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Impact of Learning Assistants on Students' Sense of Inclusion and Identity Within the STEM Classroom

By

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Acknowledgements



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- All participants who volunteered for the study

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What is a Learning Assistant? (UC-Boulder)



- Not a TA
- Not SI
- Present in regularly scheduled class sessions
- Focus on
 - Facilitating student discussions
 - Modeling good learning behaviors
 - Building classroom community

Some of what we know

- **Reduce DFW rates**

(Van Dusen & Nissen, 2020)

- **Especially in STEM gateway courses**

(Alzen, Langdon, & Otero, 2018)

- **Increase student learning gains**

(Alzen, Langdon, & Otero, 2018; Herrera, Nissen, & Van Dusen, 2018)

- **Greatest from underrepresented students**

(Van Dusen, White, & Roualdes, 2016; Van Dusen & Nissen, 2020)

- **Increasing positive attitudes about science and STEM identity**

(Kornreich-Leshem, et al., 2022; Close, Conn, & Close, 2016)

Some of what we know



- A recent literature review noted that most research on LA programs has been conducted by a small number of research groups in a limited set of institutions and disciplines, calling for further research on LA programs in new institutional contexts (such as a small, private, religiously affiliated, primarily undergraduate, HSI & MSI).

What we know



- Enter:



Purpose

- To provide insights for how an LA program can be used to:
 - support an inclusive learning environment and
 - influence the development of STEM identity in students across cultures (both the students enrolled in the course and the LA themselves)

Some of what do we know about STEM Identity?

- Females and students from underrepresented groups, have low self-efficacy in STEM classrooms

(Kalender, et al., 2020; Wilson, et al., 2015)

- Likely to affect self-perception of competence

(Rodriguez, Cunningham, & Jordan, 2019)

- Recognition is the most important factor in identity development for female students

(Lock, Hazari, & Potvin, 2019)

- Deficit in recognition (from peers and faculty) negatively impacts STEM identity for both groups

(Carlone & Johnson, 2007; Kalender, et al., 2020; Kalender, et al., 2019a, Kalender, et al., 2019b)

A Model for STEM Identity?

- 3 key factors that contribute to adoption of STEM Identity (Hazari, et al., 2010)
 - Identified interest
 - Performance/competence
 - Recognition

Context

- A private, faith-based institution in LA County holding the following classifications:
 - HSI
 - AANAPISI
 - Carnegie R2 status
- Employed across entry level and traditional gatekeeping:
 - Bio
 - Chem
 - Math
 - Stats
 - Physics
- Our participants:
 - Students
 - General Chemistry
 - General Biology
 - Calculus I
 - LAs
 - General Physics
 - General Chemistry
 - College Algebra
 - Math and Society
 - Intro to Statistics
 - Anatomy

Study Overview

Data	Participants
STEM Identity survey (PIO-4 & CIS)	Intro STEM Students (n=252)
	LAs in Intro STEM courses (n=11)
Ss Focus Group	Students in LA courses (n=3)
LA Focus Group	LAs in STEM courses (n=7)

- Semi-structured focus groups
- Analyzed using open coding

(Saldana, 2016)

Results & Claim Development

- Extracted quotes from coding
- Reviewed quotes for additional themes
- Developed claims from themes supported by coded quotes

Claims

- Faculty Effects
- LA Effects
- Program Effects

- Claim: When the LA demonstrates intentionality in their interactions with students, they create a space that is more welcoming

When the LA demonstrates intentionality in their interactions with students, they create a space that is more welcoming



Valerie: [...] my LA did a good job on making me at least feel welcome. I started calculus, I think, a week or two late due to some issues, but she helped me feel not like I was just, like, by myself since everyone else had that first week of get-to-know-me icebreakers. So she definitely helped build a community and then we all got comfortable with each other.

Lola: My LA had review sessions, during which they would make sure, “do you have any questions?” and make sure there’s something specific that we’re not talking about right now that you need to talk about. It’s kind of that inclusivity and wanting to focus on a specific person in that aspect and that definitely helped me feel seen.

When the LA demonstrates intentionality in their interactions with students, they create a space that is more welcoming



Lola: *My LA, he made sure, he wasn't too talkative in the class, but he would always try to sit in the center of the room, not directly, but near a lot of students. Sometimes he would make conversations when they were doing a problem. He would talk to some people and be like, "hey, what do you think the answer is?" and all that stuff. He tried to get our ideas flowing and through that, he would always pitch in, "oh, maybe you should consider this, or try it this way" he was always engaging and trying to get us to think more about it in a way that we could figure it out ourselves. But that was cool*

Program Effects

- Claim: For students serving as an LA, the program has increased their consideration of a teaching career
- Claim: For students serving as an LA, the program has increased their sense of belonging within the STEM community
- Claim: The LA program appears to broaden stakeholders' views of who "can do STEM".

For students serving as an LA, the program has increased their sense of belonging within the STEM community



Maurice (LA): *I feel like being an LA has definitely strengthened my sense of belonging. I think of even, [...] having a review session at the very end before the final and just being able to... it's a plethora of questions on a plethora of subjects [...] but to be able to step into any problem and be able to help them, really I was like, "wow, I know this stuff like front to back." And even when Dr. Pat is teaching and I'm like, "yeah, I know what slide's coming next," [...] I really do know this stuff and I feel like I've really enjoyed that because I also really enjoy [...] being able to explain it in a different way and I think that's really what a STEM professional should be able to do. They should be able to be taught it one way, but then be able to put it in their own words and learn how they should learn it.*

For students serving as an LA, the program has increased their sense of belonging within the STEM community



Mike (LA): *My sense of belonging was definitely solidified from being a learning assistant because I got to see people come from different backgrounds to do all these classes and some people just were a natural in STEM and some people just didn't like STEM and didn't really have any background experience in it. And so this was like their introduction to STEM and it was kind of cool to see that and be able to be part of introducing people to STEM almost, in a way. And so, I think, through that, it made me realize how much I feel like I am a part of STEM.*

The LA program has broadened stakeholders' views of who "can do STEM".



Ben (LA): [...] now that I've been more involved in taking STEM courses and also having the opportunity to be an LA, I think, it has grown a little bit then. I've always thought that I wasn't really a STEM person but over the past year or so, I've definitely felt a little bit more like inserted into a STEM community."

Mike (LA): I got to see people come from different backgrounds to do all these classes [...] And so this was like their introduction to STEM and it was kind of cool to see that and be able to be part of introducing people to STEM almost, in a way.

The LA program has broadened stakeholders' views of who "can do STEM".



Caden: *For my experience, I would say it was less interest and more how I saw the course because, [the TA] I think he has some kind of STEM minor but his major is not related at all, I think he's English or journalism or something, but it was not related to science at all. But I saw him within that class like teaching or I guess assisting the teacher and I kind of just got me thinking, "you don't necessarily need to have a STEM major to be part of this and to enjoy this." [...] He definitely had an impact, I guess, in my preconceived belief that if you're in STEM, you're there because it's your major kind of belief but yeah, he's had an impact on that for sure.*

Faculty Effects

- Claim: For an LA program to have an effect, it is essential for faculty members to buy-in to the program

For an LA program to have an effect, it is essential for faculty members to buy-in to the program



Natalie (LA): *I think one of the things that have stood out for me the most is, at least for the LA, the attitude of the teacher and how it either encourages or discourages the LA to do something or to not do something. My first semester I had a teacher who was very willing to have the LA engage with the class and created a lot of opportunities for me to engage with the class. And then this last semester, I didn't, so it was strange to kind of shift between those two, but it definitely was harder to engage with the class when I didn't feel like I could in, like, do anything without permission, which I didn't get the permission anyway."*

For an LA program to have an effect, it is essential for faculty members to buy-in to the program



Sharon (LA): *I don't know about the STEM community overall, but specifically, by my instructor, I have felt pretty seen. She's really good at listening to what I've observed. She asks what I've observed without me even bringing it up. I made a suggestion at one point about how to do a practice problem and then the next class she did it to see if we could get the class more engaged and I made a suggestion next class. She tried it. It didn't work very well, it was right after retakes, so that one really wanted to participate anyways, but she did try it so that helped me feel like she was actually listening when I said that because it was something I said in passing as I was leaving class that day.*

Implications/ Recommendations

Too Soon

Future Work

- Continue to triangulate results with data from faculty (preferably interviews/focus groups)
- Recruit more participants to increase the sample size
- Coordinate with the quantitative research team to find overlaps in results
- Refine focus group protocols according to quant team's results
- Refine quant team's survey questions with themes from current qualitative data

Questions?



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