

Resources for Participation: Examining Multilingual Students' Perspectives on What it Means to Participate in Active Learning

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More college mathematics classrooms are adopting active learning practices like collaborative learning. Participation in these practices typically requires students to engage in verbal communication and interpersonal interactions, which are mediated by language. Despite this, the experiences of multilingual students have often been overlooked in the literature on active learning. Through analyzing interviews with 26 multilingual students, this study explores what participation in active learning meant to these students. It also explores the resource that students perceived to be necessary in order to participate in active learning, for example, being comfortable speaking English. Finally, this study demonstrates how classroom discourses and broader social discourses about language shaped students' perceptions about participation.

Keywords: Multilingual learners, active learning, groupwork, classroom norms and discourses

Introduction

Active learning has become a well-established teaching pedagogy for improving student learning and promoting equity in undergraduate mathematics courses. Although this approach to teaching includes a broad range of strategies, students in active learning classrooms are often expected to work on mathematics collaboratively with peers. For instance, groupwork is a common way that instructors choose to infuse active learning into their courses (e.g., Bennett, 2022). Collaboration is also a core pillar of inquiry-based learning (Laursen & Rasmussen, 2019). As such, groupwork and collaboration are often integral parts of how students experience active learning in undergraduate mathematics courses.

When students work in groups, they are typically expected to participate in talk-intensive activities, like discussing their thinking and arguing for why their solutions are correct (see also Laursen & Rasmussen, 2019; Voigt et al., 2022). These activities also require interpersonal communication, as students learn through social interactions with others. Therefore, in active learning classrooms, participation is often mediated by language and communication.

Active learning has traditionally been linked with promoting equity in the undergraduate mathematics classroom. Analyzing data from over 100 courses, Laursen et al., (2014) found that inquiry-based learning (IBL) helped remove the gender performance gap that was observed in lecture-based courses. However, a growing body of research questions whether students from underrepresented groups experience active learning in the same way and equitably benefit from it (Ernest et al., 2019; Henning et al., 2019; Johnson et al., 2020; Reinholz et al., 2020). For instance, Ernest and colleagues (2019) demonstrated that women's verbal contributions during groupwork were less likely to be revoiced in whole class discussions.

Given the mediational role of language in active learning classrooms, students' linguistic identities may also shape how they experience active learning. At the post-secondary level, Hwang et al. (2022) documents two contrasting cases of students (Jia and Falon) who felt excluded during groupwork based on their home language identity. At the K-12 level, much has been learned about multilingual students' experiences with groupwork. Numerous studies have found that multilingual students tended to participate more in small group settings than in whole class discussions (Brenner, 1998; Civil, 2008; Gorgorió & Planas, 2001; Planas & Civil, 2013;

Planas & Setati, 2009). In addition, these findings demonstrated how normative discourse about language can shape power and participations structures in the classroom. Planas and Civil (2013) show how students in Barcelona felt the need to use the language of instruction, Catalan, in whole group discussions. This perception contributed to students feeling less comfortable sharing ideas during class.

As globalization increases, undergraduate mathematics classrooms are becoming more linguistically diverse. More research is needed to better understand how multilingual students' experience classroom pedagogies like active learning. To this end, the goal of this study is to explore multilingual students' perceptions about what it means to participate in active learning and how these perceptions are influenced by social and local discourses.

Theoretical Perspectives

A Sociopolitical Perspective on Participation

A situated perspective (Lave & Wenger, 1991) emphasizes the connection between learning and participation. That is, learning can be conceptualized as changes in students' classroom participation (Sfard 2007) where, by working together, individuals access resource for participation and become better able to engage in activities (Wood, 2013). Building on this perspective, a sociopolitical approach (Gutiérrez, 2013) recognizes that power and identity shape how participation structures unfold in active learning classrooms. A sociopolitical perspective argues that learners are not always inherently positioned in the same way in relation to the community that they are trying to participate in (Walkerdine, 1994). For example, students learning English may be positioned as less intelligent and have less access to participate in mathematical discussions (Flores et al., 2015). Thus, participation is subject to the norms and discourses¹ established by a social practices. These discourses constitute what is considered meaningful participation (Lerman, 2000). Discourses also shape what resources for participation are consider legitimate and lead to full participation (Barton & Tan, 2009). For instance, being able to formally articulate mathematical thinking is often framed as an important resource for participation in mathematics classrooms (Moschkovich, 2002).

A Sociopolitical Perspective on Language

Like mathematics, learning a language also requires participating in a new language community (Barwell, 2005). Similarly, dominant social discourses about language constitute what it means to be a legitimate language-user. For example, although English has become a lingua-franca and is spoken in many parts of the world, discourses about nativeness give preferential status to native speakers from western countries (Ferri & Magne, 2021). Subtirelu (2015) claims that these discourses operate to position groups of people as Others (i.e., different from the dominant group). "Nonnative" varieties of language can become socially stigmatized to discredit and exclude the speaker (Birney et al., 2020). Furthermore, native speakers may feel less obligated to "ensure successful communication" with nonnative speakers (Subtirelu, 2015, p. 36) and less willing to listen to and meaningful engage with their verbal contributions (Rios, 2022). A sociopolitical perspective on language recognizes that language and language status are inherently connected to who is afforded power in the classroom (Takeuchi, 2016) and whose linguistic resources are legitimized (Planas & Civil, 2013).

¹ Gee (2015) defines discourse as: "distinctive ways of being, doing, and saying. They are ways of using words, doing deeds, valuing, thinking, believing, and feeling, as well as ways of using objects, tools, and technologies that allow us to enact or recognize socially meaningful identities" (p. 245).

Research Questions

The research questions that this study addresses are: (1) How did multilingual students conceptualize participation in active learning and what resources did they feel were needed in order to participate? (2) What discourses (both at the classroom level and more broadly) were relevant in shaping students' perceptions about participation?

Methods

This paper draws on data from semi-structured interviews with 26 multilingual undergraduate students whose home languages were not English. The study took place at a large Hispanic Serving Institution. Eighteen of the students interviewed were international students (countries of origin included Bangladesh, China, India, Iran, Peru, Saudi Arabia, South Korea, Trinidad and Tobago, Uzbekistan, and Vietnam). The remaining students were either immigrants (from China or Mexico), refugees from Afghanistan, or transitional students who grew up near the border with Mexico and lived and attended school across both countries (Hamman et al., 2010). Participants were selected based on: (1) their language identities, and (2) their enrollment in a pre-calculus or calculus course that used active learning. Based on students' descriptions during interviews, their instructors typically implemented active learning by having students work on math problems in groups of three or four during class. Therefore, in this study, active learning is operationalized to be instances during class where students work on mathematics collaboratively via groupwork.

All interviews were recorded and fully transcribed. Pseudonyms were assigned to each participant. Data analysis focused on exploring students' perception about participation in active learning and the classroom and broader social discourses that shaped these perceptions. To do this, a data-drive approach to thematic analysis was used (Braun & Clark, 2006). In the first stage of analysis, transcripts were carefully read over numerous times. The data was then coded using an open coding system to identify instances where students talked about participation. Codes were categorized based on whether they reflected how participation was defined or a resource for participation. Descriptors of the codes were developed. The final step of the analysis focused on comparing, contrasting, and connections codes and identifying themes across the data. Although interviews were transcribed verbatim, the quotes presented in this paper have been modified slightly for clarity. No modification impacted the meaning or feel of any of the sentences in the quotes.

Results

Most students in this study described participating less frequently in active learning classrooms compared to their English dominant peers. Figure 1 illustrates how the students conceptualized participation in active learning: that participation meant speaking. Given this framing, students also shared a range of different resources that they perceived to be necessary in order to be active participants in the classroom. These resources were essentially personal attributes, like being comfortable speaking English, being extroverted, being brave, being good at mathematics, being aggressive, and being resilient (the font size in Figure 1 corresponds to how frequently each resource was mentioned during interviews). The second stage of analysis focused on unpacking how local classroom discourses and broader social discourses influenced these perceptions about participation.

In this section, I document what participation meant to students and how this was influenced by local classroom discourses. Next, I discuss two of the resources for participation mentioned by students, being comfortable speaking English and being aggressive, and demonstrate how

these resources were influenced by broader social discourses about language. The first resource was chosen because it was the most frequently discussed and the second one was chosen because it represented an interesting case.

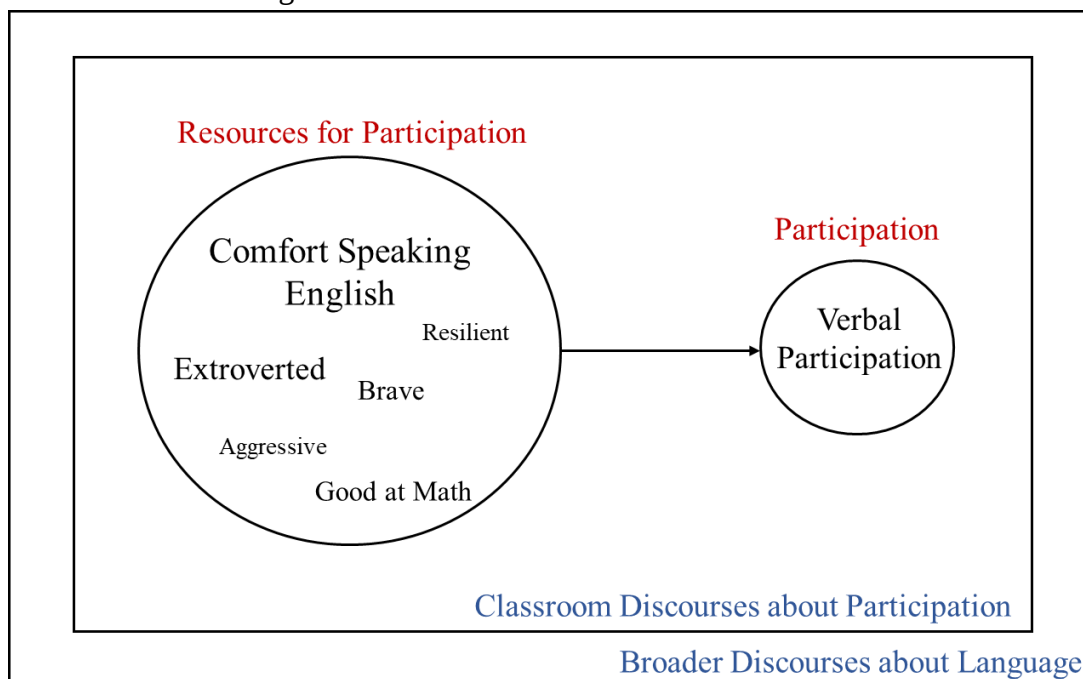


Figure 1. How multilingual students conceptualized participation and necessary resources for participation.

What Participation Meant: *Speaking*

During interviews, students frequently discussed classroom participation in terms of speaking. Whether it was in analyzing their own participation, or the participation of others, students generally associated participation with actions that centered verbal contributions (e.g., contributing ideas, responding to peer ideas, asking questions, etc.). Students shared that participation meant: “you basically speaking in front of everyone” (Dan, Trinidad and Tobago) and is “all about the group work and like I have to speak up in the class” (Sun-Hi, Vietnam).

Students also assessed their own participation in the course based on how often they spoke. For instance, although Dan was invested in the mathematics he was learning, he perceived himself as having poor participation in his calculus course because he rarely spoke during class: “When I’m not engaging much I feel like shoot. Especially when we have a question we don’t understand and the other TA comes and help us with the question, my groupmate will be the one asking the question, not me”. Despite being involved in groupwork, Dan was disappointed by his level of participation because he was not the one verbalizing the group’s question. This exemplifies how participation was almost always associated with verbal communication.

Classroom Discourses about Participation. Findings also demonstrated how classroom norms and discourses about participation communicated to students that participation meant speaking. For example, students frequently discussed the teaching moves that their instructors used to elicit more verbal participation during class. Several instructors used cold-calling² as a way to ensure that all students were contributing (verbally) to class discussions. Similarly, one students’ instructor did not allow groups to leave until a group member, randomly chosen by the instructor, explained the group’s solutions to the class. These teaching strategies, geared toward

² Cold-calling refers to randomly choosing students to answer a question or discuss their solution.

enhancing participation, all aimed at fostering verbal participation. Therefore, these strategies also reinforce to students the norm that participation in the classroom is a verbal activity.

A Resource for Participation: *Being Comfortable Speaking English*

Students felt strongly that English was the only language that could be used in the mathematics classroom. Additionally, every student in the study described the importance of being comfortable speaking English in order to fully participate (verbally) in active learning. Makhmud (from Uzbekistan) shared that the “students who are more comfortable speaking English” are the ones that are “more engaged in the math classes” and are “more active”. Prisha (from India) shared how being comfortable speaking English allowed her to be an active participant in her group:

If it's a monolingual classroom like we have here in [the US], it pretty much forces people to get out of their comfort zone if they're not comfortable talking in English. If, say I'm not very comfortable explaining my thought process in English, it would hinder my way of communicating and collaborating and it would hinder how I put myself out there, how I talk to my teachers, or how pretty much I express myself in the classroom /.../ I wouldn't be comfortable asking questions. I wouldn't be comfortable putting myself in uncomfortable situations, because just speaking in English alone is uncomfortable for me.

Groupwork in math can be a vulnerable, risk-taking activity where students are expected to produce the “right answer” and assess the correctness of their peer’s ideas. Tamir (from Afghanistan) described how these activities can feel “uncomfortable”. Engaging in them when you are already uncomfortable speaking the language “is pretty a lot to ask from somebody”. This demonstrates the importance students placed on needing to be comfortable speaking English in order to begin (verbally) participating in active learning.

In addition, students felt that if they were not comfortable speaking English in the classroom, and as a result participated less, the responsibility was on them to become more comfortable. For example, Leo felt more comfortable interacting in Spanish and shared that it was “intimidating to try to participate with others” in English. When asked what instructors could do to make speaking in groups feel more comfortable, he responded “It’s not something that they can do. It’s just something that we have to get over. It’s something we have to work on”.

Broader Discourses about Language. In contrast, study findings demonstrated how social discourses about language can impact students’ comfort speaking in the classroom. When Luis was asked if language mattered in his mathematics classroom, he responded “It’s mainly about how comfortable you feel speaking English in your class when you’re not like 100% good at the language”. Although language is a tool for communication, this quote evidences the expectation students can feel to be “100% good” at English. Numerous students described “staying silent” during class because they were afraid of making language mistakes or speaking with an accent. Many students also reported experiencing negative feelings (e.g., feeling nervous, anxious, ashamed, scared, or embarrassed) about their own language-use because they perceived it to be not “good enough”:

- I don't feel so good when I talk. I don't know it's because of I'm an international student and my English is not perfect. – Nader, international student from Iran
- Sometimes I really feel like too bad [because] sometimes in classes, I can't always speak as fluent English. – Abril, international student from Peru
- A lot of times I was embarrassed to use my English because I didn't think it was good enough. – Habib, refugee student from Iraq

In addition, peers and instructors were often less willing to engage with the communicative contributions of multilingual students. For example, Anaís (from Mexico) described how others “avoid” talking to people with an “English accent” and Prisha shared how others are “not very willing to put in the same amount of effort as they would be if somebody was more fluent in English”. Makhmud felt that “if you’re not good at English, it’s boring for others who are listening to you”. This highlights that being comfortable speaking English also reflects the sociopolitical contexts of the classroom and the discourses about language that often stigmatize the linguistic resources of non-native speakers.

A Resource for Participation: *Being Aggressive*

As an international student from South Korea, Sun-Hi’s prior math education experiences had been with traditional lecturing where students “hardly speak up in the class”. For Sun-Hi, active learning required students to “speak”, engage in “more participation in class and more interaction with instructor”, things she was “not used to”. To Sun-Hi, these practices felt “more aggressive” than traditional lectures. In fact, she used the word aggressive to describe active learning more than ten times throughout the interview.

Sun-Hi expressed that in order to participate in the active learning classroom, students also needed to be aggressive. This involved “being able to engage the instructor or disagree with opinions or discussing about the questions”. Although Sun-Hi did not explicitly articulate why these forms of participation felt aggressive, she did share that aggressive students were more likely to be noticed by the instructor. It may be the case that when students participated, they seemed to be competing for the conversational floor and the instructor’s attention, which felt aggressive to Sun-Hi. Sun-Hi expressed wanting to become more aggressive so that she could also “get noticed from the instructor”. She shared: “talking with the instructor helps me a lot, so I think being aggressive has more benefits than not aggressive”.

Broader Discourses about Language. Sun-Hi shared that being aggressive was hard for her. As a non-native speaker of English, she felt “not comfortable in English” and “not that confident to speak in class”. She also explained that: “When I speak up in class, I’m afraid, what if I’m like, I look like a silly one”. Sun-Hi worried that the way she communicated in English might be interpreted by others as “silly”. This again demonstrates the sociopolitical nature of language and its impact on students’ comfort and confidence speaking English in the classroom.

Discussion

By exploring the relationship between language and participation, the current study reveals another complexity in striving for equity using active learning. Study findings suggest that classroom discourses had an impact on how active participation in the classroom was characterized. By overemphasizing verbal participation (in English), instructors created a narrow window of what active participation could look like (i.e., someone who speaks regularly during class), which had the tendency to exclude language diverse students. Other forms of participation, like writing, listening, gesturing, participating in embodied activities that utilize materials (Nemirovsky & Ferrara, 2009), and communicating using home languages should also be recognized as valid ways that one can be an engaged member of the classroom (see Figure 2).

Furthermore, conceptualizing participation as speaking established a narrowly defined set of available resources for participation. This is particularly true in the context of multilingual students, given the stigma they often navigated in relation to their language identity. For example, discourses about language seemed to suggest to students that only English should be

used for communication in the mathematics classroom. This became a missed opportunity for students to leverage their home language in their mathematical sensemaking.

Multilingual students also overwhelmingly perceived being comfortable speaking English in the classroom as a necessary resource for active participation and felt it was something they needed to continue developing. Fitri and Aeni (2021) state that the talk-intensive nature of active learning can help multilingual students practice speaking and feel more confident doing so in the classroom. While this may be true, the responsibility should not be exclusively placed on students for becoming more comfortable speaking. As the data in this study revealed, the sociopolitical realities of the classroom cannot be ignored. The ability to feel comfortable speaking English in the classroom encompasses more than just language skills, as students also often navigate accent bias, lack of access to peers who are willing to communicate with them, and so forth. Therefore, instructors must be aware of the complexities involved with developing comfort speaking in the classroom and work to establish norms that push back on these discriminatory discourses.

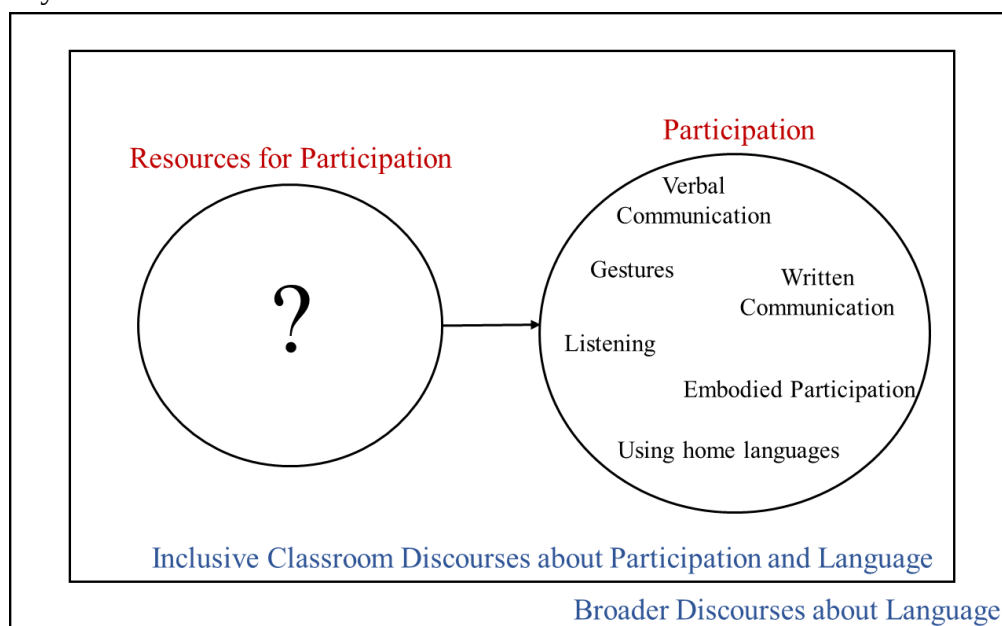


Figure 2. A reimagined and more inclusive model for conceptualizing classroom participation.

The set of resources for participation that students described were often personal attributes they did not possess, but felt they needed to develop (e.g., become more comfortable speaking English in the classroom, become more extroverted, etc.). If instructors work to create more inclusive classroom norms (i.e., norms that validate all students' linguistic resources and expand what counts as legitimate classroom participation), then the set of available resources for participation will likely become more inclusive. Ideally, these resources will embody things that students bring into the classroom (e.g., speaking in their home language, being able to visually express or gesture their understanding). Exploring this can be an area for future research efforts.

Finally, Sun-Hi and other international students described numerous cultural differences they experienced navigating active learning in their mathematics classrooms. Although all students might struggle to adjust to active learning pedagogies, international students might find certain norms and practices very different from previous classroom experiences. Making explicit some of the norms of participation and being mindful of other cultural practices can help students adapt to the new classroom environment.

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