Lessons from RIEF Mentoring: Toward Scalable Models of Faculty and Researcher Development

Dr. Julie P Martin, University of Georgia

Julie P. Martin is the Director of the Engineering Education Transformations Institute at University of Georgia. Julie is a Fellow of ASEE and the editor-in-chief of Journal of Women and Minorities in Science and Engineering, where her vision is to change the culture of academic publishing to one characterized by constructive feedback. Julie is an ASEE Fellow and a member of the Hall of Fame.

Dr. Jennifer S. Brown, University of Georgia

Dr. Jennifer Brown earned her PhD in Engineering and Science Education (2023) and her M.S. in Mechanical Engineering (2020) from Clemson University. She is currently working as a postdoctoral researcher in the Elevate lab at the University of Georgia in the Engineering Education Transformations Institute. Her primary research foci include graduate student and faculty professional development, graduate well-being, and mentorship of women and others with marginalized identities in STEM. Her engineering background is in advanced manufacturing and design.

Dr. Fred Richard Beyette Jr., The University of Georgia

Fred R. Beyette Jr. has been teaching and performing research in areas related to Mixed Technology Embedded Systems since 1988. From 1988 to 1995, his efforts contributed to the work of materials, device and systems specialists at the NSF Engineering Res

Mrs. Kristina Kennedy, The Ohio State University

Kristina Kennedy joined The Ohio State University in 2021 as an Associate Professor in the College of Engineering and Faculty Director for the Integrated Business & Engineering Program (IBE) – a multidisciplinary, cross-college program serving both business and engineering honors students. In this role, Kennedy teaches the IBE First-Year Cornerstone and IBE Senior Capstone courses. Additionally, she oversees the program – creating meaningful experiences for students, raising funds, and forging industry partnerships for student success.

Prior to her current role, Kennedy worked as an engineer with Honda Research & Development. Her roles included test engineer, interior quality lead and most recently, project leader for the Honda Odyssey and Acura MDX. During her time with Honda, she founded the first global Business Resource Group - the Women in Engineering Network – to support, develop, and highlight the work of its members. She participated in a number of leadership programs and is featured in the ”Who Makes a Honda” series.

Kristina holds a BS in Mechanical Engineering from The University of Iowa and an MBA from The Ohio State University. In her spare time, she enjoys spending time with her family (game nights, cheering for her kids’ sports teams, and puzzling), traveling, and volunteering.

Landon Todd Smith, University of Georgia

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Introduction

Building on prior work, this collaborative autoethnography examines the mentoring within partnered RIEF projects, now in their second year. For established engineering practitioners or engineering researchers, entering the field of engineering education research (EER) often requires a substantial shift in perspective while oftentimes feeling like novices as they navigate the challenges of engaging in a new research paradigm and subject area. The NSF Research Initiation in Engineering Formation (RIEF) program is designed to grow the research capacity of the EER community and support research into the professional formation of engineers, providing two years' support for engineering faculty to conduct engineering education research projects under the mentorship of an expert EER or social sciences mentor. Although NSF has invested over $23 million in Research Initiation Grants in the Engineering Education program and its successor, the PFE: RIEF program since 2011, few studies have explored the nature and outcomes of RIEF mentoring structures and relationships to date [1], [2], [3], [4].

In this study, we extend prior work by contributing knowledge surrounding an unconventional RIEF mentoring structure that includes two RIEF principal investigators (PIs; faculty mentees), their EER faculty mentor, a first-year EER graduate student, and a postdoctoral EER scholar. It is worth noting that although the RIEF faculty mentees' research projects focus on different topics related to the professional formation of engineers, there are intentional commonalities in the qualitative methods and analysis techniques used in the research. This provides a common structure for cross-disciplinary learning and support. This team mentoring model not only facilitates deeper discussions around qualitative methods, but it also offers valuable opportunities for team members to further develop mentoring skills while enhancing their capacity to conduct high quality EER studies. Within the partnered RIEF mentoring team, the postdoctoral scholar and EER graduate student occupy unique dual mentor-mentee roles: though they bring more expertise in qualitative EER methods than the faculty mentees, they continue to develop their skills under the guidance of the faculty mentor, contributing both as learners and as sources of expertise. This work builds upon the EER faculty mentor's prior autoethnographic work with former RIEF mentees [2], [5] yet is distinctive in that each RIEF faculty mentee still leads their individual project while participating in the collaborative mentoring team.

Theoretical Framing

The mentoring team's structure is grounded in two mentoring models: Dennen & Burner's (2008) cognitive apprenticeship model and Eby and colleagues' (2013) process-oriented mentoring model.

In Dennen & Burner's (2008) cognitive apprenticeship framework, learners initially acquire skills and knowledge through observation ("legitimate peripheral participation"). Over time, they progress to engaging in authentic tasks, with their participation intentionally structured, supported, and guided ("scaffolded") by expert mentors and a community of practice.

As a complementary lens for understanding the mentoring experience in the partnered RIEF projects, Eby and colleagues' (2013) process-oriented model of mentoring emphasizes three key elements: instrumental support (support that helps mentees achieve professional goals), psychosocial support (e.g., encouragement of the mentee), and overall relationship quality. This model also considers factors such as the duration of the mentoring relationship, the frequency of interactions, and the extent of the social capital of both the mentors and mentees – that is, the influence and resources they can access through their respective networks).

Methods

Our research team is using collaborative autoethnographic methods in this ongoing partnered research study to examine how the interactions within our diverse mentoring group support each other's professional growth as EER scholars. Collaborative autoethnography is a qualitative research method that is described as "a study of self [that is] conducted in the company of others" [6, p. 17]. It involves multiple individuals collectively documenting and reflecting upon their perceptions of a shared cultural or learning experience. Here, we are a research team of five academic researchers and practitioners that span multiple career stages and degrees of expertise in EER that began collectively reflecting on our team's mentoring interactions within the context of the two partnered RIEF projects that began in August 2024.

We chose a collaborative approach to this study so that we could reflect on our evolving identities as EER scholars and mentors. During the academic semesters, our team meets weekly as a full group with all five members, followed by two individual meetings dedicated to each faculty mentee's specific RIEF project, where only four of the five mentoring team members are present. Meetings are continued during the summer semester, although at a less frequent rate. Each month, team members individually complete a written reflection to structured questions that were co-created by the team at the start of the project. The questions prompt reflections on the progress of the RIEF projects and perceptions of what is or is not working well within either the projects or the mentoring team itself. Examples can be found in [7]. With each other's permission, we share these written monthly reflections with one another and discuss them as a group at the following week's group meeting. During these group reflections, we identified common themes in the written individual reflections and identify ways in which the group could improve its cohesion and communication moving forward.

To completement the written and group reflections, each team member is periodically interviewed by an external interview to reflect on their experiences in greater depth. We

intentionally chose to include this complementary method of reflecting, as some team members are more comfortable reflecting on their experiences verbally. The same external interviewer has been used each time (October 2024, May 2025) and is trained in conducting qualitative interviews. These interviews were then professionally transcribed and later verified for accuracy by the postdoctoral researcher. We anticipate a third iteration of interviews taking place in May 2026 to help probe team members' perceptions of the partner RIEF projects and mentoring team over the projects' two-year duration.

The research team periodically (every 9-12 months) meets specifically to analyze all of the collaborative autoethnographic data collected to date to identify 1) a timeline of critical incidents in the team's mentoring relationship, 2) key mentoring practices and strategies that the mentees plan to transfer to other professional contexts, and 3) any areas of improvement for the team to enhance its cohesion and communication.

Preliminary Findings

Through the group's monthly discussions about the written reflections and periodic interviews, the mentees have identified several key takeaways and practices from their engagement in this partnered RIEF experience:

1) **Transition from self-reliance to collective trust mindset.** Team members reported a significant shift from a "self-reliant" mindset to one rooted in team trust, learning to step back and allow the rest of the team to support operational or knowledge gaps. They note that this shift was directly caused through the unique mentoring structure of these partner RIEF projects.

   > *"The RIEF project is unique because while I am the PI of the project, I am not always the one who understands best what the next steps of the project are… Thus, unlike a typical research project where I have students who report to me and who nominally work on the project at my direction, in this project there is just working with a talented team that shares a common objective. The net result is that I have had to learn how to… trust that the team is more than capable of filling in the gaps that I am either unaware of or unable to fill."*

   This partnered RIEF experience has led one faculty mentee to more critically evaluate where his direct leadership as school chair is *required* versus where he can step back and empower other faculty members to lead.

2) **Cultivating inclusive team environments by reinforcing equitable participation and making sure all voices are heard.** All mentees took note of how the EER faculty mentor consistently and intentionally ensured all voices were heard by deferring questions to others in the room before weighing in on an issue. Mentees felt this deliberately created a space for them to respond without undue pressure, enhancing the inclusiveness of discussions. This approach particularly helped non-faculty team members (the graduate

student and postdoctoral researcher) feel explicitly invited into the discussion, further reducing perceived hierarchical barriers and encouraged them to contribute their perspectives with greater confidence. One faculty mentee has committed to incorporating a similar approach to their weekly teaching team meetings with undergraduate teaching assistants.

3) **Learning to intentionally integrate individualized mentorship into everyday interactions through adaptive engagement.** Beyond ensuring that all voices are heard, mentees noted that they are developing concrete strategies for seamlessly integrating mentorship into routine conversations with diverse audiences by observing how the EER faculty mentor adaptively engages during team discussions. One mentee shared that he initially believed mentoring a diverse team – particularly one spanning multiple career stages and professional development needs – would require separate, dedicated mentoring sessions to be effective. However, after observing how the EER faculty mentor tailored their engagement to each individual within shared discussions, he expressed increased confidence in applying this approach at scale. He now sees opportunities to "fold mentoring into the conversation" in broader contexts, such as faculty meetings, to support junior colleagues without derailing the primary agenda.

4) **Explicitly addressing key facets of collaboration upfront to strengthen team functioning.** Mentees emphasized the value of intentionally discussing core facets of collaboration early in the project process, including shared goals, roles, and expectations as they related to publications. The StrengthsFinder assessment was described as an "ah-ha" moment for two of the mentees, providing a shared framework for understanding individual priorities and communication styles, while recognizing that these attributes would be fluid over time. One faculty mentee has since embedded the StrengthsFinder assessment into her senior capstone course to help students anticipate team dynamics and self-select into roles and responsibilities within their industry design projects that align with their strengths.

5) **Promoting sustainable scholarly practices through intentional workload management and wellbeing strategies.** Team members reflected on how mentorship practices could actively support personal wellbeing without sacrificing scholarly progress. For example, during chaotic times of the semesters, extended project meetings were flexibly restructured into dedicated co-working sessions to ease productivity pressure between meetings. Alongside moving away from hyperproductivity norms, non-faculty mentees reflected on how intentionally sequencing their work to navigate competing academic responsibilities supported their wellbeing. The graduate student demonstrated this by frontloading time-intensive qualitative analysis to preserve focused time later in the semester to complete his comprehensive exams.

6) **Recognizing the mutual benefits to engaging graduate students as co-researchers in RIEF projects.** Aside from receiving financial support, the graduate student highlighted how his scaffolded involvement in these partner RIEF projects helped him discover the "hidden curriculum" embedded throughout the research process (e.g., policies and procedures regarding research incentives, Institutional Review Board approval processes, etc.). He cites this as a significant benefit of participating as a co-researcher, as he can apply this knowledge to smooth the pathway for conducting his own doctoral research.

Looking Forward

Through this collaborative autoethnography, the partnered RIEF projects have enabled us to explore how a diverse mentoring team can enrich research collaborations and research capacity building efforts in EER. The findings have wider implications for engineering faculty development and mentoring strategies, such as identifying practices that support both scholarly progress and wellbeing, sharing concrete strategies to improve team collaboration, and encouraging PIs to engage students as co-researchers in their projects. The research team is soon approaching its second periodic analysis meeting (April 2026), where they will meet to analyze the collaborative autoethnographic data collected during the projects' two-year duration. The outcomes of this analysis – including research team testimonials – will be shared during the NSF grantees poster session.

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