Building Ecosystems of Belonging for Neurodiverse Students

A Discussion of Instructor Practices and Training Needs

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ABSTRACT

What additional supports do instructors in Computer Science programs need to effectively teach neurodiverse students? Although many neurodiverse students (e.g., with ADHD, autism) enroll in Computer Science programs each year, few graduate. These students often struggle to communicate their needs to instructors, who in turn lack training to determine how best to support neurodiverse students. This can result in instructors unintentionally using practices that are detrimental to student success, which ultimately impacts students' sense of belonging in undergraduate programs. This BoF will provide a platform for instructors and neurodiverse graduates from CS programs to discuss several major topics relating to instructor and student needs: (1) The experiences participants have had with neurodiverse students in Computer Science programs, (2) Strategies participants have used to work with neurodiverse students, and (3) Instructors' professional development needs and preferences. This discussion represents both an opportunity for instructors to learn more from other instructors or CS students and supports an NSF-funded participatory design study to improve neurodiverse students' retention in undergraduate CS programs and provide effective training to instructors. Participants will learn about the project and be invited to stay up-to-date on the progressing project after the conference, with free access to the tools and curriculum developed through the grant for use in their own classrooms as they become available.

1 Significance and Relevance of the Topic

When neurodiverse students feel they belong, they are more likely to self-advocate, develop strong relationships, and obtain mastery in their area of study—and vice versa [1]. This impacts students who are already underrepresented in STEM fields more than most (e.g., women and Latinx students), since these students are both more likely to face discrimination and less likely to be diagnosed and have received early supports [2]. Unfortunately, most instructors are trained only for the needs of neurotypical students, just as learning environments are designed for neurotypical students, and are not trained to use teaching practices that will support neurodiverse students' atypical needs [3]. Likewise, many neurodiverse conditions bear social stigma, and students who have ever had the experience of an instructor objecting to student requests for accommodations are often afraid to ask other instructors for accommodations or support in the future [4]. Consequently, many neurodiverse students struggle in undergraduate programs and ultimately drop out or transfer out [5], despite high levels of interest in CS [6]. Instructor training is vital to building a supportive environment that instills a sense of belonging in neurodiverse students, such that students feel welcome asking for help and can benefit from teaching practices that meet their needs [7]. This discussion will support the aims of research funded by the National Science Foundation, *BPC-DP: Building Ecosystems of Belonging for Neurodiverse Computer Science Students*, including (1) designing professional development for CS instructors working with neurodiverse students, and (2) co-designing micro-credentials that will assess and share instructor preparation with students. Students can then identify instructors who are receptive to their needs, and instructors can better serve their needs. Participatory design (i.e., co-design involving students and instructors) is a valuable strategy in this case for ensuring that all stakeholders' needs are met [8]. This discussion will support the participatory design of the professional development, and also allow instructors at the BoF to learn from each other about successful strategies for teaching and even challenges they may be unaware their students face. Additionally, participants will be invited to engage long-term with the Ecosystem of Belonging project. We will invite participants to stay updated on future research progress for opportunities to freely access tools and curriculum as they become available.

2 Expected Audience

This discussion's expected audience consists of instructors and faculty in Computer Science higher education programs. Anyone who has had the experience of being a neurodiverse student in Computer Science higher education programs is also strongly encouraged to attend. This BoF discussion will support the aims of participatory design research that will benefit from a wide range of stakeholder voices, including CS instructors from different types of higher education programs and individuals who are neurodiverse. Furthermore, current or former students' experiences may spark rich discussion by presenting alternative perspectives. We anticipate an attendance between 20 and 30 people in person, with up to 20 online participants.

3 Discussion Leaders

In addition to lead discussant Rachel Bonnette, Sam Abramovich and Adrienne Decker will also lead in-person discussion, and Greg Fabiano will lead online discussion.

4 Expertise of the Discussion Leaders

Rachel Bonnette, postdoctoral researcher on the grant, is a learning scientist with expertise on motivation in STEM learning. She has published research on young adult learning in communities of practice and on factors that influence students' science fascination.

Sam Abramovich, PI on the grant, is an internationally recognized expert in Micro-credentials and his research is some of the most cited concerning micro-credentials, digital badges, and the learning sciences. He is the director of the University at Buffalo's Open Education Research Lab, which conducts research on the impact of open education technologies and resources in higher education organizations, including both 2-year and 4-year institutions. He is also the Lead Researcher for the University at Buffalo's Office of Micro-credentials.

Adrienne Decker, Co-PI on the grant, has been teaching at the college level since 2001. Her area of scholarship is computing education with a focus on assessment and creating motivating and effective curriculum for students at multiple levels of the curriculum. She has been actively involved in the computing education community, including SIGCSE and AP CSA where she most recently served as co-chair of the development committee for CSA.

Greg Fabiano, consultant on the grant, is a clinical psychologist with expertise in developing interventions and supports for individuals with attention-deficit/hyperactivity disorder across the lifespan. He has over 100 published works, two books, and continuous extramural funding since 2006 all focused on developing strategies to help individuals with ADHD reduce impairments and build skills in important areas of daily life functioning.

5 Proposed Activity During BoF

This BoF (45 minutes) will consist of the following activities:
1. (10 min) Introduction to the project and discussion.
2. (10 min) Share-out on the experiences participants have had either working with or as neurodiverse students in Computer Science programs.
3. (10 min) Discussion of strategies participants have already used to work with neurodiverse students and additional questions or challenges.
4. (10 min) Discussion of instructors' professional development requirements and needs, e.g., preferred formats and concerns.
5. (5 min) Summary of the discussion with invitation to stay in touch with the Ecosystem of Belonging project.

Each 10-minute subtopic discussion will consist of two parts. First, participants receive a prompt based on prior research on the topic and work together with two to three other people to discuss and take down notes for 5 minutes. Second, participants share out with the group for 5 minutes. At the end, all participant responses will be collected, and a written summary of reflections from the discussion will be shared with participants through the Ecosystem of Belonging project's website. Greg Fabiano will participate online to moderate online discussion in this hybrid format. Other discussants will share the responsibilities of taking notes on the discussion and moderating share-outs.

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