition to higher education. As a reminder, we had 53 student survey responses and only 14 faculty survey responses.

On the left, the graph shows the student responses - they mostly agree that they are responsible for preparing themselves for college. Although most agree that adults such as educators and caregivers should be helping them.

On the right, you can see the faculty responses – faculty were much more likely to assign moderate responsibility to each of the parties. We are curious to see if this distribution changes as we gather more faculty responses.

## Next Steps

---

1. Correlate student feelings about community
2. Find ways to gather additional faculty responses
3. Code and analyze open ended question responses on both surveys
4. Use findings to explore options for helping students at Mines and beyond transition to higher education with disabilities

Now that we have begun to analyze the data from both surveys, we are looking forward to the next steps in our research. We have Jamie as our undergraduate researcher for one more semester before she graduates. We want to look into the community questions a bit deeper to see if there are any correlations, responses to our open-ended questions should also provide more context for responses.

We are also interested in gathering more faculty responses to the survey. We hope to work with partners in the Colorado Department of Education to this end.

Finally, we will be able to use our findings to provide suggestions for helping students with disabilities transition to higher education and modify the accessibility course to address some of the areas for growth.

Thank You!



Seth Vuletich  
Scholarly Communications Librarian  
sethvuletich@mines.edu

Brianna Buljung  
Teaching & Learning Librarian  
bbuljung@mines.edu

Jamie Regan  
Mines Undergraduate Research  
Fellow  
jregan@mines.edu

Thank you for your time! Let us know your thoughts and any questions you might have.

[1] S. E. Brown, "The curb ramps of Kalamazoo: Discovering our unrecorded history," 1999.

[2] V. Williams and C. Dobak, "Successful Transitions for All Blog Series | Office of Special Education and Rehabilitative Services Blog." Accessed: Aug. 31, 2023. [Online]. Available: <https://sites.ed.gov/osers/2023/08/successful-transitions-for-all-blog-series-post-01/>

[3] National Center for Education Statistics, "College Enrollment Rates," Annual Reports and Information Staff (Annual Reports) -. Accessed: Aug. 31, 2023. [Online]. Available: <https://nces.ed.gov/programs/coe/indicator/cpb/college-enrollment-rate>

[4] M. V. Izzo, A. Murray, S. Priest, and B. McArrell, "Using Student Learning Communities to Recruit STEM Students with Disabilities," *Journal of Postsecondary Education and Disability*, vol. 24, no. 4, pp. 301–316, 2011, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ966131>

[5] L. P. Thurston, C. Shuman, B. J. Middendorf, and C. Johnson, "Postsecondary STEM Education for Students with Disabilities: Lessons Learned from a Decade of NSF Funding," *Journal of Postsecondary Education and Disability*, vol. 30, no. 1, pp. 49–60, 2017, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ1144615>

[6] A. Houtenville, "Annual Report on People with Disabilities in America: 2023".

[7] "Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023 | NSF - National Science Foundation." Accessed: Apr. 17, 2023. [Online]. Available: <https://nces.nsf.gov/pubs/nsf23315/>



- [8] United States Department of Justice Disability Rights Section, "Americans with Disabilities Act of 1990, as amended." U.S. Department of Justice, Civil Rights Division, Disability Rights Section, 2009.
- [9] Office of the Assistant Secretary for Administration and Management, *Rehabilitation Act of 1973*. 1973. Accessed: Jan. 17, 2022. [Online]. Available: <https://www.eeoc.gov/rehabilitation-act-1973-original-text>
- [10] United States Congress, *Individuals with Disabilities Education Act*. 1990. Accessed: Sep. 15, 2023. [Online]. Available: <https://sites.ed.gov/idea/statute-chapter-33/>
- [11] Office of Special Education and Rehabilitative Services, "A Transition Guide to Postsecondary Education And Employment for Students and Youth with Disabilities." United States Department of Education, Aug. 2020.
- [12] E. S. Shaffer, D. M. Marx, and R. Prislín, "Mind the Gap: Framing of Women's Success and Representation in STEM Affects Women's Math Performance under Threat," *Sex Roles*, vol. 68, no. 7, pp. 454–463, Apr. 2013, doi: 10.1007/s11199-012-0252-1.
- [13] "The State of Racial Diversity in the Educator Workforce," Office of Planning, Evaluation and Policy Development, US Department of Education, Jul. 2016. Accessed: Sep. 15, 2023. [Online]. Available: <https://eric.ed.gov/?id=ED571989>
- [14] J. Schneiderwind and J. M. Johnson, "Why Are Students with Disabilities so Invisible in STEM Education?," *Education week*, Jul. 2020, Accessed: Sep. 19, 2022. [Online]. Available: <https://par.nsf.gov/biblio/10274885-why-students-disabilities-so-invisible-stem-education>
- [15] B. Mays, "Understanding Experiences of Undergraduate Students with Physical Disabilities," May 2018, Accessed: Sep. 18, 2022. [Online]. Available: <https://shareok.org/handle/11244/299786>
- [16] A. D. Edwards and R. L. Parks, "Traumatic brain injury and the transition to college: Students' concerns and needs," *College and University*, vol. 90, no. 3, p. 47, 2015.
- [17] C. Kelepouris, "Transitioning Students with Disabilities into Higher Education," *BYU Educ. & L.J.*, vol. 2014, no. 1, pp. 27–40, 2014, Accessed: Sep. 26, 2022. [Online]. Available: <https://heinonline.org/HOL/P?h=hein.journals/byuelj2014&i=41>
- [18] Y. E. Pearson and Q. G. Alexander, "The Inclusion of Persons With Disabilities in Engineering Education and Careers," *Implementation Strategies for Improving Diversity in Organizations*. Accessed: Sep. 18, 2022. [Online]. Available: <https://www.igi-global.com/chapter/the-inclusion-of-persons-with-disabilities-in-engineering-education-and-careers/www.igi-global.com/chapter/the-inclusion-of-persons-with-disabilities-in-engineering-education-and-careers/256497>
- [19] V. S. Atkinson, "Supporting students with disabilities in transition: A case study of a college mentoring program," Ed.D., State University of New York at Binghamton, United States -- New York. Accessed: Sep. 18, 2022. [Online]. Available: <https://www.proquest.com/docview/1629465885/abstract/F166C9582149417CPQ/1>
- [20] J. Stohl, "Students With Specific Learning Disabilities; Perceptions of Postsecondary Accommodations, Barriers, and Self-advocacy," *All Electronic Theses and Dissertations*, Jan. 2017, [Online]. Available: <https://spark.bethel.edu/etd/611>
- [21] S. E. Eckes and T. A. Ochoa, "Students with Disabilities: Transitioning from High School to Higher Education," *American Secondary Education*, vol. 33, no. 3, pp. 6–20, 2005, Accessed: Sep. 19, 2022. [Online]. Available: <https://www.jstor.org/stable/41064551>

- [22] A. R. Fleming, K. M. Oertle, and A. J. Plotner, "Student Voices: Recommendations for Improving Postsecondary Experiences of Students with Disabilities," *Journal of Postsecondary Education and Disability*, vol. 30, no. 4, pp. 309–326, 2017, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ1172798>
- [23] A. J. Griffiths, J. Brady, N. Riley, J. Alsip, V. Trine, and L. Gomez, "STEM for Everyone: A Mixed Methods Approach to the Conception and Implementation of an Evaluation Process for STEM Education Programs for Students With Disabilities," *Frontiers in Education*, vol. 5, 2021, Accessed: Sep. 18, 2022. [Online]. Available: <https://www.frontiersin.org/articles/10.3389/feduc.2020.545701>
- [24] K. L. Lightner, D. Kipps-Vaughan, T. Schulte, and A. D. Trice, "Reasons University Students with a Learning Disability Wait to Seek Disability Services," *Journal of Postsecondary Education and Disability*, vol. 25, no. 2, pp. 145–159, 2012, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ994283>
- [25] N. Agarwal, E. M. Moya, N. Y. Yasui, and C. Seymour, "Participatory Action Research with College Students with Disabilities: Photovoice for an Inclusive Campus," *Journal of Postsecondary Education and Disability*, vol. 28, no. 2, pp. 243–250, 2015, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ1074679>
- [26] C. Cipolla, "'Not So Backwards': A Phenomenological Study on the Lived Experiences of High Achieving Post-Secondary Students with Dyslexia," Ph.D., Northwest Nazarene University, United States -- Idaho, 2018. Accessed: Sep. 26, 2022. [Online]. Available: <https://www.proquest.com/docview/2051258067/abstract/CB7CF9CB623D477APQ/1>
- [27] S. B. Meade, "Identifying Evidence Based Transition Strategies and the Barriers to Effective Transition Planning for Students with Learning Disabilities," Ed.D., Northcentral University, United States -- Arizona. Accessed: Sep. 26, 2022. [Online]. Available: <https://www.proquest.com/docview/1885095263/abstract/36A04BED8DBD4B12PQ/1>
- [28] H. Jeannis, J. Joseph, M. Goldberg, K. Seelman, M. Schmeler, and R. A. Cooper, "Full-participation of students with physical disabilities in science and engineering laboratories," *Disability and Rehabilitation: Assistive Technology*, vol. 13, no. 2, pp. 186–193, Feb. 2018, doi: 10.1080/17483107.2017.1300348.
- [29] J. C. Koone *et al.*, "Data for all: Tactile graphics that light up with picture-perfect resolution," *Science Advances*, vol. 8, no. 33, p. eabq2640, Aug. 2022, doi: 10.1126/sciadv.abq2640.
- [30] C. S. Bialka, D. Morro, K. Brown, and G. Hannah, "Breaking Barriers and Building Bridges: Understanding How a Student Organization Attends to the Social Integration of College Students with Disabilities," *Journal of Postsecondary Education and Disability*, vol. 30, no. 2, pp. 157–172, 2017, Accessed: Sep. 18, 2022. [Online]. Available: <https://eric.ed.gov/?id=EJ1153574>
- [31] A. L. Fall, "Assistive Drone Technology: Using Drones to Enhance Building Access for the Physically Disabled," University of Cincinnati, 2018. Accessed: Sep. 18, 2022. [Online]. Available: [https://etd.ohiolink.edu/apexprod/rws\\_olink/r/1501/10?clear=10&p10\\_accession\\_num=ucin1522399761180306](https://etd.ohiolink.edu/apexprod/rws_olink/r/1501/10?clear=10&p10_accession_num=ucin1522399761180306)
- [32] C. Dunn, D. Shannon, B. McCullough, O. Jenda, and M. Qazi, "An Innovative Postsecondary Education Program for Students with Disabilities in STEM (Practice Brief)," p. 11.
- [33] S. Seok, B. DaCosta, and R. Hodges, "A Systematic Review of Empirically Based Universal Design for Learning: Implementation and Effectiveness of Universal Design in Education for

Students with and without Disabilities at the Postsecondary Level,” *Open Journal of Social Sciences*, vol. 06, no. 05, Art. no. 05, May 2018, doi: 10.4236/jss.2018.65014.

[34] A. Babb, “A Phenomenological Study on the Experiences and Needs of Disabled Students in Higher Education,” *Doctoral Dissertations and Projects*, Apr. 2022, [Online]. Available: <https://digitalcommons.liberty.edu/doctoral/3462>

[35] “2022: How 3D printing has made chemistry more accessible for visually-impaired students - University of Wollongong – UOW.” Accessed: Apr. 24, 2023. [Online]. Available: <https://www.uow.edu.au/media/2022/how-3d-printing-has-made-chemistry-more-accessible-for-visually-impaired-students-.php>

[36] B. Stone, D. Kay, A. Reynolds, and D. Brown, “3D Printing and Service Learning: Accessible Open Educational Resources for Students with Visual Impairment,” *International Journal of Teaching and Learning in Higher Education*, vol. 32, no. 2, pp. 336–346, 2020, Accessed: Apr. 20, 2023. [Online]. Available: <https://eric.ed.gov/?id=EJ1286477>

[37] A. Duncan and R. Ali, “Students with Disabilities Preparing for Postsecondary Education: Know your rights and responsibilities.” US Department of Education (ED), Sep. 2011. Accessed: Nov. 22, 2023. [Online]. Available: <https://www2.ed.gov/about/offices/list/ocr/transition.html>

[38] I. Cueto, “‘Where the bats hung out’: How a basement hideaway at UC Berkeley nurtured a generation of blind innovators,” *STAT*, Mar. 28, 2022. Accessed: Sep. 11, 2023. [Online]. Available: <https://www.statnews.com/2022/03/28/the-cave-uc-berkeley-nurtured-generation-blind-innovators/>

[39] A. Bongiovanni, S. Vuletich, and A. L. Odicino. “Accessibility Course for Education.” Course. Canvas Commons, 2021. Available: <https://lor.instructure.com/resources/dbcb0b8d3013439386afe910e924eec7?shared>.