

WIP: Faculty Preparation: ECE Graduate Students' Experience in a Teaching Fellowship Program

Zachary Brumbach, Georgia Institute of Technology
Davide Balzerani, Georgia Institute of Technology

Davide Balzerani received his Bachelor of Science in Electronics Engineering from Sapienza University of Rome in 2020. He earned a Master of Science in Electrical Engineering from the Georgia Institute of Technology and a Master of Science in Electronics Engineering from Sapienza University of Rome in 2022. He served as a teaching assistant for two semesters for an Instruments & Electronics Lab, as a learning mentor in Fall 2025, and he is currently an instructor of record for an ECE course on Circuits and Electronics. During his graduate studies at Georgia Tech Lorraine, Davide began conducting research in III–V compound semiconductors and microfabrication. He was awarded the Premio Frank Silvio Marzano for Best Master's Thesis in Electronics Engineering at Sapienza University of Rome (2021–2022) for his work titled "Microfabrication and characterization of micro-opto-fluidic devices infiltrated with liquid crystal for photonic applications". Now, as a Ph.D. student in the School of ECE and the Center for Compound Semiconductors, his research focuses on developing gallium nitride–based, high sensitivity UV solid state photon counting devices. In addition to his research, Davide is an ECE Supporting Teaching ExpERience (STEER) Fellow and is pursuing a Georgia Tech's Tech to Teaching Certification through the Center for Teaching and Learning (CTL).

Ellie Madeline Pond, Georgia Institute of Technology

Ellie Pond is a PhD student at the Georgia Institute of Technology in the Electrical and Computer Engineering department. Her focus is on the implementation of new teaching strategies and course designs.

Pranav Oommen Mathews, Georgia Institute of Technology

Pranav Mathews received the B.S. degree in electrical engineering from The University of Texas at Dallas in 2021 and the M.S. degree in electrical engineering from the Georgia Institute of Technology in 2023, where he is currently pursuing the Ph.D. degree with the School of Electrical and Computer Engineering, with a focus on floating-gate, analog, and neuromorphic systems.

Suman Ghosh, Georgia Institute of Technology

Suman Ghosh received the B.Tech. degree in Electrical and Electronics Engineering in 2022 from Vellore Institute of Technology, India, and the M.S. degree in Electrical and Computer Engineering from the Georgia Institute of Technology in 2023. He is currently pursuing the Ph.D. degree in Electrical and Computer Engineering at the Georgia Institute of Technology, where he builds on his prior research foundation. His interests include technical problem formulation, research development, and engineering education.

Dr. Lakshmi Raju, Georgia Institute of Technology

Lakshmi Raju is the Director of Student Engagement and Well-Being, and a faculty member in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. Her focus is on initiatives and programs that foster a welcoming and inclusive student community while expanding their academic, professional, and personal development.

WIP: Faculty Preparation: ECE Graduate Students' Experience in a Teaching Fellowship Program

Abstract

This work in progress (WIP) explores the experiences of current Ph.D. students in an Electrical and Computer Engineering (ECE) graduate program who are participating in a teaching fellowship program designed to prepare future faculty. The fellowship program is a three-semester commitment, beginning with structured pedagogical training and mentorship. By the end of the program, fellows have served as instructors of record for an ECE course, allowing them to apply evidence-based teaching strategies in a discipline-specific context.

This work presents the reflections from the authors – Ph.D. students at various stages of the fellowship program. The fellows selected for the program range from those with no teaching experience to those with teaching experience. Additionally, students in the program have varied professional goals, from tenure-track positions, industry positions, and teaching-track positions. The students describe their growth in the program, changes to their professional outlooks, and the impact of the pedagogy learned and cohort experience.

Through participation in the fellowship, students explore their own interest in teaching, increase their confidence in teaching, and are better prepared for their faculty applications. This work highlights the transformative impact of a structured program designed to develop graduate students as educators.

Introduction

Faculty development plays a critical role in preparing future academics to navigate the complex and multifaceted responsibilities of the professoriate. New faculty are expected to balance teaching, research, mentorship, service, and administrative duties, often with minimal formal preparation beyond disciplinary research training. This lack of systematic preparation is particularly pronounced in research-intensive institutions, where teaching is frequently learned informally or implicitly. Effective faculty development programs address this gap by providing structured opportunities to learn evidence-based pedagogical practices, reflect on teaching identity, and develop confidence as educators. By supporting graduate students before they enter faculty roles, such programs not only improve instructional quality but also enable more informed, intentional career pathways within and beyond academia.

A number of faculty development programs exist, ranging in scope from general professional

development to teaching-focused programs^{1,2,3}. It has been shown that not only are these programs helpful to aspiring faculty, but that teaching experience in particular is an area graduate students lack⁴. The transition from the graduate student or post-doctorate role to a faculty position is a challenging time, suddenly the previous one-track mind of a Ph.D. candidate must transition to handle a new “multi-dimensional role”⁵. There is evidence, specifically at ‘Research 1’ (R1) universities, that new faculty are unprepared to handle teaching, mentorship, grant writing, and administrative duties⁶. Studies concerning future faculty development programs have reported a range of experiences and approaches, though a common throughline appears of inadequate systematic preparation, especially with “little attention [given] to faculty careers outside of the tenure-track at research universities”^{7,8}.

This paper aims to magnify the personal experience of graduate instructors by following a future faculty fellowship program focused on teaching development at Georgia Institute of Technology. “Although it is crucial to understand how graduate instructors negotiate this liminal space, scholarship in teaching and learning in sociology has not fully examined the first-time teaching experience from the graduate student perspective. Knowledge about the challenges graduate instructors face [...] is crucial to the future of the discipline because of the effects this experience may have on both graduate student instructors and undergraduate students”⁹. Since its inception in Summer 2023, the program has supported six cohorts of fellows (including the current spring cohort), with a total of 15 participants to date (excluding the newest cohort that has not yet begun).

The fellowship was created to provide an avenue for ECE graduate students who were interested in teaching to receive a one-year education in the theoretical underpinnings of teaching and to obtain practical experience via teaching a class for a semester. This program was created in conjunction with the university’s Center for Teaching and Learning (CTL), where the accepted fellows would take courses offered by CTL and complete their teaching certificate¹⁰, while having the opportunity to teach an introductory electrical engineering class.

Narrative techniques have been used as a research tool with a strong impact on teaching and pedagogical studies^{11,12}. Rossiter and Clark use self-oriented narrative and explore its impact on adult education. Reflective thinking and self-understanding are used to write and collect narratives from which analytical conclusions are drawn¹³. A particular type of narrative technique, narrative inquiry, was used to analyze the efficacy of future faculty development programs that have a structure similar to the program discussed in this paper¹⁴.

Narrative inquiry is defined by Clandinin and Connelly (2000) as the use of lived or told stories in the understanding of an experience through reflectivity and interpretivism¹⁵. Narrative inquiry has been used since the early 1990s to gather insights on the teaching experience and on the individual development of teachers’ lives^{16,17}. Researchers can get a profound understanding of educational experiences by analyzing the stories of the participants through an analytical process¹⁸.

Narrative inquiry is a reflective tool and unlocks opportunities for teachers to reflect on life experiences and interpret their narratives¹⁹. Sudtho et al.¹⁴ highlight how the narrative inquiry method allowed them to understand the impact and changes that the future faculty development program had on the participating students. In this paper, we will use this methodology to conduct

a qualitative analysis on the impact of a teaching development program on graduate students at different stages in the fellowship program.

It is important to note that this work relies on self-reported reflections from participants, which introduces inherent limitations. As participants are both the subjects and evaluators of their own experiences, responses may be influenced by personal bias, selective recall, or a desire to present the program positively. While these narratives provide valuable insight into perceived growth and transformation, they do not constitute an objective measure of teaching effectiveness or program impact.

The Supporting Teaching Experience Fellowship

The Supporting Teaching ExpERience (STEER) fellowship is a program offered by the ECE department at Georgia Institute of Technology since 2023. The purpose of this fellowship is to encourage and support Ph.D. students who are interested in teaching through a structured training program and an opportunity to instruct an undergraduate class. The program for the fellowship can be broadly split into two categories, training on the theory of teaching and practical hands-on teaching training. If accepted into the program, the fellows are assigned to one of two classes: Circuits and Electronics or Fundamentals of Digital System Design, both of which serve as introductions to the ECE department for non-ECE undergraduate students.

Graduate students serve as instructor of record for these courses, appearing on the transcript and acting as the primary instructors for the entire semester. Student teachers are supervised by a faculty course coordinator, but are given ample room to teach the course in whatever way they choose.

Accepted student fellows will commit to a year of participation. Over the summer semester, the fellows complete asynchronous online training courses that introduce the practice of teaching in higher education. The subject of these courses include crafting effective learning objectives, creating effective assessments, and teaching with technology. These courses fall under the theory of teaching category required by the fellowship. There is not a practical hands-on teaching counterpart offered over the summer.

The first regular semester (spring or fall) of a fellow's participation in the program involves the student serving as a learning mentor for the introductory class assigned to them and taking the class Course Design for Higher Education. This class is offered by the school's CTL department. This graduate-level class covers evidence-based teaching, formative and summative assessment, and educational technology. While learning these techniques over the course of a semester, the students build course portfolios for their assigned class that includes a syllabus, an assessment plan, a sample lesson plan, and a sample major assessment. The practical experience during their first regular semester is serving in the role of a learning mentor for their assigned course. The main function of this role is to give the fellows an opportunity to review or learn the course material they will be teaching in the following semester. However, the learning mentors might also be given the chance to plan and deliver a lecture, aid in laboratory assignments, and help the current instructor with grading. Lastly, in this semester, the fellows are required to attend monthly STEER cohort meetings. Each cohort typically consists of three graduate students. In the monthly

cohort meetings, two classes of STEER cohorts are expected to attend, those currently instructing a class and those serving as learning mentors for the class.

In the final regular semester of a fellow's participation in the STEER program, they will serve as the instructor of record for one section of their assigned course, take the CTL class Teaching Capstone in Higher Education, and continue participation in monthly STEER meetings. In this class, the students apply evidence-based teaching and backward design principles, student assessment, peer and mentor feedback through supervised college teaching. At the end of this final semester, the fellows will have earned a teaching certificate offered by CTL. As instructors of record, the fellows take full responsibility for a section of their assigned class, scheduling the semester plan, creating and delivering lectures, and crafting effective assessments of student learning.

Methods

This work in progress explores the reflections of five STEER fellows regarding their individual experience, perspective, and the impact of the STEER fellowship. Collectively, the authors of this paper created 10 prompts to be answered by each fellow. Broadly, the prompts were sectioned into questions regarding the time pre-fellowship, during the year-long fellowship experience, and post-fellowship. The first three questions are as follows:

1. What is your background education?
2. What was your experience with teaching prior to becoming a STEER fellow?
3. Why did you apply for the STEER fellowship?

These prompts serve to establish the experience, background, and motivation of the students prior to participating in the fellowship.

The next three prompts are:

4. What has your experience been in regard to the theoretical program requirements of the STEER fellowship?
5. What has your experience been in regard to the practical teaching experience required by the STEER fellowship?
6. What has your experience been with respect to the communal aspects of being a STEER fellow?

These questions prompt reflection on the three main aspects of the STEER program, the theoretical learning, the practical experience, and the cohort-structure.

The next four questions are:

7. Has your perspective on teaching for higher education changed throughout the fellowship?
8. Have your future career plans changed since joining the fellowship?
9. How satisfied are you with your experience as a STEER fellow? Have your initial goals for the program been accomplished?

10. What changes would you recommend be made to the STEER fellowship?

This set of questions aims to prompt reflection on the impact of the fellowship, to determine if it has caused changes in the fellows' perspectives and plans.

These questions and their temporal sectioning were informed by the method of narrative inquiry. From¹⁶, narrative inquiry and educational research are naturally linked because “humans are storytelling organisms who, individually and socially, lead storied lives.” Instances of narrative inquiry in regard to the process of learning and professional development can be found in^{20,21,22}.

Results

Pre-fellowship

The fellows featured in this work-in-progress consist of three students who have completed the program and two who are in their final semester of the fellowship. All of these students are ECE Ph.D. students, studying a variety of research topics within the discipline. Four of the five participants obtained B.S. and M.S. degrees in electrical engineering, while the other participant obtained mechanical engineering B.S. and M.S. degrees. Of the three who have completed the program, the students are within their third and fourth year of graduate school. The in-progress students are in their fourth or fifth year of graduate school. All of the fellows have spent the majority of their education at R1 universities.

Four of the participants had previous experience as a graduate teaching assistant (TA), while the other fellow had experience as an undergraduate TA. Two of the students had previous higher-education teaching experience as either a primary instructor or co-instructor of an undergraduate class. Three fellows, the two who had previously instructed and one who had extensive experience as a TA and with sports instructing, self-described their experience with teaching as high prior to joining STEER. The other two fellows, self-described their experience as very low, “limited and largely informal.”

When prompted to explain why they had applied to the fellowship in response to Questions 3, all participants cited the opportunity to learn how to teach in a structured, educational setting as the main reason for applying.

“I have always had a strong passion for teaching, but the means to shape that passion with formal study and practice was an experience that interested me greatly.”

Another respondent stated that the fellowship was “a rare opportunity to study pedagogy formally [and] practice teaching in a supported setting.” Three of the five respondents directly cited a long-held “passion and interest in teaching” as a reason for applying. Three participants were interested in becoming faculty members after obtaining their doctorate, and felt that this fellowship would help determine if they should follow this path. One of these students indicated that having the fellowship “as an award” on their resume would help them pursue their future career path. One respondent discussed their disappointment that they had not had an chance to get experience with teaching during graduate school,

“Despite my expectations at the beginning of graduate school, I never had an opportunity to get hand-on experience with teaching, not even in a teaching assistant role. The STEER fellowship seemed like my only opportunity to learn more and to experience teaching prior to graduating.”

All of the fellows indicated that the STEER fellowship was a rare and unique opportunity for graduate students.

During the fellowship

In response to Question 4, every fellow enthusiastically expressed that the theoretical requirements of the program were “invaluable,” “overwhelmingly positive,” and “transformative” to their perspectives on teaching and education.

“The Center for Teaching and Learning courses introduced me to learning theories, instructional alignment, assessment design, and inclusive teaching practices that fundamentally reshaped how I think about education.”

One fellow discussed how the CTL classes shifted their “own biases towards teaching” that were informed by their experience as a student, helping them recognize “the sheer amount of work it takes.” Two of the three fellows who have completed the program highlighted a specific requirement of the capstone class, interviewing current faculty members about their teaching perspectives and experiences, as “extremely helpful for deciding [their] future career path” and “helped [them] translate theory into actionable practice.” One went on to explain that the theoretical CTL classes caused them to create a “more intentional and reflective teaching identity.”

Regarding the course design class, both of the in-progress fellows reflected on the unexpected benefit of taking this course with multi-disciplinary peers,

“The multidisciplinary student body of the course, ranging from engineering to math, medical, and natural sciences students, was beneficial to see how different teaching techniques and styles can be applied to different disciplines.”

The class features a large amount of peer and instructor feedback on the course portfolio that each student is drafting. “Discussing my course design plan with peers outside my discipline helped me craft a better, more concise, and clear course plan,” noted a respondent, and ultimately prepared them to better serve their students who are new to the electrical engineering discipline. One of these in-progress fellows expressed that through this course they became aware of and developed an interest in pedagogical research and engineering education in particular.

In response to Question 5, inquiring about the hands-on teaching experience offered through the fellowship, the three fellows who have completed the fellowship expressed that being an instructor of record was “among the most impactful aspects of the program.” “While I had much experience teaching as a TA, working as an instructor of record was a different experience entirely,” said one respondent. Another stated that “practical teaching is by far the best way to solidify theory.” Each of these fellows stressed the importance of having complete control over their classes,

“Serving as an instructor of record allowed me to take full ownership of course delivery, pacing, assessment, and classroom climate.”

The respondents emphasized how unique of an opportunity it was to be the instructor of record as a graduate student, that they would not have gotten that opportunity “under any normal circumstances as a graduate teaching assistant.” As instructors of record, the fellows all received end-of-semester evaluations from the students, which provided “meaningful feedback on [their] teaching” and allowed them to reflect on how their teaching can be improved.

The two in-progress fellows have not yet completed a term as an instructor of record, instead their practical teaching experience is through the learning mentor role. The two fellows were assigned to different courses at the start of the fellowship. Both agreed that the role was “incredibly useful” for familiarizing and learning the content of the course. However, they reported differing opinions on their experience as learning mentors. One of the fellows expressed that the role allowed them to “get hands-on experience” through “answering student questions, exam grading, supervising laboratories, and teaching two sessions of the class.” They found the role “remarkably impactful [for] teaching skills development,”

“It was a way for me to break the ice, get teaching experience, and receive constructive feedback from both the students and the instructor of record.”

However, the other in-progress fellow found the learning mentor role to be ‘ill-defined.’ “The most helpful aspect of this position was [their] constant attendance of the course, which helped familiarize [them] with the course content, the structure of its delivery, and the attitude of students within the class.” A fellow who had completed the program commented the following on the combined experience of a learning mentor and an instructor of record:

“As a learning mentor, I gained insight into student challenges and engagement patterns from a different vantage point. These experiences [as instructor of record and learning mentor] complimented each other, helping me connect preparation with execution.”

In response to Question 6 regarding the communal impact of the STEER fellowship, four of the five fellows expressed that this was the weakest of the three components offered by the fellowship.

“I did not feel a strong sense of community.”

“I don’t think the STEER cohort is that close.”

“I did not feel much a part of the STEER community.”

“Applying to the fellowship, I thought the STEER cohort would have been a big add-on to the program. However, I have mixed feelings about my experience with the STEER cohort.”

One of these fellows believes that a reason for this lack of community could be due to the inherent lack of time graduate students have. On the required monthly meetings, one respondent felt the meeting topics were redundant with what was being discussed in the CTL classes and that “[the cohort] didn’t establish a deep connection that could have driven to more spontaneous and

enriching discussions.” Three of these four fellows did express a feeling of community and belonging to the larger CTL community, which grew from participating in the required courses course design and capstone CTL classes.

“I have felt much more a part of the Center for Teaching and Learning community than the smaller STEER community.”

However, one respondent expressed that “the communal dimension of STEER significantly enriched [their] experience.”

“Being part of a cohort created a space for open discussion about teaching challenges, experimentation, and growth. Peer observations and feedback fostered a culture of trust and shared learning, where teaching was treated as a scholarly practice rather than a solitary task.”

This respondent also commented on the positive impact of the “broader STEER community, including faculty members and CTL staff” on their experience.

Post-fellowship

In response to Question 7 regarding the participants perspectives on teaching in higher education, four of the five students expressed that their initial view of teaching in higher education has been reinforced and strengthened through the experience. Three of these respondents commented on the relationship between research and teaching at their university. Two of these three feel that the fellowship has intensified their view that teaching is undervalued by their research-intensive school, “many professors treat teaching like a side task, and do not give it proper attention or dedication.” Both of these fellows mentioned their surprise upon learning that many professors do not learn nor practice teaching prior to becoming faculty members. The third fellow stated that they now “empathize with professors who choose not to prioritize teaching” in the high-stakes, research-intensive environment. This respondent notes that this shift in perspective was partly due to their new understanding of the sheer amount of teaching information and techniques available, along with the amount of work that goes into being an effective teacher.

One fellow reflects on their personal relationship with teaching through the fellowship, stating that their perspective on teaching has changed “substantially.”

“Instead of asking whether I ‘covered’ material, I now ask whether students meaningfully engaged with it and developed transferable understanding.”

They go on to discuss the sense of pride they felt when their class demonstrated a strong understanding on a challenging and conceptual final exam, noting that the students’ demonstrated a “level of conceptual creativity that [they] personally did not achieve when [they] first learned this material.”

The respondent that did not feel their perspective has changed much throughout the fellowship disclosed that they had taken a course prior to becoming a fellow that was designed for students interested in pursuing an academic career. They say that “this course had a transformative impact on [their] teaching/research perspective,” and that “if [they] hadn’t taken this class before, the STEER fellowship would probably have had a similar impact in [their] change of perspective.”

The responses to Question 8 regarding the fellows' future career plans varied greatly. One respondent explains that their plans prior to the fellowship, working in industry while serving as an adjunct or teaching professional, has not changed, but that they now have the "experience and certification to help [them] prove to hiring staff that [they are] a well-qualified applicant." Another fellow feels that their career goals have not changed, but have become more clearly defined through the process.

"While I remain deeply committed to research, I now view teaching as a parallel scholarly pursuit rather than a secondary responsibility."

They note that their confidence in their plan to pursue faculty positions has increased due to the experience. Similarly, one of the in-progress fellows states that at the start of the program they knew they wanted to pursue a faculty position, but did not know if they wanted to follow a research or teaching track. They believe that once they finish the STEER program and serve as an instructor of record that the experience "will help [them] identify which career path [...] is more appropriate for [their] future."

The last two fellows believe that the fellowship has concretely changed their future career plans. One respondent expresses that their "experiences made [them] sure [they] did not want to be an R1 research professor." They strongly considered pursuing a faculty role at a non-R1 school throughout the program, but have ultimately chosen to follow a different path, "working [...] in industry and serving as an adjunct professor."

"I doubt that, without the STEER program, I would have stumbled onto a job track that works so well for me."

The other fellow, who feels their plans have concretely changed, expresses that they "have firmly decided to pursue teaching-focused positions." They discuss that prior to the program, even though they were interested in teaching, they weren't planning to apply to faculty positions, believing that their lack of experience would preempt their ability to obtain a faculty role.

"I have also gained the confidence to apply for [faculty] roles that I previously thought were not worth trying for, due to my lack of experience."

Additionally, they now plan to contribute to pedagogical research in the future, a field that they learned about through the STEER fellowship.

To Question 9, all respondents expressed that they are "extremely" satisfied with their STEER fellowship experience. From the fellows who have completed the program:

"The program was everything I thought it was and has enabled me to further my personal and professional goals."

"I owe the fellowship a lot for changing my perspective on my career, and the skills I have learned will continue to help me in the future."

"When I joined, my primary goals were to gain confidence in teaching, learn evidence-based pedagogical strategies, and understand how to translate theory into practice. These goals have been fully accomplished."

The in-progress fellows expressed:

“When I joined the program, I had two main goals: strengthen my confidence in my teaching skills [by] teaching a full course, and learning pedagogy techniques and course design rules. Being a learning mentor has been a very rewarding experience and has helped me build confidence in my teaching skills while I was preparing for my teaching role as an instructor of record. Attending the course design class, I learned an incredible amount of pedagogy and course design techniques.”

“Initially, I was nervous about the prospect of being the instructor of record for a course I have never taken and in a field that I am new to. However, throughout the program I feel that I have been well-prepared to teach this class.”

On the final prompt, concerning any recommendations the fellows would make to the STEER fellowship, three of the respondents made suggestions for altering the role of learning mentor.

“I believe that the learning mentor role should be better defined for future STEER cohorts.”

“One recommendation is to make the learning mentor role more inclusive and immersive. Learning mentors could be more actively involved in the course that they are expected to teach in the subsequent semester.”

These three students suggested formally incorporating the opportunity for learning mentors to plan and deliver one lecture during the semester, opposed to it being an opportunity offered to some of the mentors dependent on the instructor.

“I think learning mentors teaching at least one section should be something baked into the course.”

Two students suggested changes to the monthly STEER cohort meetings, both suggested involving more ECE faculty members:

“I believe the STEER fellows could benefit from more discussions on the faculty role and responsibilities (and how they are different in research-intensive and teaching-intensive universities), the faculty application process, and faculty interview.”

“I think one way the program could be improved would be to involve existing faculty a little more. Throughout the department, there are many teaching philosophies and experiences which I think would be interesting to hear about and discuss.”

Takeaways and Future Recommendations

The collected thoughts echo a sentiment shown in the wider literature: teaching experience is extremely valuable for training graduate students, not only for those who aspire to be future faculty but in helping students decide what career path is appropriate for them to pursue. Student responses show increased awareness of a professor’s role in teaching, a perspective shift in their own teaching, and definitive impact on future career plans. Practical experience as an instructor of record following pedagogical training was universally highlighted as a positive aspect of the

program. This aspect of the program is supported by²³, which emphasizes the importance of “[providing] a strong foundation in pedagogy before and during the first semester of teaching.”

However, flaws in the program were highlighted. While the program did overall greatly satisfy the respondents, improvements can be made to make the fellowship a better experience and differentiate it from the base CTL experience. The feedback indicates that the lack of formal community building was felt by many of the fellows. In²³, creating a strong peer mentoring program is determined to be a research-backed best practice for training graduate student instructors; “Involving returning graduate instructors in a training and mentoring program can help to build relationships among team members, create opportunities for experienced instructors to take on leadership roles and share teaching ideas and resources with new instructors.” We recommend the program experiment with formalizing peer-mentorship in the STEER fellowship to improve the sense of community. Since two to three cohorts are active and in various stages of the fellowship at any given time, it seems to be a missed opportunity that this is not taken advantage of.

In addition, the variable nature of the learning mentor role emerged as a flaw in the program’s design. We recommend the program impose a stronger structure on the role of learning mentor, so that future fellows are better prepared for the following semester where they serve as instructors. The time as a learning mentor can be used as a low-stakes opportunity to bridge the gap between ideological pedagogical learning and practical instruction. Through this change, future fellows might feel better prepared for their time as an instructor⁹.

This work reports early results from the STEER fellowship; currently 15 participants have passed through with most still in graduate school. However, as the program continues, so too can this study. The exact impact can be quantified in several directions. As more time passes, the career paths and faculty application outcomes can serve as an indication of the impact of the program on future directions and success of the participants. Additionally, the impact of this program on the undergraduate student body, those who take the classes taught by the STEER fellows, can be used to investigate the impact of STEER on the wider Georgia Tech ecosystem. This could be explored using end-of-semester student feedback and focus group discussions. By collecting more concrete data as the program continues to grow, the impact of the STEER fellowship can be better quantified.

The effectiveness of the STEER fellowship can also be compared to other programs^{1,2,3,5,6} in all these metrics. Comparisons of this nature help answer questions on the most effective way to develop future faculty at the graduate student levels. This work is simply the first step in examining intentional development of graduate students for future careers in academia from the perspective of the graduate student participants.

Concluding Thoughts

Across the past, present, and future phases reflected in this narrative inquiry, the STEER fellowship emerges as a connective bridge between graduate students’ prior experiences, their current professional development, and their evolving career trajectories. Prior to the fellowship, participants entered with widely varying teaching backgrounds and levels of confidence, yet

shared a common sense that formal preparation for teaching was largely absent from their research-intensive training. During the fellowship, structured pedagogical coursework and authentic instructional responsibility allowed fellows to reconcile theory with practice, reshaping how they conceptualize teaching as an intentional, evidence-based, and reflective process rather than an implicit or secondary task. These experiences served not only to build concrete teaching skills, but also to clarify professional identity through supported experimentation and reflection. Looking toward the future, fellows describe increased confidence, more informed career decision-making, and, in several cases, a reorientation of long-term goals toward teaching-focused or hybrid academic roles. Taken together, these reflections illustrate how sustained, scaffolded teaching development can transform uncertainty in the past into clarity and agency in the future, highlighting the value of embedding intentional faculty preparation within graduate education.

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