

Learning Assistants: The Assets of Relationships in Mathematics Classrooms

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Near-peer mentor models to support students in mathematics are becoming increasingly used at institutions across the United States. One model, the Learning Assistant model, has been implemented at Crossroads State University. Using Yosso's Community Cultural Wealth framework, this paper discusses the qualitative impact this model has on students, learning assistants, and the instructor of a College Algebra class. Based on findings, additional qualitative research is suggested to further investigate the Learning Assistant model.

Keywords: Learning Assistants, Near-Peer Mentors, Departmental Change

The use of near-peer mentors has become more common among universities and colleges in the US in the past 15 years (Otero et al., 2010b; Sellami et al., 2017). Many different efforts are being used across the nation to combat STEM attrition at the college level, such as co-requisite models, active learning initiatives, and curricular reform (Battersby et al., 2015; Dawson et al., 2015; Estrada et al., 2016; Theobald et al., 2020). Near-peer mentors have been used as a way to help implement active learning and curricular reform, while also seeming to offer some unique benefits both socially and academically to support students. Near-peer mentors thus serve as a topic of interest when considering systemic change within mathematics departments (Barrasso & Spilios, 2021; Sellami et al., 2017). While near-peer is not a well-defined term, and different schools use various models to implement the use of near-peer mentors, typically these near-peer mentors are fellow undergraduate students who have demonstrated the skills to function as mentors in certain classes to support other undergraduate students.

Crossroad State University, a four-year Hispanic serving institution (HSI) in the southwestern United States, utilizes a variation of one such model, called the Learning Assistant (LA) model, to support students in introductory mathematics courses. In this model started by CU Boulder, students who have successfully passed a course can apply for a learning assistant position for that course to serve as an additional resource to students in the classroom (Otero et al., 2010a; Otero et al., 2010b; Top et al., 2018). These LAs receive pedagogical training and then work with instructors in classrooms to help facilitate discussions and promote student learning.

A body of research shows several improvements to student performance related to the implementation of the LA model. Studies have found that the LA model has helped increase the implementation of cognitively demanding tasks in the classroom, as well as improved student performance on higher order cognitive skills assessments (Sellami et al., 2017; Webb et al., 2014). Other studies have demonstrated increases in active learning and improved collaboration in the classroom, as well as improved student satisfaction in these STEM courses (Campbell et al., 2019; Sellami et al., 2017). Additionally, studies have found that the implementation of the LA model has helped to reduce DFW rates (i.e., the percentage of students who withdraw, or receive a D or F grade in the course) and close performance gaps for under-represented minority (URM) students (Alzen et al., 2018; Sellami et al., 2017). While many benefits have been measured quantitatively with the LA model, there is sparse literature to qualitatively describe the phenomena that are occurring from implementing this model.

Qualitative research is of interest to better understand *how* the LA model is making a difference. For instance, while it is valuable to know that studies have found LAs useful in

supporting URM students, further study to know *why* this is the case can serve to further improve the model and support students. Where Crossroads State University's student population is composed of over $\frac{1}{3}$ URM students, studying the qualitative impact of the LA model in Crossroad State's Mathematics and Statistics department is especially relevant. With this in mind, in this pilot study I set out to address this question: *What are the perceived assets of LAs as described by the students and instructor who work with learning assistants, and the LAs themselves?*

Analytical Framework

Yosso (2005) outlines the framework of *community cultural wealth*, which takes a more holistic look at the assets, or capital, that an individual brings with them into a given situation, assets which are often overlooked by societal norms. She articulates why these assets are overlooked through the lens of Critical Race Theory (CRT), explaining that Whiteness prescribes the norms of cultural capital, thus overlooking other types of capital that individuals, and especially those who are minoritized, carry. Yosso (2005) outlines six dimensions of community cultural wealth, or six types of capital, that minoritized individuals especially use to "to survive and resist macro and micro-forms of oppression" (p. 77). These six dimensions are 1) aspirational capital—the ability to maintain hopes and dreams despite facing real barriers, 2) linguistic capital—the communication skills gained through various uses of language and style, 3) familial capital—cultural knowledge nurtured from *familia*, 4) social capital—networks of people and community resources, 5) navigational capital—the knowledge and skills to maneuver various institutions, and 6) resistant capital—the skills fostered through opposition which help challenge the status quo. Where mathematics has long been a space of oppression (Kozol, 2005; Martin et al., 2010), Yosso's (2005) community cultural wealth framework serves as an appropriate lens to view some of the ways that students bring various assets with them into mathematics classrooms to help themselves and others persist through the gate-kept field. Especially from a qualitative research standpoint, this framework has the potential to bring to light data which would likely be overlooked in quantitative studies, providing rich insight into the LA model that so far has not really been explored.

Methods

Over the course of a semester, I conducted four class observations in two sections of a College Algebra course. All names used are pseudonyms. Elena, a Hispanic female senior studying mathematics, was the undergraduate learning assistant in one section, and Jesse, a white male junior studying engineering, was the undergraduate learning assistant in the other section. Both sections were taught by a graduate student with prior college mathematics teaching experience named Megan, a white female studying mathematics. Based on observations, both class sections were racially diverse, with a seemingly even distribution of male-presenting and female-presenting students.

At the end of the semester, I conducted a semi-structured focus group interview with three students (1 White female presenting student, 1 Asian male presenting student, and 1 Hispanic male presenting student) from the College Algebra sections I had observed. Additionally, I conducted a semi-structured interview with Elena (LA), Jesse (LA), and Megan (instructor). I had three different protocols—for students, LAs, and the instructor—each of which asked questions which allowed participants to elaborate their experiences working with (or being) an LA during the semester. The observations I had conducted earlier allowed me to ask more

personalized follow up questions during each interview based on interactions between students, LAs, and the instructor I had seen during the semester. From these interviews, I generated memos of the salient ideas shared in response to each question, and then used a priori coding of Yosso's (2005) community cultural wealth framework to analyze the memos.

Findings

I will now discuss the findings across each of the six dimensions of cultural capital wealth, articulating how the experiences of working with (or being) LAs were perceived by students, LAs, and the instructor.

Aspirational Capital

Aspirational capital was described both by LAs and the instructor in the form of supporting the students and LAs, respectively, in their own trajectories as students. Jesse shared, "I might not do the most, but I want to show students that I want them to succeed," recognizing that while he might not be able to provide every support to help students, he wanted students to know that he was indeed there to support them and help see them through to succeed in the class. Elena described her love of helping students have "aha" moments in class, articulating her belief in their capabilities to succeed through the class.

Megan talked about enjoying the opportunity of working with LAs because she recognized it as a resource to help support these LAs in their own student careers. She expressed enjoying being able to help them grow and succeed by providing this mentoring opportunity to students. For both the LAs and the instructor, their recognition and belief in the students for whom they were supporting was a form of aspirational capital that benefited the class.

Linguistic Capital

There was one instance discussed of linguistic capital by students. They shared how LAs in the class could explain mathematical ideas in different language from the instructor, which was something they benefited from. Where mathematics is often described as a language, having various ways to discuss mathematical concepts is indeed a nod to linguistic capital. LAs are able to bring different perspectives into the classroom and articulate them in ways that students relate to, allowing for more opportunities for mathematical understanding.

Familial Capital

Familial capital was not discussed during the interviews, because the focus of the interviews was about an academic setting. Thus, questions did not focus on outside community where familial capital might have been mentioned.

Social Capital

Social capital was perhaps the most mentioned form of community cultural wealth during interviews, being discussed by students, LAs and the instructor. Students discussed how LAs would make small talk with them at the beginning of class, getting to know them on a more social level. Students expressed that this helped them to feel more comfortable with the LAs, giving them the courage to also approach them about mathematics questions during class. LAs also were aware of this phenomenon, and noticed students being more comfortable to approach them over the course of the semester.

LAs discussed specific examples of noticing how students at times seemed apprehensive to ask questions to the instructor, but were willing to call the LA over to ask questions they had about the math. As Jesse put it, he was aware that LAs "have a better influence on you as a student." Another form of social capital that LAs discussed had to do with the network that was formed with other LAs. Elena and Jesse both described the support they received from their LA

peers in their LA roles, as well as the social support as students in general navigating their own courses.

The instructor was also aware of the connection that LAs had with students, being an easier authority for students to approach during class. Megan articulated this social capital by saying, “it’s valuable to have a second person [in the class] that is potentially in a little bit more of a mediation kind of middle zone,” describing the power dynamics that students might feel when approaching the instructor compared to a fellow undergraduate student. Megan also talked about the LAs being a great support to her, and someone to bounce ideas off. LAs were also a support and a network to the instructor, providing valuable insight about students and ideas for how to navigate class.

Navigational Capital

Both the instructor and the LAs discussed the ways that LAs supported both students and themselves in navigating the role of being a university student. The instructor discussed that because she had not experienced being a student at the university, she did not have the insight to provide her students related to questions regarding things like where to take an exam, where to get accommodations, or where to go for study help. Megan discussed the LAs as a major strength to the class because they were a few years ahead in their studies and were familiar with the various university systems that younger students often had questions in navigating.

The LAs also discussed on an emotional level understanding what it was like being a student at the university and being able to relate to students in this way while also giving them advice for how to navigate the systems of the university. LAs also discussed how being in LA positions had helped them to develop better skills to succeed in their own careers as students. Elena discussed improved time management skills from balancing being an LA and a student, and Jesse discussed developing more efficient study skills through helping model them to students he supported as an LA. Additionally, Elena discussed how taking this job had connected her to network of new faculty that were opening doors for her future career. Across these comments, it is very clear that these LAs both provided and developed navigational capital.

Resistant Capital

One student and both LAs discussed forms of resistant capital that LA positions brought to the classroom, and to the lives of the LAs, respectively. One student shared that this was his second time taking College Algebra because he had failed the previous semester and struggled a lot with the material. He happened to have Jesse as an LA both semesters. The student discussed that he felt that Jesse was aware his unique circumstance and would regularly check in on him. He described feeling grateful that Jesse wanted to help him persist and succeed this time around, despite his struggles. These small efforts on Jesse’s part made a big impact on the student.

The LAs also talked about developing resistant capital in taking up these roles. Jesse talked about having imposters syndrome when first starting as an LA, but that this job had helped him learn how to make mistakes and learn from them—something he was not used to from his engineering courses working with other upperclass students. Elena said that she has “worked smarter” as a student from the skills she has gained being an LA. Both LAs discussed how taking up these positions had helped them to develop more confidence in themselves as students, and that they saw skills learned as an LA showing up in their own studies as students, helping them to persist through higher level STEM courses.

Discussion

These findings demonstrate a variety of assets that the LA model has afforded multiple groups of people associated with mathematics classes at Crossroads State University. When asked whether they would prefer to take a future math class with or without LAs, one student said, “I would obviously take the one with the [LA]”, and the other students shared similar sentiments. Megan said that given the choice, she would also choose to teach in the future with LAs rather than without them. Elena and Jesse both expressed how being an LA has afforded them both with meaningful personal growth and skills that continue to benefit them in their journeys as students. The LA model, from these interviews, seems to have a qualitatively positive impact on students, learning assistants, and instructors involved with the program.

Many of the assets described seem to relate to the *relationships* that are formed among LAs, students, and instructors. Where traditionally introductory mathematics courses are often taught as a lecture-style course (Webb et al., 2014) where an instructor relays information for students to passively absorb, with less opportunities to form relationships during class time, the LA model adds a more human element to the mathematics. While several studies have demonstrated improved quantitative gains, these findings perhaps point towards a major reason for these benefits—the opportunity for more personal relationships to be formed allows for additional capital to be utilized while teaching and learning mathematics. These findings matter because these are not the data that would necessarily be tracked to understand the value of implementing roles like learning assistants within a department. Yosso’s (2005) framework reveals several important assets that these LAs bring to the department that would not typically be measured.

Conclusion

This study demonstrates assets that LA roles can bring to a mathematics department, namely social and navigational capital among others. Further research should study the implementation of learning assistants within the department (i.e., professional learning and training models), and to investigate how this system can be improved. Additionally, it would be of value to understand the impact of learning assistants on STEM persistence by doing some type of ethnographic study over time by following students who have engaged with learning assistants during their careers, as well as following students who have taken up the role of LAs to see their trajectories. These are a few of many potential angles of qualitative work to better understand the benefits of near-peer learning models on the teaching and learning of mathematics.

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