

Alignment and Misalignment: Critical Differences in the Way That Instructors and Students Perceive Support for Neurodiversity in Undergraduate Computer Science Education

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Abstract: Successful graduation from post-secondary programs can be a major stumbling block for neurodivergent students' transition to work. Most of the accommodations universities offer rely on neurodivergent students' abilities to self-advocate. But understanding, synthesizing, and communicating one's needs can be particularly challenging for neurodivergent students. This leaves instructors to make their best guesses at how to support their students, creating potential for misalignment between student and instructor perceptions surrounding neurodiversity. By understanding the alignment and misalignment between instructor and student understandings of neurodivergent student needs, the practices that can support them, and the barriers that hinder support, we can more effectively identify feasible pathways towards addressing neurodiversity in the classroom. This exploratory study investigated themes and compared student and instructor responses in an undergraduate Computer Science program. Preliminary findings suggest students may more easily identify the barriers they encounter than communicate the underlying need or a solution. The instructors—themselves neurodivergent adults—struggled less with vocalizing neurodivergent needs and identifying practices that could potentially support their learning, but likewise identified numerous barriers to enacting the practices they thought would help the most. We discuss preliminary findings on misalignment between the issues instructors and students identified and possible areas for professional development.

Introduction

In many fields today, holding a bachelor's degree is a pre-requisite to entry-level jobs. But for neurodivergent students, even those who thrived in K-12 education settings, university settings can present major challenges (Baczewski et al., 2022). In addition to the changes represented by adult responsibilities, like living away from parents, procuring their own food and clothing, and navigating adult relationships (Reifman et al., 2007), post-secondary education generally represents the first time that neurodivergent students are expected to self-advocate for their needs without the support of parents and adults who have watched their development over the years (Sarrett, 2018). Neurodivergent students may struggle with mental health issues throughout the pressures and trials of college (Gunin et al., 2021). Many also experience distractions and barriers to learning that come from the learning environment itself such as sensory processing disorder issues related to lights and sound (Jones et al., 2020). Social and communication barriers may hinder participation and belonging (Casagrande et al., 2020). Time management challenges associated with executive functioning can no longer be scaffolded by parents (Bolden & Fillauer, 2020). But if neurodivergent are not fully aware enough of these difficulties to then be able to articulate them to guidance counselors or faculty, they go without support (Sarrett, 2018). Even for those students who can self-advocate, the expectation places an undue burden on students who are unlikely to be able identify and articulate evidence-based teaching practices that will meet the needs and challenges they face (Woolf & de Bie, 2022). Accommodations provided by universities in the United States are likewise limited, and often ill matched to the specific needs of neurodivergent students (Weis et al., 2021). As a final pitfall to this system, faculty may struggle to understand the reason for the accommodations that are provided, particularly as students may choose not to disclose the disability or condition that distinguishes their neurodevelopment or mental health from the cultural norm (Price et al., 2017). Students who have experienced even one faculty member that was reluctant to meet their needs or except the

accommodations that were offered by the university are much less likely to reach out about the support they need to faculty in the future.

One important solution, then, is to make sure that instructors working with students are aware of the potential needs of neurodivergent students in their classroom and utilize more inclusive and accessible teaching practices, much the way that we call instructors to be able to adapt to culturally and racially diverse classrooms. A growing body of research has addressed the impact of educating instructors on Neurodiversity to ensure that they accept students' accommodation requests, and other requests for support. Educating faculty on these issues significantly improves faculty members' willingness to use practices that will support their students (Dwyer et al., 2023), but this does not mean that faculty know the practices that will be most effective for their neurodivergent students, nor does it address potential barriers to being able to use practices they know to be effective. Understanding where and why student and faculty perspectives differ on the subject of support can offer important insight into the process of self-advocacy and inclusion in undergraduate classrooms.

Methods

In this exploratory study, we wanted to understand the alignment between student and faculty perspectives to study their perspectives on neurodivergent needs, the practices that support them, and the barriers that hinder meeting those needs from both a teaching and learning perspective. We had a sample of three neurodivergent students, who reported that they felt comfortable self-advocating, either to faculty, or at least speaking to us in co-design sessions meant to develop training for computer science instructors at an east coast, urban University. In addition, we had a sample of two self-identified neurodivergent Computer Science faculty who were willing to contribute their experiences to the design of this research and who said that they felt motivated to learn more about best practices themselves. This sample allowed us to look at alignment and misalignment when the obstacle of faculty awareness and openness to neurodivergent needs is substantially improved and student willingness, if not ability, to self-advocate to the research team is addressed.

Data Collection

Faculty and students were recruited in Spring 2023 for a co-design project to design neurodiversity training for faculty through the university's accessibility office and newsletters sent through the Computer Science program. The research team met with researchers in separate, anonymous groups over the course of one semester in the spring of 2023. Meetings took place once monthly to discuss different potential challenges to effective neurodivergent student instruction and the way that they could be addressed. Students were given the additional assignment of meeting with the researcher for one-on-one interviews to talk about challenges they were currently experiencing in the computer science classes. Faculty and students were also asked to complete written, take-home reflective assignments that ask questions ranging from how they were affected by the organization of the course to sensory issues that may or may not take place in the classroom itself. Student participation in the study was inconsistent, resulting in a larger number of one-on-one interviews for one student than the others, ranging from 3 to 7. The subset of data analyzed so far consisted of: two instructor co-design meeting transcripts, two student personal interview transcripts, one teacher reflection assignment, and one student reflection assignment.

Analysis

We use an interpretive phenomenological inquiry approach (Gubrium & Holstein, 2000) to analyze the qualitative data resulting from our data collection. The affordances of this method are that it allows one to analyze and compare several different kinds of artifacts across a small group to begin to understand a particular phenomenon, in this case, the alignment between student and faculty perspectives on meeting neurodivergent needs in college. This approach calls for distancing oneself from biased understandings of the research and an inductive coding process to look for emergent themes from the data. Transcripts from interviews and research meetings were initially descriptively coded, discussed by the research team, through analytic memos, structurally coded in several iterative passes, and finally re-coded upon the development of discrete definitions for three sub codes, listed below (see Table 1). Data that did not explicitly fit into

any of these categories was marked as *not applicable*, including anything that was either too vague to draw conclusions or was stated by a researcher during co-design collaborative meetings. After the research team agreed upon the structural codes, neurodivergent, undergraduate researchers we're trained on the structural coding process and asked to apply the structural coding procedures to separate passages within an Excel spreadsheet, which they then annotated with descriptive codes. Findings from their analytic memos were then shared with the research team and discussed in conjunction with the coded spreadsheets to derive preliminary findings and themes surrounding alignment and misalignment between student and teacher perspectives.

Table 1. Final structural codes and their definitions.

<i>STRUCTURAL CODE</i>	DEFINITION	EXAMPLE PASSAGE
<i>NEED</i>	Student and instructor perspectives and experiences about which neurodivergent student needs should be met to achieve learning and inclusion.	"If this is how you work, you should figure out what to do that helps you, because you're not always in the section that's gonna help you the most. So come to class, see how I do it, and look at his stuff also, so that you have access to whatever is most effective for you."
<i>PRACTICE</i>	Actionable recommendations or practices that teachers or students believe could improve teaching and inclusion for neurodivergent students.	"So, if I lecture, at least I can provide the material in a couple of different ways, and they have a video then that they can go back and look at, they have something..."
<i>POTENTIAL BARRIER</i>	Circumstances that students or teachers state causes or exacerbates an unmet need OR limits the ability to enact best practices.	"Cause there's like 100 to 200 of them in the room, and being able to do [something other than lectures] is [impossible]."

Results and Discussion

Students and faculty groups both had much to say on the subject of neurodivergent instruction in undergraduate Computer Science classes. Throughout all data types, for both groups, potential barriers were identified more often than any other code. Preliminary findings suggest students were more likely to talk about needs than practices, while faculty were more likely to talk about practices than identify student needs.

Faculty in our sample were able to articulate their beliefs about some neurodivergent student needs, drawing connections to their own experiences as neurodivergent adults, the difficulties they had in school, and even the challenges their own children currently faced. Primarily, however, they focused on the practices they use to try to support neurodivergent students, the barriers they face when trying to enact them, and additional barriers that typically explained why a practice might not successfully meet a need (e.g., students not coming to class) or why they may be unable to engage in a practice at all (e.g., class size). This way of framing practices in relation to barriers demonstrated the faculty members' focus on testing and encountering problems when using different practices.

Students in our sample typically talked about barriers they encountered but struggled to articulate the root neurodivergent need underlying their problem. Students rarely identified a solution. This makes it

difficult to determine what approaches they believe could address the underlying need behind a barrier, a typical problem of self-advocacy; even students who are willing to self-advocate cannot be expected to know the best practices for learning and instruction, even if they have positive or negative perspectives on an individual practice. Despite this, their perspectives suggest core insight into the challenges they are facing, even if they struggled to articulate them.

Table 2. Preliminary findings from student and teacher perspectives about supporting neurodivergent undergraduate Computer Science students.

	<i>Needs</i>	<i>Practices</i>	<i>Barriers</i>
<i>Students</i>	Clarity on instructions	Clearer instructions and organization of assignments/materials	Lack of TA/Teacher training on neurodiversity
	Answers to questions about course materials	Recordings to review materials	Distractions from environment
		Hiring more neurodivergent faculty	Lack of TA/instructor time to provide one-on-one support
<i>Teachers</i>	Time management issues	Awareness of policies to support neurodivergent students	Accommodations do not meet students' actual needs
		Accommodations specific to student disability/needs	Student attendance
	Focus and concentration	Hiring more neurodivergent faculty	Lack of information/disclosure on specific student needs
		Utilize practices for engagement (e.g., breaking up lecture, activity, funny images)	Class Size

Table 2, above, suggests that perhaps the biggest areas of alignment between student and faculty responses so far are: 1) neurodivergent needs can be difficult to articulate and identify, 2) there are significant benefits to having more faculty awareness about neurodiversity in general, either by being neurodivergent or having more training, and 3) school resources like having large class sizes and limited teaching assistants and faculty time per student present a major barrier to providing the support that would be most effective for addressing student needs.

The biggest misalignment, in terms of a potential contradiction, comes from expectations about responsibility; students talked about what teachers are not doing to support them or what challenges they present, like refusing to provide recordings or changing instructions about assignments, while teachers also emphasized student behaviors that negatively impact learning, like failure to attend class or participate in an activity. While research supports how beneficial some of the student-preferred practices can be for inclusion (e.g., recordings), they also acknowledge valid reasons and considerations faculty may have for choosing not to engage in a given practice (Horlin et al., 2023). Faculty awareness of student concerns may eliminate many of their concerns, but not all.

Conclusion

Alignment and misalignment between neurodivergent student and faculty perspectives on neurodivergent undergraduate student needs identified at this point in this study bear implications for both research and practice. From a research perspective, more work needs to be done to identify the underlying needs both faculty and students are attempting to address in undergraduate programs to identify the best

practices for addressing them, since practices and barriers are ultimately relevant only to the extent that they indicate solutions for underlying needs. From a practice perspective, the difficulty in identifying neurodivergent student needs presents potential conflict between teacher and student priorities. If students and faculty are not the same page about what faculty can and should be doing to support neurodivergent students, this can negatively impact trust and make it harder for instructors to address all necessary needs through possible practices. Ultimately, students need to be aware that school resources can significantly limit what individual instructors could do to help their students, while instructors need more tools and training for working with neurodivergent students while accounting for constraints of time, class size, or course load.

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