

Teacher Professional Development as a Mechanism for Cultivating Competence and Professional Identity in Graduate Student Instructors' Transition to Faculty Roles

Melinda Lanius
Auburn University

RaKissa Manzanares
Hawai'i Pacific University

Scotty Houston
The University of Memphis

Gary A. Olson
University of Colorado Denver

Leigh M. Harrell-Williams
The University of Memphis

In the past decade, teacher professional development has gained popularity as a tool for preparing graduate student instructors. Research demonstrates the immediate positive impacts of this training for both the undergraduate students the graduate students teach and the graduate students' own professional teacher identity development. However, much less is known about its long-term impact. For this study, we interviewed eleven former graduate student instructors who participated in such a training program and now have a position in higher education with teaching responsibilities. We leverage Lankveld et al.'s (2016) framework of psychological processes and contextual factors for teacher identity development to explore their sense of competence as mathematics educators as they transition into their new higher education contexts. Findings suggest that a sense of connectedness to new peers and past training experiences supports productive comparison and reflective practice that promotes identity growth in new academic environments.

Keywords: Teacher identity, graduate student instructor, teacher professional development

Introduction

Teacher professional development for graduate student instructors (GSIs) has been an important research priority for the Mathematical Association of America (MAA)'s Special Interest Group Research in Undergraduate Mathematics Education; these efforts are codified in evidence-backed resources published by the MAA (e.g. the 2018 Instructional Practices Guide or the 2020 College Mathematics Instructor Development Source) (Yee et al., 2023). The duration of these efforts provides us with a unique and vital opportunity to conduct longitudinal research on the impact teacher professional development has on GSI's as they transition into faculty roles.

We are particularly interested in this transition phase because professional development for novice instructors positions them as future change agents (Hauk & Speer, 2023) within their new institutions. Additionally, GSIs, in particular, are receptive to learning and implementing student-centered strategies (Ellis et al., 2016). As GSIs transition to new institutions, they must acclimate to a new departmental culture and navigate changes in their teacher identity.

Theoretical Perspective

Developing a professional identity is an essential process for novice mathematics educators as they become members of the professoriate. Professional identity – which shapes an individual's beliefs, values, and motives as they navigate membership of their community – is constituted and reconstituted by their experiences in the profession (Beisiegel & Simmt, 2012). This process is accelerated with the transition from graduate school to faculty roles (Colbeck, 2008). Lankveld et al.'s (2016) systematic review of teacher identity literature identified four contextual factors (interaction with students, staff development activities, direct work environment, and the wider context of higher education) and five psychological processes (a

sense of appreciation for teaching, a sense of connectedness to other educators, a sense of competence as an educator, a sense of commitment to educate the next generation, and the ability to imagine their future teaching career trajectory) that impact the development and maintenance of teacher identity in higher education. For this report, we will focus on a sense of competence and how it is related to the other strengthening and constraining factors.

In Lankveld et al.'s framework, competence represents an educator's feeling of being well prepared/equipped to teach courses assigned, as well as their feeling of being a valued contributor, collaborator, or resource to the instructional mission of their department. Competence also includes feelings of preparedness for instructional leadership roles, such as directing a tutoring center or volunteering for a textbook adoption taskforce. Competence captures a teacher's overall sense of confidence in what they "bring to the table" as an educator.

Within our study, staff development activities are drawn from the teacher professional development program, *Promoting Success in Undergraduate Mathematics through Graduate Teaching Assistant Training (PSUM-GTT)*, which was implemented at three large, public universities in the United States between 2015 and 2022. Each location adapted the five program components to fit the constraints of their local context. The development program spanned three to four years and incorporated a pedagogical seminar, a Critical Issues in Undergraduate STEM Education workshop series hosted by visiting researchers, active learning support from a teaching assistant coach, regular one-on-one peer mentoring (Manzanares et al., 2023; Lanius et al. 2025), and regular opportunities for written and oral reflection (Lanuis et al., 2024).

Research Question

Our overarching research question is: In what ways does this multifaceted teacher professional development experience shape the teacher identity of GSIs transitioning into faculty roles? However, in this report, we narrowly focus on the question: In what ways are new faculty's sense of competence within their new institution impacted by past participation in a teacher professional development experience?

Methods

Data Collection

A graduate student on the research team conducted interviews with 11 former program participants utilizing an interview protocol designed by the training program's research team. The protocol aimed at soliciting participants' historical perspectives on the components of the professional development program (i.e., mentorship, teaching, program didactics), their insight into their experiences of their current position, and the ways that previously engaging with the program impacted their recent experiences. The interview protocol underwent one round of revision after the first interview to edit questions for clarity and interview length. Each interview took approximately 1.5 hours. Interviews were first transcribed with Otter.ai, with the graduate student and two research team members editing the transcripts for accuracy and anonymization.

Participants

The eleven interview participants had transitioned into a career with a teaching component after participating in the teacher training program while earning their graduate degree from one of the three universities. Four participants had undergraduate teaching experience when the teacher training program began, and therefore served only as mentors. Six participants began the training program as mentees and later became mentors. One participant was a mentee, a mentor

and a teaching assistant coach. One participant was employed where they earned their graduate degree, one was employed at the institution where they earned their undergraduate degree, and the remaining were employed at four-year institutions they had not attended. Two participants had been in a faculty position with teaching responsibilities for over two years, three were in their second year as faculty, five had completed one semester as faculty at their new institution, and one was a post-doctoral researcher with a one-course per semester teaching load.

Analysis

As the interviews were quite extensive, for the purposes of this report, the research team narrowed the corpus to portions of the interview transcripts that were specifically addressing the faculty members' experiences at their new institution. The research team used a priori coding (Saldaña, 2013) with a codebook we developed from Lankveld et al.'s framework. In addition to marking codes where they applied in the text, each coder took analytic memos to capture how these constructs uniquely manifested and how the codes related to one another. For example, a passage of text might be marked "staff development activities → competence". As the purpose of this project is exploratory and does not aim to make any frequency claims, we did not conduct interrater reliability statistical analyses. Instead, we had open discussions for consensus building where coders could share their independent findings and receive feedback.

Results

Because the constructs within the teacher identity framework interact in unique ways for each junior faculty member, we discuss results at the individual level before generalizing.

Alex

Alex reflected that as a novice GSI they only lectured, which mirrored the lecture-heavy learning experiences they had as an undergraduate. With support of the training program, they developed comfort with utilizing engagement techniques like group work and think-pair-share, and came to appreciate the value of active learning strategies. In their new faculty role, they conveyed a continued sense of competence in their teaching practices and expressed a curiosity to learn more teaching strategies (sparked in particular by an exposure to alternative grading in their new department). Although they are confident in their instructional practices and enjoy discussing teaching with others, they are careful not to present their approach as "*my way is the best*". A sense of connectedness, to both the GSI training program and to their new colleagues, is key to their growing sense of competence because it allows them to reflect on their teaching and gain insight by observing their peers. In the language of the teacher identity framework, Alex's professional identity and competence is heavily influenced by the skills they developed in the training program and a sense of connectedness derived from participating in the program's community of practice and engaging in teaching discourse with new department members.

Bojing

For Bojing, the sense of connectedness they developed while a GSI in the training program supported their sense of competence, particularly through the process of observing a peer teach and also being observed by a peer. They reflect that their teaching experiences as a GSI have helped them to thrive in their new faculty position and to be less stressed in comparison to others at their institution. Bojing is in an interesting position, now serving as a faculty member in the department where they earned their undergraduate degree. They report struggling to be seen as a

colleague with teaching knowledge by some people in their department and instead are seen as a former student. This tension is reflected in how they engage in teaching-related discourse with new department members: *"We talk about teaching usually. We're pretty open about it. I'm at more of a teaching university. I don't know if I'd say I'm a resource per se, but sometimes I give out ideas or suggestions."* In the language of the teacher identity framework, Bojing's professional identity and competence is positively influenced by a sense of connectedness to others, which allows productive comparison, and is negatively mediated by the direct work environment which introduces a struggle to be perceived in a new way by department members.

Carmen

For Carmen, the self-reflection practices they developed while a GSI in the training program have directly influenced their sense of competence as a teacher. While a GSI, this reflection was facilitated by observing another GSI teach. As a faculty member, their connection to students in a large lecture setting has inspired further reflection on how to improve their teaching through an equity lens. Carmen shares that they have a strong teacher identity, explaining *"I think I'm a better teacher than researcher."* Their sense of connectedness to other educators in their department has changed since they were a GSI. As a novice GSI, when they felt like they didn't know something, they were reluctant to find support. The training program was integral in developing their competence as an effective educator and they recognize they will always be learning. As a faculty member, they don't mind being the new person, and *"feeling dumb"*. They are comfortable connecting with people in their new context and addressing problems early. They reflect, *"...you're supposed to have all the answers, quote, unquote, because you're now the doctor, faculty member....But if you've been in the situation, you know, you're never above it. And there's always going to be something within every situation, you could do better."*

Domingo

For Domingo, participating in the training program gave them the confidence to be an instructor. They speak of coming into their new context as a faculty member with a *"collaborative mindset"*, which reflects a readiness to connect with other educators. Comparing their training to other new faculty further enhanced their sense of competence, particularly among colleagues who had no prior experience as an instructor. In their new context, they shared experiences of refining existing department resources to share and incorporating inclusive teaching practices and active learning strategies and reporting that it worked well.

Edric

For Edric, being given teaching responsibilities as a graduate student was intimidating because they felt a duty to try their best to do well. Their current feelings of competence are derived from those early teaching experiences, especially as they compare their training and experiences to those of graduate students at their current institution. As a faculty member, they do not see themselves as a resource within their department, but do frequently talk to others about teaching. In terms of their teacher identity, they describe themselves as a *"new teacher"*, as they are struggling with classroom time management and teaching large lectures. They report a drive to try new approaches for their new context, like incorporating iClickers for large lectures.

Fadi

As a GSI, Fadi quickly employed the things that they learned in the training program and talked to others about them. This participant's sense of competence directly feeds into their sense of connectedness and drive to engage with others around teaching. The converse was also true, with them sharing an experience where they felt less connected and consequently felt less competent as an educator. Fadi felt like a “spokesperson” for the goals of the training program and has brought this forward into the future, still trying to advocate for the use of active learning strategies in the classroom. Fadi has a strong sense of self as an instructor, explaining “*I was confident that I could be a good teacher, I had a lot of supporting evidence, right?*” Despite being the newest hire in their department, they further share “*I definitely feel confident that I have something to contribute to these spaces, even though... I'm the newest hire in the department. I still feel like I have a space and some skill set that I can share with others*”.

Gerard

Before participating in the GSI training program, Gerard had a couple of years of teaching experience and recognized that they weren't growing as an educator. Through the connections they made with the community that grew around the training program, they started trying active learning techniques: “*I mean I was told by many [program] mentors how important active learning is, and I really started implementing them. And it turns out that they are. They're super important and super engaging for students.*” At their new institution, they report that teaching is very different than at a big university and that they're doing much more active learning in the classroom and are exploring developing new skills, like implementing inquiry-based learning into the classroom. Fostering a sense of connectedness remains important for Gerard. For example, when teaching statistics for the first time, they found a colleague who was willing to share their materials and talk to them frequently about teaching the course. Additionally, in comparing themselves to other new faculty, they feel more prepared and thus competent as an instructor, but also explain, “*I'm growing, and I'm learning always.*”

Harley

As a faculty member, Harley feels a strong sense of competence in effectively implementing group work and other activities that they learned while participating in the GSI training program. A sense of connectedness from participating in the professional development program also contributed to their growing sense of competence in the classroom. Their reflection on the training highlights the role of connectedness in developing competence:

“When there were seminars, that was good... I appreciate those things. And also the time that we got to share with each other because when you're teaching, it's a local thing. It's changed to university, university, university. So it's really important to share tools, strategies, and get to know about classes. So having that kind of conversation is really good. So I enjoyed that. And I got to know some ideas.”

In their new departmental context, they view themselves as a resource for others, for example substitute teaching for other faculty.

Ivon

Participating in the GSI training program helped Ivon to feel knowledgeable and like they were a better teacher. The sense of connectedness they developed within the program community directly contributed to this confidence, with them reflecting “*I participated in many meetings,*

where we were sharing each other's opinion about active learning...It gave me various ideas...it comes with experience, and it comes with meeting your mentor, or attending those critical issues seminar meetings. So, I was feeling pretty confident as a teacher". In their new context they have mixed feelings about their competence as a teacher. They shared two issues that have preoccupied them: (1) communicating with students because some students have left feedback in course evaluations about their accent, and (2) making class more engaging. Engagement is of particular concern for them in the large lecture format, where they are teaching a large course for the first time and feel less prepared than their colleagues. On the other hand, they do feel like a useful resource to the teaching assistants helping with the course. Ivon continues to seek connection with others, reflecting *"there is no unique way of teaching. So it really is interesting to see how my friends are teaching. I sometimes wish to go to another person's class to see how. Although I'm teaching pretty well, sometimes students are not super excited because it's math."*

Jasper

Jasper candidly shared that they did not want to participate in the GSI training program. However, now as a faculty member, they see how much they have learned. This appreciation is further deepened by comparing their experiences as a GSI to the teaching experience of others on the job market: *"I was way more aware of a lot of the education research and how to deliver materials and issues like that, compared to a lot of the people who I was working with...I was like, 'holy cow, like I got a great foundation from this seminar', because other people were just like, 'Oh, I've never heard of that before.'"* Although Jasper has a strong sense of competence, their new context gave them new challenges to navigate, such as multiple course preps, time management, and balancing teaching and research. In terms of connecting with new colleagues and engaging in discourse around teaching, they shared *"I feel like right now, I'm just like taking a lot of stuff in, but I feel like I will be able to participate more in the future."*

Kyla

For Kyla, participating in the training program supported their sense of competence as an educator and gave them the language to express what they were doing in the classroom with others. As a GSI, they felt competent to generate new tactile activities and to try new teaching or grading approaches. In comparing themselves to other faculty at their new college, they feel *"worlds ahead"*, with particular confidence in their ability to effectively take on a large teaching load. They are currently working with others on writing an open access book. In summarizing their perspective on being a teacher, they shared *"I tend to be very modern in my thinking. I tend to be very, 'oh, let's just try this. That didn't work. Okay, let's try something else.'"*

Discussion

As GSIs, program participants were members of a community of practice that fostered a sense of connectedness. Participants frequently cited the relationships they cultivated through the program, specifically mentoring interactions and peer discussions in seminars, as central to their growth. These training experiences provided a foundation for reflective practice and normalized teaching-related dialogue within their academic communities. Many participants report continuing these practices within their new context. For a majority of our interviewees, productive comparison with new colleagues – on prior training and teaching experiences – supported self-reflection, which bolstered their sense of competence as a new faculty member and inspired them to grow their teaching practices. This process of social comparison enabled

them to locate themselves within the broader institutional teaching culture and engage more meaningfully in pedagogical discourse. For many, it was through navigating a new professional environment, making these comparisons, and engaging in reflective dialogue that participants further developed their confidence and competence in their teacher professional identity.

Reflecting on their experiences as GSIs, many participants noted the value of constructive feedback through peer teaching observations. Participants noted this feedback directly contributed to their instructional improvement, and when it was absent in the new environment, they expressed disappointment. Jasper shared, *“And so I’ve gotten a few helpful insights from faculty mentoring but I felt like I got a lot more from the peer mentoring.”* This may indicate that new faculty mentors and department chairs should implement an observation protocol designed to provide constructive feedback, such as the red-yellow-green feedback system (Yee et al., 2022) or teaching TRIOs (Bleiler-Baxter et al. 2020).

For two participants, mathematics research was their only career goal when they entered graduate school, and participation in the teacher training inspired a shift in their career goals. All participants acknowledged that the GSI training program substantially supported their job search process because it enabled them to effectively articulate their teaching philosophies and to effectively discuss pedagogy with faculty search committees.

Conclusion

The PSUM-GTT training program functioned as a formative site for teacher identity construction, where GSIs developed not only a sense of competence but also a sense of belonging to a professional teaching community. For many participants, their strong teacher identity inspired them to pursue teaching-focused careers.

As participants transitioned into faculty roles, their prior participation in the PSUM-GTT training program continued to have a lasting and transformative impact on how participants perceived themselves as educators. The program instilled instructional confidence, fostered pedagogical curiosity, and provided language and frameworks for articulating and refining teaching practices. Further, we saw that a sense of competence as a teacher can be deepened by the experience of transitioning itself, when GSIs-turned-faculty are given a new context to situate themselves within and to compare themselves to. Many participants described entering their new departments with a stronger foundation of teaching skills and a clearer understanding of how to reflect on and improve their teaching practices compared to peers. On the other hand, comparing themselves to faculty with a much broader range of teaching experience also provided new opportunities for reflecting on where they currently are and for identifying opportunities for growth.

In conclusion, we found that a sense of competence is not a static psychological process, but rather a dynamic, socially constructed aspect of teacher identity, deeply influenced by prior training experiences, interpersonal connections, and institutional context.

Statement on Generative AI Use

Our first draft of this manuscript was over the page limit. ChatGPT-5 and Claude.ai were asked to suggest ways to condense. All suggestions were thoroughly discussed as we have an ethical responsibility to accurately represent the participants appearing in our report.

Acknowledgments

Based on NSF grants #1821454, 1821460, and 1821619. Gratitude to Justine Piontek for conducting the interviews.

References

- Beisiegel, M. & Simmt, E. (2012). Formation of Mathematics Graduate Students' Mathematician-As-Teacher Identity. *For the Learning of Mathematics*, 32(1), 34–39.
- Bleiler-Baxter, S. K., Hart, J. B., & O.P., S. C. A. W. (2020). Teaching TRIOs: Using Peer Observation to Initiate Department Change. *PRIMUS*, 31(3–5), 550–564. <https://doi.org/10.1080/10511970.2020.1772918>
- Colbeck, C. L. (2008). Professional Identity Development Theory and Doctoral Education. *New Directions for Teaching and Learning*, 113, 9–16. <https://doi.org/10.1002/tl.304>
- Ellis, J., Deshler, J., & Speer, N. (2016). Supporting institutional change: A two-pronged approach related to graduate teaching assistant professional development. In T. Fukawa-Connelly, N. Infante, M. Wawro, and S. Brown (Eds.), *Proceedings of the 19th annual conference on research in undergraduate mathematics education*. Pittsburgh, PA. 729–735. <http://sigmaa.maa.org/rume/RUME19v3.pdf>
- Hauk, S., & Speer, N. M. (2023). Developing the next generation of change agents in college mathematics instruction. In M. Voigt, J. E. Hagman, J. Gehrtz, B. Ratliff, N. Alexander, and R. Levy. *Justice through the lens of calculus: Framing new possibilities for diversity, equity, and inclusion*. The Mathematical Association of America. 28–44.
- Lankveld, T. A. M., Schoonenboom, J., Volman, M., Croiset, G., & Beishuizen, J. (2016). Developing a teacher identity in the university context: a systematic review of the literature. *Higher Education Research & Development*, 36(2), 325–342. <https://doi.org/10.1080/07294360.2016.1208154>
- Lanius, M., Haskell, H., Olson, G., Manzanares, R., Houston, S., & Glotov, D. (2025). Exploring Peer Mentors as Instructional Change Agents in a Dispersed Model for Conducting Teaching Observations of Graduate Student Instructors. *School Science and Mathematics*. Published online first. <https://doi.org/10.1111/ssm.18416>
- Lanius, M., Manzanares, R., Olson, G. A., & Houston, S. (2024). Office Talks: Connection & Discourse in Peer Mentoring of Postsecondary Educators. *College Teaching*. Published online first. <https://doi.org/10.1080/87567555.2024.2440889>
- Manzanares, R., Webb, J., Harrell-Williams, L. M., Olson, G. A., Houston, S., Lanius, M., Funkhouser, K., Shannon, D., Gomez, J., Jacobson, M., & Merchant, L. (2023). A Case Study of a Multi-Institution Replication of a Comprehensive GTA Teacher Training Program. *PRIMUS*, 34(7), 746–762. <https://doi.org/10.1080/10511970.2023.2214909>
- Mathematical Association of America. (2018). Instructional practices guide. Washington, DC: Mathematical Association of America. Retrieved from [https://www.maa.org/sites/default/files/Instruc tPracGuide_web.pdf](https://www.maa.org/sites/default/files/Instruc%20tPracGuide_web.pdf)
- Mathematical Association of America. (2020). *CoMInDS resource suite*. Washington DC: Mathematical Association of America. Online at: www.connect.maa.org
- Saldaña, J. (2013). *The Coding Manual for Qualitative Researchers* (2nd ed). SAGE.
- Yee, S., Deshler, J., Rogers, K. C., Petrulis, R., Potvin, C. D., & Sweeney, J. (2022). Bridging the gap between observation protocols and formative feedback. *Journal of Mathematics Teacher Education*, 25(2), 217–245. <https://doi.org/10.1007/s10857-020-09485-x>
- Yee, S. P., Hauk, S., Gonzalez, T. L., & Wang, J. (2023). College mathematics instructor professional development providers: Who are they? *School Science and Mathematics*, 123(2), 39–41. <https://doi.org/10.1111/ssm.12571>