

Estudiante Perceptions of Classroom Inclusion: A Pilot Study

Naneh Apkarian
Arizona State University

Jason Guglielmo
Arizona State University

Steven Ruiz
Arizona State University

Carlos Acevedo
Texas State University

Kate Melhuish
Texas State University

Estrella Johnson
Virginia Tech

Feelings of inclusion in the classroom are one contributor to students' decisions to pursue a particular degree pathway, and students from marginalized groups are more likely to experience feelings of exclusion in these spaces. These feelings may be exacerbated by particular classroom actions and interactions, including microaggressions based on race and/or gender as well as being ignored or talked over; these actions are often compounded by instructor and student biases. Being able to observe such events is key to instructors' ability to disrupt those moments and develop more inclusive spaces, but many observation protocols are built from an external researcher perspective about practices that support equity. We report on a pilot study at an HSI, comparing what Hispanic and Latine students report makes them feel more or less included to what is typically captured by observation protocols.

Keywords: Estudiantes, Inclusion, Instructional Practice, Observation Protocols

Over the past decade, Estudiantes (students who identify as Hispanic, Latine/o/a/x, Chicane/o/a/x, Nuyorican, etc.) have experienced rapid growth (an increase of 53%) as a share of students enrolled in higher education (NCES, 2011; 2021). Likewise, the proportion of STEM degrees awarded to Estudiante undergraduates increased from 8.5% in 2008 to 15.1% in 2018 (NCSES, 2021). This growth has coincided with increased attention to STEM equity and inclusion, but Estudiantes in STEM fields continue to have negative experiences, such as encountering negative assumptions about their group, stereotype threat, and “scientific disidentification” during STEM coursework (Ong, Smith, & Ko, 2018; Woodcock et al., 2012). The knowledge base for creating equitable undergraduate classroom learning environments is growing yet remains underdeveloped. Scholars have called for postsecondary research to adopt a sociopolitical lens in ways that parallel the work done at the K-12 level (Adiredja & Andrews-Larson, 2017), supported by recent research illustrating that the links between active learning and equity (e.g., Tang et al., 2017; Laursen et al., 2014) are not consistent across contexts, and in fact, active learning has the potential to amplify or introduce new inequities (Johnson et al., 2020). Mathematical classrooms are not neutral spaces; they can, and often do, serve to perpetuate systemic inequities regardless of modality. Assessing the ways in which a class perpetuates or disrupts inequities is therefore valuable, however the majority of our field's instructional observation tools do not attend to equity, nor the perspectives of students in the classroom (Yee et al., 2022). We have both a moral and practical imperative to better understand inclusive instruction in partnership with students most affected by systematic racism. To further this goal, we report on a pilot study at an HSI, comparing what Estudiantes report makes them feel more or less included to what is typically captured by observation protocols.

Literature Review and Theoretical Perspective

This pilot project is part of a larger project aimed at developing new observation protocols for assessing the inclusivity of undergraduate mathematics classrooms for Estudiantes. We

approach this broader work through a critical lens, drawing on tenets of LatCrit and QuantCrit. LatCrit is an extension and specification of Critical Race Theory (CRT) focused on the lived experiences of Hispanic and Latine people in the United States (Solorzano & Yosso, 2002). Consistent with CRT, LatCrit seeks to challenge the dominant ideologies of society that continue to propagate White patriarchal hegemony inside and outside the classroom (Battey & Leyva, 2016). A central tenet of QuantCrit is to bolster quantitative data with the experiential knowledge of people belonging to marginalized groups. This pilot is the start of an investigation of the lived experiences of Estudiantes in undergraduate mathematics classrooms that will be expanded and, in partnership with Estudiantes, inform the development of quantitative instruments that center their lived experiences.

In keeping with our critical lens, we incorporate the idea of *intersectionality*, which acknowledges and accounts for intersecting systems of oppression/marginalization and identities, highlighting the heterogeneity of experiences rather than homogenizing the lives of people sharing a particular identity characteristic (Collins & Bilge, 2016; Crenshaw, 1991). For example, the higher education experiences of Hispanic and Latine students vary significantly based on their economic class, gender, sexuality, and disabilities, among other factors (Byrd, Brunn-Bevel, & Ovink, 2019; Ovink, 2014). There is no singular “classroom experience” that is shared by all students in a classroom: students have multiple and differing experiences that are inflected by their identity and social location with reference to those of peers and instructors (Mohajeri et al., 2019). Applying an intersectional theoretical lens also focuses our attention on intragroup power dynamics: e.g., classroom experiences of Estudiantes will additionally vary because of power differentials between genders, upper- and lower-income status, other sources of social inequality, and histories of advantage and disadvantage, the legacies of which still reverberate in contemporary higher education environments (Collins, 1971; Karabel, 2005). We leverage intersectionality as we strive to develop local theories of how particular instructional approaches differentially affect students.

We see instructional practice—that is, what instructors actually do during instruction—as an essential element of promoting equitable classrooms, and an entry point where transformation can occur (Gutiérrez, 2012). Higher education literature also identifies the undergraduate classroom as critical to the experiences of minoritized students in terms of racial climates and the prevalence of microaggressions (Suárez-Orozco et al., 2015; Solorzano et al., 2000; Yosso et al., 2009). In the undergraduate mathematics education literature base, there are not many studies of classrooms and equity, and many of these focus on achievement or persistence outcomes (e.g., Laursen et al., 2014; Johnson et al., 2020) or instructor bias (e.g., Reinholz et al., 2019); these have primarily focused on inquiry-based learning (IBL) as the key to equitable instruction. We suggest two limitations of this: inquiry instruction is not a panacea for equity (e.g., Johnson et al., 2020) and most undergraduate instruction does not use inquiry (Larsen et al., 2015).

Recently, Leyva et al. (2020; 2021) have explored the ways that precalculus and calculus course instruction may reflect racialized and gendered mechanisms. Students’ journaling revealed several mechanisms at play that reinforce broader discourses and stereotypes. For example, the “ignored student” event: students reported instructors more often ignored Black or Latinx students, potentially reinforcing “troublemaker” stereotypes about Black and Latinx students who spoke up and discouraging others of similar background from asking questions in class. A related finding is that the management of stereotype threat (particularly in relation to “who” is capable of doing mathematics) is significant to the STEM experience for undergraduates of color (e.g., McGee & Martin, 2011). Additional narrative, such as the myth of

meritocracy, and advocacy for constructs like “grit” take a substantial toll on Latinx and Black students when societal racism is deemphasized, while individual perseverance is celebrated. These studies begin to unpack the experiences of minoritized students, but outside of a few cases and institutions, we still know little about these experiences in critical courses like precalculus and calculus (Leyva et al., 2021). We position our work as part of that which is needed “to document if, when, and how [inquiry] instructional approaches are equitable for all students” (Adiredja & Andrews-Larson, 2017, p. 459).

Methodology

Pilot data was collected in Summer 2023 at a large HSI in a state which shares a border with Mexico and has a high proportion of Estudiantes in their student body (40%); the proportion of bachelor’s degrees awarded to Estudiantes is slightly lower (37%) and the proportion of STEM bachelor’s degrees awarded to Estudiantes is slightly lower still (34%). Data comes from two courses taught in different modalities: Precalculus (flipped), Calculus 2 (in-person). Data collection for each class was conducted in the span of a single week. For each class, two sessions were video and audio-recorded on consecutive days, and interviews with students from that class were conducted on the following day. This will allow us to compare what is accessible to an observer with the moments that students found impactful. At the end of the second observation day, the observer/researcher (a Hispanic man) invited students who self-identify as Hispanic/Latine to participate in a group interview about their experiences. The two semi-structured interviews involved 2 men (Precalculus) and 1 woman (Calculus 2). Each lasted approximately one hour, and were also audio and video-recorded. Participants were asked to reflect on moments in which they felt included/welcome or excluded/unwelcome in the class, as well as specific actions that led them to believe that their teacher cared about them and other students (or did not); with an eye toward intersectionality, they were asked if they felt that their Estudiante and/or gender identities impacted their experience and/or treatment in the course.

Interviews were transcribed using Adobe Premiere Pro and manually checked for accuracy. Three members of the authorship team conducted the qualitative analysis of these transcripts, and that analysis was reviewed by the other authors. Analysis proceeded according to the stages of thematic analysis (Braun & Clarke, 2006). In the first phase, data familiarization, transcripts were developed and read independently by the researchers. In the second phase, the team independently made research memos (Maxwell, 2013) and generated initial codes of interest. We take a data-driven approach as part of our commitment to understanding what is salient to students themselves, while retaining a focus on students’ feelings of inclusion/exclusion, perceptions of the impact of race/gender on their experiences, and aspects of classroom practice that students connect to those feelings. We then progressed to the interpretive phases, beginning with *thematizing*, in which individual codes are organized into broader umbrella themes and sub-themes. We are currently engaged in the fourth and fifth phases, in which the themes are reviewed in connection with the original data, edited, and finally named. In this report, we present the current state of our work, in which codes have been identified and themes have provisional names. Our next steps include analyzing the classroom data using three existing observation protocols and comparing those reports to the student interviews.

Preliminary Findings

All three students who were interviewed for this project report generally positive feelings about their current mathematics course, though they mention having negative experiences elsewhere. These were often brought up as a foil, in order to explain what *wasn’t* wrong with

their current class. As such, most themes emerged with both positive (inclusive, encouraging) and negative (exclusive, discouraging) codes; the exception being the *microaggression* theme. We present these themes and some of their constituent codes in Table 1.

Table 1. Themes and examples of codes within each theme from the interview analysis.		
Theme	Positive Codes	Negative Codes
Involvement in daily classroom activities	Working in groups Going to the board Involved in in-class Q&A	Sitting and watching lecture
Personal relationship with instructor	Instructor shares personal information (e.g., hobbies) Instructor is fun / funny / personable	No insight into instructors' life Feeling like "a number"
Perception of inst. care [human]	Instructor knows name(s) Flexible deadlines / extensions	Instructor doesn't know name(s)
Perception of inst. care [math/learning]	Instructor's goal is everyone passes Instructor notices when Ss are confused Instructor tries to understand what Ss are thinking before helping Extra help sessions	Instructor states that many students will fail Instructor gives "how" solutions without "why"
Community [Class]	Knowing people in the class Having identity peers in class Small classes	Having trouble finding a group Large class / online class
Community [Uni]	Joining affinity groups Having identity peers on campus	Fewer Hispanic people than high school Seeing fewer Catholic people than home
Microaggressions	"How could you not understand this" Pretty girls aren't smart People assuming they're not smart	Being ignored in group projects Being told that engineering (STEM) is a "man's" major/field

From the themes that emerge, we note an emphasis on interpersonal relationships and community. These three students report that opportunities to connect on a quasi-personal level with an instructor who they believe cares about them and their learning, and enjoys being in the classroom with them, help them feel like they belong and are being included in a classroom community; similar things were reported regarding interactions with their peers and classmates. They also report experiences with distant instructors where they felt like "a number" and believed that the instructors were concerned only with doing the bare minimum with regards to interacting with them - those experiences left them feeling like they didn't belong or were unwanted in those academic spaces; again, there were similar comments regarding interactions with peers and classmates. These students also point to in-class instructional practices which made them feel more included and a part of the learning experience, such as working with other students (particularly when they were able to answer other students' questions), while large lectures felt impersonal and uninviting. All three students speak of a desire to be in community with others who shared identity markers, evincing clear awareness of the demographic makeup of their campus, majors, and classes. These ideas are evinced in the following exchange from the Precalculus interview:

Interviewer: If you could suggest any improvements or changes to this precalculus class to better support Hispanic/Latinx students, what would they be?

Student: Other than adding more Hispanic people? There's only like two or three in our class that are, like, Hispanic.

Interviewer: Well, how, what, how would that make it better?

Student: Um, because I think, like, because I'm going back to culture. Um, so like, where I'm from, like, everybody learns, you know, like the professor talks. And maybe that's why I'm so receptive to the professor, right, because he talks, like, on a personal level [...] And other professors here [...] were more impersonal, and maybe that's why the retention rate, like, for Hispanics is, like, lower, because they're just not, like, not relating to the professor. It's like a white, smart man who's like, you know, obviously he's worked hard for it, but maybe they just don't relate to it. I don't blame them, you know, but maybe it's just harder for them to understand or even want to be there, because they're uncomfortable [...] Nothing's familiar to them.

One theme did not fit in with the positive/negative coding, that of *microaggressions*, as they are inherently negative. We used this term to capture codes which referred to specific comments and interactions which negatively affected students' sense of inclusion. These include events that indicated others assumed they were not smart, although students could not always pinpoint *why* that assumption was being made. The two men in Precalculus were not specific about the root of the assumption, but they reported incidents which made them feel that way - including interactions with instructors and teaching assistants. The woman in Calculus 2 reported events which led her to wonder if people believed that she was "too pretty to be smart," compounded by others in her life making comments that "engineering is a man's major."

Discussion and Next Steps

All three students interviewed in this pilot study report feelings of inclusion in their current class, compared to prior experiences where they felt less sense of belonging. Common themes across the students included a recognition of the value of being in a community space and human interactions with peers and instructors. There were, of course, some differences in what they said. Only the woman noted gendered microaggressions and stereotypes, although the men recognized that women were a minority in their classes. The men emphasized the personal, humanized relationship they had with their instructor as valuable, while the woman did not mention this. Further work is needed to uncover the extent to which these distinctions are related to intersectional heterogeneity of identity, instructor, class modality, and/or course level. In this pilot, we inquired about students' ethnoracial and gender identity, and one student volunteered religious identity (Catholic) as a salient identity characteristic. Parsing heterogeneous intersectional experiences, while avoiding determinism, is one of the goals of this work.

The immediate next steps of this work are the application of three existing observation protocols to the class recordings, and comparison of the resulting reports to students' interviews. The three protocols are *Classroom Interpersonal MicroAggression* (CIMA; Suárez-Orozco et al., 2015), *Equity and Access Rubrics for Mathematics Instruction* (EAR-MI; Wilson, 2022), *Equity QUantified In Participation* (EQUIP; Reinholz & Shah, 2018). A cursory comparison of the themes and codes from the interview analysis with the constructs targeted by these protocols suggests the potential for considerable overlap with CIMA, some overlap with practices outlined in EAR-MI, but no overlap with the EQUIP constructs of participatory equity. Full analysis will reveal the extent to which these protocols capture these students' experiences in these particular classes. Future work will scale up this research to many more classrooms across multiple sites, building toward more generalizable findings.

References

- Adiredja, A. P., & Andrews-Larson, C. (2017). Taking the sociopolitical turn in postsecondary mathematics education research. *International Journal of Research in Undergraduate Mathematics Education*, 3(3), 444–465. <https://doi.org/10.1007/s40753-017-0054-5>
- Battey, D., & Leyva, L. A. (2016). A framework for understanding whiteness in mathematics education. *Journal of Urban Mathematics Education*, 9(2), 49–80.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Byrd, W. C., Brunn-Bevel, R. J., & Ovink, S. M. (Eds.). (2019). *Intersectionality and higher education: Identity and inequality on college campuses*. Rutgers University Press.
- Collins, R. (1971). Functional and conflict theories of educational stratification. *American Sociological Review*, 1002–1019.
- Collins, P. H., & Bilge, S. (2016). *Intersectionality*. John Wiley & Sons.
- Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 43, 1241–1299.
- Gutiérrez, R. (2012). Context matters: How should we conceptualize equity in mathematics education? In B. Herbel-Eisenmann, J. Choppin, D. Wagner, & D. Pimm (Eds.), *Equity in Discourse for Mathematics Education* (pp. 17–33). Springer Netherlands. https://doi.org/10.1007/978-94-007-2813-4_2
- Johnson, E., Andrews-Larson, C., Keene, K., Melhuish, K., Keller, R., & Fortune, N. (2020). Inquiry and gender inequity in the undergraduate mathematics classroom. *Journal for Research in Mathematics Education*, 51(4), 504. <https://doi.org/10.5951/jresmetheduc-2020-0043>
- Karabel, J. (2005). *The chosen: The hidden history of admission and exclusion at Harvard, Yale, and Princeton*. Houghton-Mifflin Harcourt.
- Larsen, S., Glover, E., & Melhuish, K. (2015). Beyond good teaching. *insights*, 93.
- Laursen, S. L., Hassi, M. L., Kogan, M., & Weston, T. J. (2014). Benefits for women and men of inquiry-based learning in college mathematics: A multi-institution study. *Journal for Research in Mathematics Education*, 45(4), 406–418.
- Leyva, L. A., Quea, R., Weber, K., Battey, D., & López, D. (2020). Detailing racialized and gendered mechanisms of undergraduate precalculus and calculus classroom instruction. 1–34. <https://doi.org/10.1080/07370008.2020.1849218>
- Leyva, L. A., McNeill, R. T., Marshall, B. L., & Guzmán, O. A. (2021). “It seems like they purposefully try to make as many kids drop”: An analysis of logics and mechanisms of racial-gendered inequality in introductory mathematics instruction. *The Journal of Higher Education*, 92(5), 784–814. <https://doi.org/10.1080/00221546.2021.1879586>
- Maxwell, J. A. (2013). *Qualitative research design* (3rd ed.). SAGE.
- McGee, E. O. (2016). Devalued Black and Latino racial identities: A by-product of STEM college culture? *American Educational Research Journal*, 53(6), 1626–1662. doi:10.3102/0002831216676572
- McGee, E. O. (2020). Interrogating structural racism in STEM higher education. *Educational Researcher*, 49(9), 633–644.
- McGee, E. O., & Martin, D. B. (2011). “You would not believe what I have to go through to prove my intellectual value!” Stereotype management among academically successful Black mathematics and engineering students. *American Educational Research Journal*, 48(6), 1347–1389. <https://doi.org/10.3102/0002831211423972>

- Mohajeri, O., Rodriguez, F., & schneider, finn. (2019). Pursuing intersectionality as a pedagogical tool in the higher education classroom. In W. C. Byrd, R. J. Brunn-Bevel, & S. M. Ovink (Eds.), *Intersectionality and Higher Education: Identity and Inequality on College Campuses*. Rutgers University Press.
- NCES (National Center for Education Statistics), Integrated Postsecondary Education Data System (IPEDS). (2011). Enrollment component. Retrieved September 2023.
- NCES (National Center for Education Statistics), Integrated Postsecondary Education Data System (IPEDS). (2021). Enrollment component. Retrieved September 2023.
- NCSES, (National Center for Science and Engineering Statistics). (2021). *Women, minorities, and persons with disabilities in science and engineering* (Special Report NSF 21-321). National Science Foundation. <https://ncses.nsf.gov/wmpd>
- Ong, M., Smith, J.M., & Ko, L.T. (2018). Counterspaces for women of color in STEM higher education: Marginal and central spaces for persistence and success. *Journal of Research in Science Teaching* 55(2):206–45. <https://doi.org/10.1002/tea.21417>.
- Ovink, S. M. (2014). “They always call me an investment”: Gendered familism and Latino/a college pathways. *Gender & Society*, 28(2), 265–288. <https://doi.org/10.1177/0891243213508308>
- Reinholz, D. L., Pilgrim, M. E., Corbo, J. C., & Finkelstein, N. (2019). Transforming undergraduate education from the middle out with Departmental Action Teams. *Change: The Magazine of Higher Learning*, 51(5), 64–70. <https://doi.org/10.1080/00091383.2019.1652078>
- Reinholz, D. L., & Shah, N. (2018). Equity analytics: A methodological approach for quantifying participation patterns in mathematics classroom discourse. *Journal for Research in Mathematics Education*, 49(2), 140–177.
- Suárez-Orozco, C., Casanova, S., Martin, M., Katsiaficas, D., Cuellar, V., Smith, N. A., & Dias, S. I. (2015). Toxic rain in class: Classroom interpersonal microaggressions. *Educational Researcher*, 44(3), 151–160.
- Solorzano, D., Ceja, M., & Yosso, T. (2000). Critical Race Theory, Racial Microaggressions, and Campus Racial Climate: The experiences of African American college students. *The Journal of Negro Education*, 69(1/2), 60–73. <http://www.jstor.org/stable/2696265>
- Solórzano, & Yosso, T. J. (2002). Critical Race Methodology: Counter-Storytelling as an analytical framework for education research. *Qualitative Inquiry*, 8(1), 23–44. <https://doi.org/10.1177/107780040200800103>
- Tang, G., El Turkey, H., Cilli-Turner, E., Savic, M., Karakok, G., & Plaxco, D. (2017). Inquiry as an entry point to equity in the classroom. *International Journal of Mathematical Education in Science and Technology*, 48(sup1), S4–S15. <https://doi.org/10.1080/0020739X.2017.1352045>
- Wilson, J. (2022). Initial steps in developing classroom observation rubrics designed around instructional practices that support equity and access in classrooms with potential for “success.” *Teachers College Record: The Voice of Scholarship in Education*, 124(11), 179–217. <https://doi.org/10.1177/01614681221140963>
- Woodcock, A., Hernandez, P. R., Estrada, M., & Schultz, P. W. (2012). The consequences of chronic stereotype threat: Domain disidentification and abandonment. *Journal of Personality and Social Psychology*, 103(4), 635–646. <https://doi.org/10.1037/a0029120>

- Yee, S. P., Rogers, K. C., Miller, E., & Galvin, T. (2022). Collegiate mathematics observation protocols: Current characteristics and desired foci. *International Journal of Research in Undergraduate Mathematics Education*, 1-32.
- Yosso, T. J., Smith, W., Ceja, M., & Solórzano, D. (2009). Critical race theory, racial microaggressions, and campus racial climate for Latina/o undergraduates. *Harvard Educational Review*, 79(4), 659–691. <https://doi.org/10.17763/haer.79.4.m6867014157m7071>