

Fostering STEM Identity: Community Support & Peer Mentoring for Neurodivergent Students

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Despite interest and potential in STEM (Science, Technology, Engineering and Mathematics), neurodivergent (ND) individuals face underrepresentation and marginalization. These individuals experience low rates of degree completion and even higher dropout rates from STEM programs. In the workplace, elevated levels of unemployment among individuals with disabilities underscore the need to address obstacles to persistence in STEM programs and pathways to the workforce. The AIE-STEMPLOS (Access to Innovative Education in Science, Technology, Engineering, and Mathematics-Providing Learning Opportunities and Scholarship) program at Landmark College, launched in 2021, aims to empower ND STEM scholars by leveraging effective mentoring strategies to support degree completion and career development in STEM fields. Supported by the National Science Foundation (NSF) through scholarship funding (S-STEM), the program's primary goals are to support domestic low-income, academically talented ND scholars in Computer Science and Life Science, create a robust culture of mentorship within the STEM department, and strengthen scholarly professional development. We generally refer to students as scholars in this program as that is the language preferred by the NSF. The mentoring component is designed to enhance psychosocial and professional development through faculty, group, and peer mentoring. Employing tools like the Birkman Method, mentor maps and Individual Development Plans (IDP), the program fosters self-understanding and community among scholars. Evaluation methods include qualitative and quantitative assessments, with data showing high satisfaction with mentor-mentee relationships, robust engagement in professional development activities, and significant improvements in scholars' professional outlook and STEM identity. This comprehensive approach integrates faculty mentors, career counselors, and weekly cohort meetings for mentoring and professional development activities. This paper will highlight the faculty and group/ peer mentoring components of the program, demonstrating how inclusive educational strategies can promote diversity within STEM fields.

Keywords: Neurodiversity, STEM, Mentorship, Disability

Introduction & Literature Review

Landmark College (LC) is one of two colleges in the U.S. that focuses exclusively on serving neurodivergent (ND) students which encompasses those who have learning differences such as dyslexia, attention deficit hyperactivity disorder, autism, and/or executive function challenges. ND students are underrepresented in the fields of Science Technology Engineering and Mathematics (STEM) although they hold tremendous potential for contributing significantly to these areas (Moon, 2011).

Just 29% of students with disabilities complete a four-year undergraduate degree within six years, compared to 42% of the general population (Sanford et al. 2011). This same group has even higher rates of departure from college STEM programs (Honken and Ralston, 2013). The rates for individuals with disabilities working in STEM professions are equally as troubling with 10% of the U.S. workforce comprised of individuals with disabilities, but only 2% making up STEM professions (Moon, Todd, Morton, & Ivey, 2012).

Neurodivergent students are not being hired as workers in STEM fields at rates comparable to their peers (Ladner & Burgstahler, 2015; Krzeminska, et.al., 2019). It is recognized that neurodivergence can serve as an advantage in organizations (Hyland & Connolly, 2018). Indeed, the field continues to amass data on strengths associated with different neurotypes for example those with dyslexia having greater strengths in visual-spatial capabilities or those with ADHD demonstrating higher levels of energy, hyperfocus and creativity (Fung, 2021) Notably, there is a call for diversity in the STEM fields to include neurodiversity (Austin & Pisano, 2017; Annabi et al 2019). Recognizing these factors, LC prioritizes developing innovative pedagogical systems to engage ND students, crucial for supporting their pursuit of STEM careers and advocacy once they achieve STEM employment.

While student engagement in faculty mentoring relationships has been shown to promote academic improvements in both performance and retention, the impact of such mentoring for neurodivergent students is much less understood. (Patrick &

Wessel, 2013). Mentoring also contributes to the socioemotional growth of undergraduate students in their sense of belonging and self-efficacy (Crisp et al., 2017) in addition to self-care and the realistic self-evaluation and identification of personal barriers to success (Gibbons et al., 2019).

Alongside the support of dedicated career counselors, the AIE-STEMPLOS (Access to Innovative Education in Science, Technology, Engineering, and Mathematics – Providing Learning Opportunities and Scholarship) program, which launched in 2021, is crafted to leverage effective mentoring strategies in multiple formats through faculty, group and peer mentoring to support scholars in career planning, network development, competence/strengths awareness and social/emotional support. The primary purpose of the research component within the AIE-STEMPLOS program is to demonstrate that effective mentoring leads to better outcomes in STEM fields for ND individuals. Specifically, our goals are: 1) To support domestic low-income, academically talented neurodivergent students in Computer Science and Life Science programs through degree completion; 2) create a robust culture of mentorship within the STEM department which houses the bachelor's and associate degree programs for Computer Science and Life Science; and 3) to build and strengthen scholarly professional development, drawing from STEM department faculty and Career Connections.

Neurodiversity and Neurodivergence

Neurodiversity is a social construct based on a biological fact that there is a natural variation in the way brains develop and work, and instead of separating people into normal and abnormal, neurodiversity asks us to accept variation (Landmark College). Neurodivergence is a non-medical term that refers to a brain that works differently than expected. It is linked to both exceptionality and disability which can co-exist in an individual. This can be referred to as a "spiky profile" as a student may be intellectually gifted, but also struggle with reading or social communication. Neurotypes such as dyslexia or autism are considered neurodivergent. Our program is designed to identify key features in a mentoring program that is considerate of neurodiversity.

Inclusive Mentoring Programs

From the start, our mentoring program was designed to focus on psychosocial and professional development of scholars who have long identified as outsiders. One way that we encourage self-understanding and community is through the Birkman Method. The Birkman Method is a personality assessment tool that evaluates individuals' behaviors, motivations, stress responses, and communication styles to enhance personal and professional development (Birkman,

n.d.). This tool de-pathologizes personal traits that scholars may attribute to their neurotype and provides language to describe work and communication styles. This survey is administered to all members of the AIE-STEMPLOS team, mentors, mentees and career counselors. This gives all involved a common language with which to analyze and discuss individual and team roles and strengths. support reflection on strengths and challenges in the classroom, the lab and in mentor- mentee relationships.

Faculty/Staff Mentoring

As students enter the program they are matched with a faculty mentor. Our STEM faculty is a small cohort, so mentor/mentee matches are made based on student interest as well as on faculty recommendations. Ideally, the faculty member mentoring the scholar can provide internship opportunities for participation. These opportunities range in size and complexity and are often tailored to the student. As needed, students engage in several internal internships before they venture to apply to external programs. Engaging in the scaffold of internships with trusted mentors enhances the scholars' confidence in their application in science and builds their self-assurance before pursuing other opportunities. Even though research and internships may not always go as planned, scholars who are comfortable with their mentors and feel at ease in their environment are more likely to share their ideas and actively participate. This involvement helps them develop the essential skills needed for a future in STEM. Mentors are supported through regular workshops addressing topics like developing relationships with a mentee or how to support mentees in creating an Individual Development Plan (IDP).

Group and Peer Mentoring

Peer mentors significantly influence S-STEM scholars during their initial years of the academic journey, whereas faculty mentors become more impactful in the later stages (Seymour & Hunter, 2019). At the heart of the program is the weekly meeting of STEM Identity and Community. As made clear by the title, this meeting provides group and peer coaching and mentoring, fosters a sense of belonging and supports STEM Identity development which have been shown to lead to positive experiences in internship and research experiences for scholars (Anderson et al, 2019). This dedicated multi-level 1-credit course is based upon best practices and includes: peer-to-peer dialogue and feedback, peer assessment, and increased student responsibility (Perrin, 2014). Meeting the needs of our population, this weekly gathering provides support for developing executive functioning skills which can be challenging for ND scholars as they work to build STEM proficiency. With varying degrees of