

MAXIMIZING ACADEMIC SUCCESS FOR STUDENTS WITH AN AUTISM SPECTRUM DISORDER IN A GEOSCIENCES PROGRAM: LESSONS LEARNED AT A SMALL LIBERAL ARTS INSTITUTION.

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Introduction: The number of students entering college with an autism spectrum disorder (ASD) is increasing. To elaborate, between 250,000 to 500,000 students in the United States with an ASD are either in college or will be soon [1]; this number does not include individuals who have either not self-identified as having an ASD [2] or were not diagnosed until during or post college [3]. Therefore, this range of students likely represents an underestimate. As a result, there will likely be an increase in students with an ASD enrolling in geoscience and related courses as majors, minors, or for general education requirements. In order to best serve this increasing segment of the student population, it is imperative for geoscience departments, and academic departments in general, to examine, and modify as necessary, their learning environments and programs.

Strategies for increasing accessibility and inclusivity of geoscience departments for students with an ASD have recently been addressed and have focused on developing curricula [4] and field courses [5]. Here, we want to build on those strategies and consider the overall structure of the department when serving this segment of the student population. Specifically, in the Department of Geology at Mercyhurst University where we have worked extensively with students with an ASD for over 10 years, we have found there are four broad factors that should be addressed in order to maximize success for this student population. Addressing these four factors in our department have shown them to be effective for helping students with an ASD navigate through our curriculum. However, more work needs to be done to examine the potential long-term impact of these strategies on students after graduation.

Background: *Mercyhurst and Geology.* Mercyhurst University is a Mercy institution founded by the Sisters of Mercy in 1926 and has an enrollment of ~3,500 students. A majority of students come from the Buffalo-Cleveland-Pittsburgh region and represent a mix of first-generation college students, returning veterans, and students who have had one or more family members attend college as well. The geology department consists of two full time faculty and ~30 students who are majoring or minoring in either geology or environmental science. ~100 students/year take geology courses as part of their general education requirement and a typical class size is ~25 students; students who have identified as having an ASD may

represent ~5–25% of a course's enrollment. That percentage also represents the typical number of majors and minors in the geology department as well.

Autism Initiative at Mercyhurst (AIM) Program.

The AIM program is a distinct entity from our university's learning differences program and has a mission to support students with an ASD in all areas of the college experience, including campus life and academics. The program consists of seven staff members and >60 students (~2% of the university's student population). Students meet weekly with one of the staff members to check in with how classes, and how college life in general, are progressing. AIM counselors then reach out as needed to instructors and academic advisors as needed for more information and/or to loop them in on student progress.

Lessons learned: In this section we outline the four factors we believe should be addressed to best serve students with ASD. We also discuss strategies for how to address those factors.

1) *Campus and department environment.* A campus-wide support network for both students and faculty needs to exist that includes strong communication between students, support staff, and faculty (and possibly parents while following the Family Educational Rights and Privacy Act, or FERPA). Faculty, administrators, and security also need education and training about ASDs through either conversations or workshops with appropriate campus offices (e.g., a learning differences-like office and/or a Title IX office). The degree to which a campus is supportive of students with an ASD will dictate the success of the other three factors and it needs to begin with school and department administrators modeling appropriate behaviors.

2) *Classroom organization.* Sensory overload can occur for students with an ASD and this leads to significant challenges for the student in the classroom [6]. Neurotypical individuals can filter what they receive whereas students with an ASD struggle with that ability, which can delay responses. Sensory stimulation (e.g., lighting, background noise) should therefore be reduced if possible and having students with an ASD sit in front rows can help. Spacing tables/desks to maximize room flow, together with labeling workstations/drawers and reducing clutter, is also helpful, though there may not always be an ability

to control a room's structure and organization. When interacting with students, it is important to recognize that students may employ a coping mechanism when a situation becomes overwhelming (e.g., they turn away, fidget, or put head down) [7]. Students with an ASD may also overshare/over contribute to class discussions and developing techniques to focus those contributions towards a positive direction will help keep class time moving forward; being direct and firm, but polite with a student regarding over contributing has worked well in our courses. Finally, before a class period begins, it is helpful to make sure the room is open and then actively invite students standing around to come inside.

3) *Teaching pedagogies and assignments.* Students with an ASD may have different processing rates for content than neurotypical students and may have difficulties with fine motor skills. Consequently, multiple ways of demonstrating course content mastery may be necessary while maintaining course rigor. Transitions are difficult and should be communicated when they will occur; maintaining classroom consistencies such as writing a schedule for that day's class can aid transitions, which may be difficult for a student with an ASD to recognize and/or make; directly connecting the upcoming topic/lesson with what was just covered may be another means of managing transitions.

4) *Academic advising.* Students with an ASD may not self-advocate nor understand subtlety and may have difficulties with executive functioning and therefore need to be paired with a patient advisor who will take time to work closely with them. Advisors need to be explicit and not assume a student with an ASD will pull information from their peers like a neurotypical student may. Parents of a student with an ASD are not usually helicopter-like parents, but they do like to be kept in the loop with how their child is doing; we have found that utilizing this connection while staying within the confines of FERPA can help ensure any message we may be trying to communicate to a student does sink in with them.

Discussion: Our experiences suggest that everyone within a class or program (students with an ASD as well as neurotypical students) can benefit from implementing these strategies because more clarity and communication can increase transparency and help ensure everyone is on the same page. Implementing these strategies, at least at first, does require one to go beyond what might be considered "normal" teaching and advising roles because no one student with an

ASD is the same. So, techniques and approaches that work with one student may not work with another.

Ultimately, most of what we discussed here extends from practices used in the K-12 system [e.g., 7] and has involved some form of 'trial and error'. This has been humbling and signifies there is still a lot of work to do to help ensure our programs are accessible and inclusive for students with an ASD. However, throughout our evolving practices, we have found that communication, support, flexibility, and patience are four common themes that commonly re-occur. Modeling these practices, especially with regard to support and patience, is absolutely critical for any implemented plan to be successful; students watch our behaviors and will follow our lead.

Where to go next: Because our practices are continually evolving and we have devised our strategies based on "trial and error", there is still a lot of room for us to grow. To elaborate, everything discussed here has been qualitative and we have not yet quantified the success of any of these approaches or looked at the long-term effects of our strategies; tracking student employment and experiences post-graduation is necessary to do this. Further, exploring attitudes and expectations students with an ASD are bringing into the classroom may help bridge gaps that exist within our strategies; this would also be interesting to explore with neurotypical students as they also bring their own attitudes and biases to a course, which can affect interactions with students with an ASD both positively and negatively. Understanding those attitudes could help guide ways to engage 'neurotypical' students, faculty, and staff to further support students with an ASD. Finally, our strategies have been developed at a small, private liberal arts institution and may not work at different sizes and types of institutions and it would be interesting to explore strategies that have been employed at other colleges and universities.

References: [1] Jackson, S.L. et al. (2018) *J. Autism & Developmental Disorders*, 48(3), 639-642. [2] Wenzel, C. & Brown, J.T. (2014), in *Handbook of autism and pervasive developmental disorders*, 4th ed. [3] White, S.W. et al. (2011), *Autism*, 15(6), 683-701. [4] Billig, D. & Feldman, H.R. (2017), *GSA Today*, 27(10), 36-37; doi:10.1130/GSATG325GW.1. [5] Lang, N.P. and Persico, L.P. (2019), *J. Geoscience Education*, <https://doi.org/10.1080/10899995.2019.1625996>. [6] Jones, R.S.P. et al. (2003), *J. Intellectual & Developmental Disability*, 28(2), 112-121. [7] *Autism Speaks* (2016). Facts about autism. Retrieved from <https://www.autismspeaks.org/what-autism/facts-aboutautism>