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Constructing biology education research identities: a duoethnography

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An emerging theme that has gained traction across science, technology, engineering, and mathematics (STEM) classrooms in recent decades is acknowledging *who* is responsible for the discoveries and content that we teach. Centering the human aspect of who the researchers are and how their identities intersect with perspectives in research impacts the lens through which the work is done but also shapes the community of practice in our classrooms and the evolving ecosystem of research communities that contribute to STEM education. In particular, discipline-based education research (DBER) is an emerging interdisciplinary field aimed at understanding and improving discipline-specific learning and teaching. Entering and establishing oneself in a new research field can be a daunting process. For many DBER scholars who began their careers in another discipline, their career trajectories have necessitated this challenge. Here, we focus on our experiences in Biology Education Research (BER). We use duoethnography to explore our overlapping trajectories into and engagements with BER, allowing for the juxtaposition of our experiences to give meanings to and build new understandings of our pathways in BER, which include entry points, reasons for persistence, and identity navigation. Through collaborative reflections, we formulated novel insights that we experienced BER as a community of practice that values the participation of emerging scholars and arrived at a transformed understanding that our educator identities were important driving factors for our continuing pursuit of BER. Results from this duoethnography not only provide insights into how BER faculty may navigate multiple professional identities but can also shed light on potential opportunities and challenges for research and practice partnerships connecting science and education faculty where such identities reside not in single individuals but with multiple persons in a cross-disciplinary collaboration. We see parallels between this work considering faculty identity and pathways into BER with work considering student identity and pathways into STEM, and we hope that these results also highlight the value of utilizing qualitative methodologies that may be novel to both the BER and more broadly, DBER, communities as a tool for centering the human experience that can spark future work and applications within STEM education.

KEYWORDS

biology education research, duoethnography, faculty, identity, professional development

Introduction

A common professional concern amongst many faculty members, at any career stage, is the ability to sustain a vibrant research program while balancing teaching and service commitments (Wolverton, 1998; Clegg, 2008; Billot, 2010; Skelton, 2012; van Lankveld et al., 2017). For Rou-Jia, a pre-tenure assistant professor, the question that had been on her mind since she began her faculty appointment was how to sustain not one but potentially two research programs: one in protein biochemistry and one in discipline-based education research (DBER). Having completed her PhD in Biochemistry in a Chemistry and Chemical Biology department lab as a graduate student affiliated with the Molecular Cell Biology graduate program, Rou-Jia was no stranger to navigating multiple disciplines as part of her career. In moving towards DBER, however, she discovered unexpected opportunities and challenges.

Conferences can be sites of productive and supportive conversations for research and professional development. In her career trajectory, the majority of Rou-Jia's teaching responsibilities (Introductory Biology, Advanced Cell Biology, and Biochemistry) sparked interest in Biology Education Research (BER). At the Society for the Advancement of Biology Education Research (SABER) conference in 2019, Rou-Jia's internal question came up in a conversation with Emily. What started as a "how have you been doing?" friendly catch-up became an engrossing discussion that lasted through dinner on how other people balanced two research programs, how career trajectories like that even came to be, and what could be done to support graduate and postdoctoral scholars on track to apply for faculty positions where BER can sometimes be seen as accessory to biology research. We realized that although our common experiences with BER prompted our curiosity about the same set of questions, it was also our differences in career trajectories that informed the context with which we approached these questions.

Both Emily and Rou-Jia began their careers in a biology research field, found their way into BER after graduate school, and currently maintain research programs in both BER and their first biology research fields. In discussing how we both landed where we were, it led us to wonder—how did others find themselves on similar career trajectories? Both of us were (and still are) in tenure-track faculty positions at academic institutions, which led us to wonder how other people do BER work within their current job descriptions? Why would someone continue doing double the work when it was not required for tenure or promotion? Here, our differences in faculty rank and institution meant we considered these questions from very different perspectives. Rou-Jia's pre-tenure status meant that she thought about these questions at a highly practical and personal level, whereas Emily thought deeply about these questions in the context of her post-tenure role as a mentor to graduate and postdoctoral scholars. Together, we pondered questions such as how one should think about two parallel research programs in preparing a tenure prospectus and how one might support individuals for a career in BER while sustaining a parallel biology research program.

The new insights we found in our conversation led us to wonder if our experiences and descriptions of our own pathways into BER could be informative to other colleagues in the community. To get some feedback, Rou-Jia shared this idea with Stanley, a longtime friend and BER collaborator and mentor to Rou-Jia and colleague of Emily's via different BER conferences. The process of Rou-Jia recapping her conversations with Emily resulted in a further stimulating dialogue with Stanley on his view of these questions through the lens of his own experiences, as someone who also began their career in another biology research field but then transitioned into a tenured position doing primarily education research. The richness of these conversations around pathways into BER prompted us to explore these questions further using duoethnography as a methodology to collect and interrogate our narratives. The focus of this exploration was to build new understandings of our disparate pathways in BER, which include entry points, reasons for persistence, and identity development. Specifically, we examined the following guiding questions:

1) What were our pathways into BER?
2) What driving factors facilitate our continued participation in BER?
3) How did we develop our professional identities within BER?

Materials and methods

Duoethnography as methodology

Ethnography is the systematic and empirical study of people and phenomena (Case and Light, 2011). Duoethnography is a specific ethnographic approach that "stud[ies] how two or more individuals give similar and different meanings to a common phenomenon" and "critically juxtapos[es] the experiences of two or more disparate individuals who experience a similar phenomenon" (Norris, 2008). This methodology is often used to interrogate autobiographical experiences to gain insight into issues related to professional identities (Breault, 2016). A distinguishing feature of a duoethnography is that the participants act as both the researchers and the site of research (Sawyer and Norris, 2013). Thus, the trajectory of a duoethnography moves beyond identifying and affirming parallels or themes to a shared experience; instead, duoethnographers use dialogue and interacting narratives as a methodology to challenge each other's perspectives and bring a critical lens towards deepening and transforming their understanding of the topic and themselves (Breault, 2016).

Several features of our initial conversations led us towards this methodology. As indicated earlier, it was the quality of our dialogues with each other – the push and pull of simultaneously sharing and questioning one another's experiences – that formed the basis for this study. Even though all three of us engage in BER, we found that the differences in our professional identities provided ample opportunities to question our own personal narratives. These differences in our professional trajectories and spaces were essential for fostering a dynamic dialogue on our experiences – namely, we were able to look backward to reflect on experience, sideways to take in new perspectives, and forward towards a transformed understanding rather than stagnating in a shared metanarrative. This disruption of metanarratives is made possible by the polyvocal and dialogic features of duoethnography, in which the voices of each researcher are made explicit throughout the narrative as participants share and discuss crucial differences in their shared experiences (Norris and Sawyer, 2012). We found duoethnography to be an ideal methodology to

engage in dialogues, as our differences created the critical tension as described in Norris and Sawyer (2012) necessary to lead us to a deeper and transformed understanding of ourselves as BER scholars. Although initially we began with a list of questions to answer, our goal in this duoethnography was to uncover the significance of moments in our career trajectories that led us to our current selves through this transformed understanding made possible by the approach.

Duoethnography has a number of tenets that are especially suitable for not only exploration of our journeys but also as a methodology uniquely suited to interrogating our experiences with the BER community. First, duoethnography embraces the concept of currere (Norris, 2008), the autobiographical reflection on lived experiences that shapes an individual's awareness and understanding (Pinar, 1994). As such, a duoethnography documents the authors' learning process instead of presenting broadly generalizable descriptions (Sawyer and Norris, 2009), and we invite the reader to learn alongside us by comparing our experiences with their own. Second, the goal of duoethnographic inquiries are not predefined, and the discussions are emergent rather than prescriptive (Sawyer and Norris, 2013). We share our experiences not as a commentary for how others should behave but as examples of our own learning process (McClellan and Sader, 2012) while discussing our pathways into BER. Third, duoethnography compares and contrasts experiences from two or more individuals to describe critical variations of how they experience the same phenomenon (Sawyer and Norris, 2013). The emphasis on variations of a common experience helps examine how the three of us engage in BER, with a focus on understanding possible professional pathways into BER rather than to draw conclusions about ourselves. However, we do not present our experiences as typical or universal. We simply open up our learning process to the reader and invite them to join us on our journey.

Research site and positionality

Emily earned her Ph.D. in Community Ecology in 2007 and had been tenured as an Associate Professor in the School of Biological Sciences at a public doctoral and professional university for about two years at the beginning of this study. Rou-Jia earned her Ph.D. in Biochemistry in 2011 and was pre-tenure as an Assistant Professor in Biology at a private baccalaureate college at the beginning of this study. Stanley earned his Ph.D. in 2009 in Biochemistry and had just recently been awarded tenure as an Associate Teaching Professor in Cell and Developmental Biology at a public doctoral university with very high research activity at the beginning of this study.

Data collection and analysis

First, it was necessary to develop our methods together and co-formulate our overall approach. We read and discussed chapters from the edited volume by Sawyer and Norris (2009) and published duoethnographies such as Eaton and Bailey (2018) and Hernandez et al. (2015). This literature provided concrete examples of the duoethnographic tenets described earlier and also showed us variations in styles and approaches to data collection and analysis that were useful as we developed our approach. We also emphasize that our approach simply represents one of many in this methodology. In particular, the book on duoethnography as a methodology (Sawyer and Norris, 2013) helped us formulate our initial approach to collecting and analyzing data.

We considered practical issues during a pandemic and in the academic year, where opportunities to meet in person were significantly limited. We were also physically located across three different time zones. Therefore, we established a regular meeting for 1 h each week by video conference. The regularity of our meetings was critical for maintaining momentum on the project; however, this limited time together meant that we needed to think carefully about how to use our time effectively both as a group and as individuals.

Duoethnography as a methodology is inherently flexible (Norris, 2008), and the way we managed, recorded, and shared our experiences was not necessarily a fixed procedure. Our initial interactions were guided by written prompts and reflections, and over time, our discussions naturally continued on ideas that had been noted previously. Due to the practical considerations noted earlier, we used a video conference platform (Zoom in this case) to capture and record live, synchronous dialogues. Transcripts from these sessions were generated using the auto-transcription function in Zoom followed by manual correction. We also maintained a single "Meeting Summary" shared document on Google Drive, where we synchronously recorded notes during each session. In other shared documents, we posted asynchronous responses to our discussion prompts. Reflections were first written individually, followed by a period of asynchronous commenting and more reflections. These written responses provided additional fodder to discuss during our synchronous sessions. We met regularly for over 2 years, with the bulk of data collection occurring in the first year followed by a period of data analysis and drafting manuscripts summarizing our findings. Altogether, our meeting recordings and notes, transcripts, and written reflections represent the artifacts, or data, of our duoethnography.

The room for adaptation and adjustment in duoethnography as a methodology allowed us to follow the experiences and stories arising naturally from our conversations, rather than constricting us to the original set of guiding questions. Our analysis began with reviewing the data to identify repeated topics as preliminary commonalities; this was followed by additional discussion and interrogation to identify key dialogues and statements. Variations in our shared experiences also arose in these discussions, as well as connections between our experiences to the literature on professional identity and communities of practice. Guided by these emergent discoveries, we grouped and re-grouped segments of transcripts to co-construct our conversations about our experiences in BER. The product of this research takes the form of dialogic storytelling, in which co-constructed narratives are woven together into a coherent dialogue. Prior to submission, we conducted member checking by sharing the manuscript with individuals who were named in our dialogues to solicit feedback and check narrative accuracy.

Results and discussion

As noted in the Methods, we have chosen to present the results of our duoethnography in the form of extended pieces of dialogue interspersed with brief periods of analysis outside of that dialogue. The length of these dialogues is intentional, allowing us to highlight the value of a duoethnographic approach in disrupting our preexisting

narratives about our own experiences and creating spaces for transformed understanding. Our approach required iterative reading and re-reading of our initial transcripts to arrive at the co-constructed narratives presented below, and we invite the reader to also engage in an iterative reading and re-reading of our narratives as an opportunity to begin engaging with this process.

Our pathways into BER

We began our duoethnographic explorations by discussing memorable moments related to our BER experiences. Beginning with Rou-Jia's recollection of her participation in an education-related conference for the first time, our interacting narratives led to a series of revelations about our respective experiences with other biology research fields compared to those with the BER community.

> Rou-Jia: I remember the first education-related conference I went to, people were being very open, sharing their ideas, and being so collaborative. I remember thinking, is this what science is supposed to be like? Grad school for me never felt quite like that. The sense of community has been something that's really nice because everyone is so supportive and encouraging.
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> Emily: I'm curious as to why this was a different sense of community than you felt in other settings? Did you go to other scientific conferences and not have a sense of community? Was it really the communities themselves that are different, or is it your perspective?
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> Rou-Jia: When I started graduate school, I think there was a difference between asking questions to foster development of research versus criticism for the sake of criticism. Even though they meant well, the way it came out was more aggressive rather than just questioning. I think that is very dependent on the field; I've heard the worm field is very different. My fields in grad school were protein biochemistry and structural biology. And it wasn't that we were in direct competition with other people, but there wasn't a sense of, ah, this is my community. Even now going to conferences that are more related to the benchwork, while I feel more comfortable asking people questions, it still feels more closed.
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> Stanley: I would agree with that. I don't know if it's the nature of the field or the nature of the people who happened to be in the field. In grad school I remember talking to another student who had just come back from a conference with her poster. We were talking about, why don't you put your poster up, there's a big board outside. She said, oh this is not the real poster; this is the decoy poster we brought to the conference to trick our competitors, so it wasn't even her actual work. And similar stories just keep coming. When I go to education conferences, you get critical feedback that could still be aggressive but not in that competitive way that I used to see in biology. Instead, it's thoughtful and supportive in a mentor-ish kind of way. I hadn't appreciated and hadn't thought about this contrast of fields and their communities until you had said about the sort of openness and collaborative nature of the field. Maybe the aggressiveness is a biochemist thing?
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> Emily: Well I can speak from the ecologists' standpoint. I think in the field of ecology, there's less aggression to be the one on top, and more disinterest because you don't have that common goal. Arctic fish ecologists are interested in Arctic fish, not tropical lichens, and there is less interest if it doesn't apply to your system or to your organism. Whereas I think within BER, there's more of this common purpose: Many of us teach intro biology, or we taught it at one point, and we have that common experience to bring us together or that much of that research affects all our students.
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> Rou-Jia: It's interesting. I've dabbled in many different things – biochemistry, fly behavior, cell biology, molecular biology – and this sense of, this isn't my community, has continued. And I've just associated that with bench research in general. But it's been interesting starting to work with worms though, because I've heard positive things about the *C. elegans* community, that they're very collaborative about sharing resources and experience, and this seems to be part of the culture of their community. The adjectives I've heard used to describe that community seem more similar to how I felt when I dipped my toe in the DBER community. If that's the case, I wonder what my research experience could have been had I experienced that community from the outset!

We found that we each entered the dialogues with some prior understanding and previously internalized meaning to our narratives about how BER differed from the other biology fields of our original training. Rou-Jia had a strong view that her experience with the BER community shared qualities with her notion of what a scientific community should be like, whereas her experiences with her graduate school and bench research communities did not. In hearing this, Stanley realized that he also shared similar experiences but never noted this contrast until this duoethnographic process. Our dialogues allowed us to engage with one another in a trusted space that introduced this sideways view to question the perceived meaning underlying each other's narratives as part of this process.

Had it just been Rou-Jia and Stanley, the conversation might have continued to reinforce these elements of their shared, seemingly parallel experiences; however, at this point in the conversation, Emily shared her experiences with ecology and BER communities. These contrasting experiences simultaneously supported the notion that the BER community did feel different from Emily's field research community but not for the same reasons that Rou-Jia and Stanley had articulated. Similar to the realization Stanley had, hearing Emily's perspective led Rou-Jia to name and question the implicit assumption behind her narrative – that all bench research communities shared a competitive and aggressive persona that made them unwelcoming – and instead to consider what her perspective would have been like had she engaged with a field that did have the community she had found in BER.

The contrasts that emerged in our dialogues were critical in fostering additional reflection on the preexisting assumptions that grounded our internal narratives. This reflection led us to reevaluate the lens through which we viewed our individual experiences. Stanley reconsidered what originally felt like a collection of stories to what subsequently identified as a pattern of shared experiences about how one field felt competitive and another collaborative. Rou-Jia

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reconsidered that her experience was not a bench research vs. BER dichotomy, rather a difference in how welcoming each field felt that may have contributed to her entry into BER. We viewed this shift and recontextualization of our prior understanding through our dialogues as one example of the transformed understanding that could result from a duoethnography.

Much of our dialogues centered around the notion that our experiences with the BER community provided positive interactions that felt missing in our other research communities. This realization led us to wonder, what were the features of our interactions with the BER community that created such contrasts? Could identifying the features that were important to us yield potentially insights into how we found our pathways into BER?

> Emily: Thinking about the first memorable moments that kind of sculpted me into the person that I am and what I'm doing, one of mine was being part of the FIRST IV program [Faculty Institutes for Reforming Science Teaching, fourth iteration]. While I was in the program, I pitched the idea for a potential research study on student plagiarism to one of the program's mentors, and they were less supportive than I had hoped. But I was like, I think this is a good idea! And because I connected with another one of the mentors, I reached out to her and said, "Hey, would you let me pitch this idea and see what you think." I vividly remember they were so supportive, and I was like "Yeah I think this can totally work!" That one conversation was what gave me the confidence to dip my toe into a research realm in which I had no training and would entirely teach myself.
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> Rou-Jia: I was a participant in a Summer Institute on Scientific Teaching [now the National Institute on Scientific Teaching] in 2015, just before I started as a visiting assistant professor. I remember one of the session leaders said, "What if we treat our teaching the same way we treat our scientific research?" You come up with a hypothesis, collect data on it, and then use it to refine your teaching. That was kind of mind blowing to me, and that always stuck out in my mind. I feel particularly fortunate that I was able to attend that Summer Institute right before I began teaching full time, because it helped reinforce the urge to collect data points in my teaching, and not just rely on "oh that felt okay".
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> Stanley: For me, it's not a single moment, but it's like a cumulative moment of long-term interactions with multiple people doing really interesting and sophisticated qualitative work that got me to rethink the value of that approach and what kind of insights we can gain from it. One of my many moments was when my mentor and I sat down at a coffee shop for hours on a Sunday afternoon, right before I left for my first [American Educational Research Association] meeting, to go over our interview data, because I hadn't figured out how to analyze it and present it. Watching him make distinctions and how he was looking at the data really helped me see how to do qualitative research in a deeper way.
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> Emily: Reflecting on each of our moments makes me appreciate that it really is about the people and those interactions that determined our fates in this field. Anecdotally, we harken back to childhood experiences or that "love for nature" in determining our fate as biologists, but undeniably, it is the people as mentors that lures us in and retains us.
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> Rou-Jia: Stanley was one of my first mentors in this field – I called him my gateway drug into BER, introducing me to qualitative research, always being willing to bounce ideas off of, and connecting me to people in his network that have proven instrumental in setting up current projects. In addition to the strong impact of mentoring, what struck me was the importance of having a safe space to pitch your ideas and receive feedback, and in some cases, pitch again! It's interesting to me because I feel like it parallels student comments about what makes them stay or leave STEM fields, this idea of feeling like their ideas are respected or valued and having a constructive environment to struggle in.

Here, at first glance, it appeared that our narratives were parallel and reinforced our shared experience that mentorship by others was critical to our pathways into BER. However, the development of these narratives occurred as a function of our duoethnographic process. Although we each considered individual moments that had impacted us, it was only through the process of collaborative reflection, as Emily notes, that we collectively realized the impact of these mentoring moments on our personal journeys. Engaging in this duoethnography transformed three individual narratives about mentors into a newfound appreciation of how professional validation, in varied forms, helped pave our way into BER.

Moreover, it was the contrasts rather than the similarities in our experiences that provided the crucial new insight: The important touchpoints were the formative aspects of our interactions with senior colleagues who were willing to provide feedback and or guidance. Most importantly, we noted that these meaningful interactions were not limited to established mentor-mentee relationships; in fact, as evidenced by Emily and Rou-Jia's experiences, these interactions still retained significant meaning even as transient conversations that occurred in the absence of established relationships. This feature of our experiences identified from the duoethnography highlighted the value of informal conversation and contexts in which we could easily and casually interact with colleagues of the community, similar to how Thomson and Trigwell (2018) found that informal conversations provide a space for reassurance and transformation of ideas in faculty professional development.

In addition to validation or recognition by mentors, other facets of our individual experiences prompted us to explore BER further. Borrowing from the literature on student identity in science, technology, engineering, and mathematics (STEM), interest is important in formulating identity. Hazari et al. (2010) emphasized interest as a component of identity, expanding the earlier three-component model by Carlone and Johnson (2007), which included competence, performance, and recognition. Interest reflects an individual's personal desire and curiosity to engage with a community and tasks associated within the community. Below, we share an extended dialogue that highlighted different moments that prompted us to explore our interests in BER, including notable conversations with colleagues that led to shifts in our perceptions, unexpected sources of intellectual stimulation, or support of our ideas.

> Rou-Jia: It's interesting, the first moment that Emily was talking about, with that feeling about an idea where it's like "This is a good

idea, and I want to do it!" It also reminded me of just how I felt with this [National Science Foundation] grant on the augmented reality project that ended up getting funded. I remember feeling like, I think this could be a cool idea, and I believe in it enough that I wanted to write the grant, and talk to people, and try to make it actually happen. I just remember being struck by that, that you have an idea, and then to be supported in it, and actually be able to see it become a thing, is very powerful. I started publicly identifying myself as doing some BER work after I got the NSF grant.

Emily: Now that you kind of mentioned that, I had a very similar experience during my Ph.D., where I had a little hair of an idea. I asked my advisor about it, who I respect beyond belief. And he was like, "No, it's not a good idea." But I thought it was a good idea, and so I just did it. So in a way, my advisor was kind of similar to one of my BER mentors, someone who is very respected in the field, and I respect and see them both as strong mentors, but I was willing at that point to make the leap to say, "No, I think this is worthwhile to pursue, despite their hesitation."

Stanley: Something is emerging here, like having an idea and then somehow knowing it's a good idea to pursue. I had the recent graph theory paper that we published in [CBE-Life Sciences Education]. When I first had the idea, I was never able to convince my colleagues that it would be useful work to pursue. There was an engineering colleague who thought the mathematics was neat and would occasionally ask me about it, and then I just kept working on the project.

Rou-Jia: I am thinking about who provides recognition to us. We've referenced senior mentor type people, but we also talked about just the amorphous community, either like a conference or an entity like a journal or a grant. It seemed like there was a transition from recognition that was supportive of "oh we're trying this" to recognition that "hey, where we could be a contributing member to this field" with our ideas.

Emily: I remember when my mentor asked me to serve as a guest editor for an [CBE-Life Sciences Education] special issue, that feeling like a big honor, and I think the recognition associated with such an invitation helped me firm up my identity as a BER scholar. At that time, I only had one publication in BER but a decade of publication experience in lichen ecology research. I gained a lot from my fellow editors; they made me feel part of a community and that my ideas mattered. It meant a lot to me that my insights could be helpful to the team.

Stanley: Thinking about the recognition bit, there were a couple moments where I felt like, well, now I am a real person, like a real researcher. Like getting my first issue of the American Educational Research Journal in the mail – I even posted it on social media! Or being selected for a long talk at SABER. Another colleague and I were the two selected long talks. That colleague was already an established person in the field. I was a new person, and we gave these back-to-back long talks right at this keynote slot. It was such an honor!

Emily: One of my moments was me attending that talk! I remember being so washed over by your talk that I had no idea what I just hit me. That was my first SABER meeting, and I had never heard qualitative stuff before my entire life. And that was a really big eye opener for me.

Stanley: I'm so honored to be part of your moments!

Rou-Jia: What does it mean for these interactions to be meaningful? It's not like these interactions occurred in isolation; it would be like you have a meaningful interaction, and then you'd be asked to do something. Not only did we have people saying something that made us think about something differently, but there's an opportunity to follow up on that.

Emily: Do you think that us having these interactions and being given the opportunities that followed just so happened to be in BER? Could it have also happened in some other field, and we're collectively brought together here just because all those meaningful opportunities just happened to coalesce around one common field? I was reflecting on some of our earlier conversations, and I tried to pull out some of these words we used, you know, saying our bench fields were aggressive or antagonizing or competitive. Whereas, when we're talking about BER, we're saying it's welcoming and encouraging and collaborative. And my biggest question is: Is it the communities themselves that were different, or is it our perspective and where we are in our development?

Rou-Jia: Like how much of this was this field, and how much was chance? I'm not sure. But I don't think we are trying to make a judgement on communities as a whole, but that there are features of them that led them to feel a certain way for us in our own circumstances and contexts.

Stanley: I feel like that may be a difference. Maybe the [relatively young] age of the BER field plays into it because everyone is sort of a novice. But I could imagine that maybe in other emerging interdisciplinary fields, people could still have that kind of competitive model that you're describing. It could have happened in our field as well, but the result is that it didn't happen in this particular field. I don't think we're going to solve the question of whether this is true for other fields.

Rou-Jia: I don't know how easily these opportunities come to novices in other fields. It feels like they do exist, but you have to be more established in order to be asked to be a guest editor, or to collaborate on new projects. I don't know! It's a really good question.

Emily: Well that is kind of interesting though, because the three opportunities I had written down for each of us was being asked to be an editor, being asked to give a plenary talk, and then I put down for you Rou-Jia, securing your [National Science Foundation] grant. And I would argue that all three of us thought that we were novices when we were asked to do these things.

Stanley: Yes. I think that's an important point, that we felt like we had those opportunities as novices. I feel like as novices, we had the opportunities to do the same kinds of things that established experts in the field typically get to do, and that is

> actually a core definition of a community of practice. Novices and experts all participate in the same activities, even though the novices may be doing it at a different level of sophistication, but they are part of that practice because they do all the same things everybody does. It's called legitimate peripheral participation, because you are doing legitimate things even if it is peripheral.
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> Rou-Jia: Like being a novice isn't necessarily a bad thing. You can still have something to offer as a novice, even if you're just learning how to do it. Even though we felt like we were novices, we were still asked to do these things, and that was empowering and impactful to us.
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> Emily: I have this memory in my head of my first meeting with the other editors for the [CBE-Life Sciences Education] special issue and talking about what this was going to look like. I remember feeling like I was made part of this community, even though I was still a novice, and that really made a really big impact on me. I was never really asked to do all these important things as an ecologist, but I was asked to do a lot of things as an education person. I was asked to be a leader on things related to education and education research, which inevitably has shaped my own perceptions of my own capacities.

Here, we again saw how our shared narratives could lead to the emergence of a new understanding of the themes that connected our patchwork memories. Each of us had moments in which we had an opportunity to engage with or in the role of an 'expert' in the field—Rou-Jia mentions funding for her NSF grant, Emily the opportunity to be a guest editor, and Stanley mentions being asked to give a long talk at a national meeting. Although none of our moments were the same, it was through this lengthy back-and-forth dialogue that we found the common thread, i.e., how those moments shaped our feelings of ourselves and how we engaged with the BER community. Moreover, we realized that the significance of these interactions with the community went far beyond the sense that BER was simply more supportive and cohesive than our other biology research communities—namely, one key outcome of these experiences was that we each felt a sense of being recognized as Stanley puts it, a "real researcher." According to Gee (2014), it is through language, action, valuation, and interaction that one is recognized and thus becomes an authentic member of a community. In fact, our experiences described in the duoethnography revealed that the BER community had for us been a true community of practice.

As we discovered in our discussions with one another, our initially peripheral engagement with the BER community, largely through individualized interactions with senior community members, allowed us to begin exploring our interest, provided opportunities for performance and establishment of competency, and facilitated recognition that fed back into those dimensions through legitimate peripheral participation. Lave and Wenger (1991) and Wenger (1998) introduced the idea of community of practice, with community and practice as the two underlying features. Biza et al. (2014) further defined a community of practice as "a group of people identifiable by who they are in terms of how they relate to each other, their common activities and ways of thinking, and their beliefs and values" (p. 162) that are established socially, historically, and culturally. In the community of practice framework, learning is understood as the "process of becoming a full participant" (Lave and Wenger, 1991, p. 29), and identity can be thought of as the shared practices in the community (Farnsworth et al., 2016). Altogether, the impressions that emerged from the duoethnography supported our experiences with BER as a community of practice that not only welcomed us as novices but also provided opportunities and a supportive environment to perform authentic tasks within the community despite our novice status.

In addition to facilitating our entry into BER, how did these experiences impact our own professional identities? As Emily noted at the end of the previous dialogue, these experiences had inevitably shaped her own views of her own capabilities. Wenger (1998) argued that mutual engagement is key to formalizing identity, by belonging to a community, imagining personal trajectories towards becoming experts, and aligning with norms and expectations of the community. Even though we self-identified as novices in our interactions with the BER community, we were still coming in with skills and experiences drawn from our previous identities within our other biology research communities. These previous competencies can represent transferable skills to a new field of research, distinguishing these "crossover BER scholars" (Lo et al., 2019) from true novices (Mayotte, 2003). However, there are still new skills specific to a second career or research area that require both learning and integration with these previous experiences. Williams (2010) coined the term "expert novices" to describe this tension between the prior expert identity from the first career and the novice aspects of the new identities in the second career. Similarly, we recognized that our experiences were perhaps examples of one type of BER scholars, i.e., individuals who encountered BER as a second research community after having already developed an expert identity in a prior research community. Therefore, our experiences were likely distinct from those of, for example, undergraduate and graduate students or even postdoctoral scholars who are encountering BER as their first research community, highlighting the need to include a broader range of narratives in the consideration of what the BER community has been and what it could be going forward.

Continued participation in BER

Up until this point, our discussions have focused largely on our gateway into BER and the development of our BER identities based on our experiences with the community. However, our prior experiences and existing professional identities could also have impacted our interest or willingness to switch into and then stay in a new field. This leads us to consider our second question: Why have we stayed in BER?

> Stanley: I'm wondering if why we got into BER is because we had all or some of these pieces, of interest, competence, performance, and recognition, but I don't know if why we stayed also has all of these pieces. Is there an external and internal piece for how we got into and stayed in BER? I think the community of practice, the given opportunities, that's mostly external. Is there a complimentary internal piece, like about our own intersection with those experiences or those external events?
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> Emily: I do feel like there's that internal need, something about us, that made us go into BER. I do think our teacher-ness is a

component. As a researcher you may see things that aren't working, but it's not so directed to you as the person who is doing that, whereas teaching is really personal. I feel like teacher-ness is someone who is willing to do this reflective practice, and someone who is open to people perpetually saying that you're not doing a good job, and you need to change, and you need to adjust. I have seen biologists that are nervous to be reflective. I don't see this as a value judgement on BER people being a better kind of person, just different. I feel like in BER, I am constantly looking at new literature, new strategies, new techniques, and that you have to be really open to new things. I don't know if I am naive or blind to that occurring in other fields.

Stanley: For teaching, there is more of a personal connection or ability to actually make an impact. I think maybe that's what drew me to teaching initially, but I've never thought about it that way until now. Even though there is a lot of failures and adaptation in both research and teaching, the teaching feels more personal, and I think that is similar to my experience.

Rou-Jia: I hadn't thought too much about what teacher-ness meant to me, but for me, I think a lot of those things squished together. BER and teacher-ness are intertwined for me. It was all happening at the same time, and so they feel more integrated for me. I was just leaving a postdoc. I was at the Summer Institute preparing for my first semester of teaching, and I think the fact that I was stepping into this new role as the instructor of record also made me more receptive.

Here again, our duoethnographic inquiry allowed us to reflect on our prior experiences and review our narratives through the lens of one another's experiences and insights. Emily's discussion of how being an educator influenced her research self; her naming her sense of teacher-ness not only brought up similar moments for Rou-Jia and Stanley but also prompted each of the two of us to reconsider our prior understanding of our reasons for how we connected to BER. The new understanding that emerged was a product of this reevaluation and reflection.

A reflective approach we consistently returned to in our discussion was drawing comparison between our bench or field research and BER experiences as a way to unearth meaningful features of our journeys into BER. As our dialogues continued, it became evident that while there was a common set of factors supporting our choices to enter and stay in BER, distinguishing among which factors were responsible for which behavior was rather difficult (as noted by Stanley's comment that although "we had all or some of these pieces, of interest, competence, performance, and recognition, but I do not know if why we stayed also has all of these pieces"). We defined an external factor as one that was situational or changeable depending on circumstance, whereas an internal factor reflected qualities that were inherent to ourselves and therefore unlikely to change regardless of circumstance (Rotter, 1966). For example, a key internal factor we identified in the duoethnography was our need for intellectual engagement to sustain both entry into and continued participation in BER, noting that factors important for our entry into BER were also important for sustaining our participation in the field.

Stanley: There is also more agency in BER. When the biochemistry research doesn't work, it just doesn't work. There's no personal involvement, the adaptations I can do in research may or may not work for no reason. And sometimes I'll do the same thing a few months later and it'll work. Does that happen in ecology?

Emily: For my dissertation work in Alaska, I was completely dependent on getting to my field sites by helicopter. And I would sit and wait for the weather to clear, and there were days that the helicopter pilot would say, "We cannot go. The clouds are too low." So there was a lack of agency to some degree, but it didn't feel like I had no idea what's going on. I knew exactly what was going on! It was just frustrating.

Rou-Jia: I feel like there's this illusion of control in certain areas like molecular biology or biochemistry. Like there is this idea that we should have control over as many conditions as possible, which makes it even worse when it doesn't work. Whereas in education research, it's almost like your presupposition is that you don't have control over it. You're going to get what you get, or you'll collect what you get when you get to the site when you're able to get there.

Emily: I think this lack of control happens in all research fields. I was just in a meeting with six panicked grad students who were worried about whether they could get out and do their summer research or not, due to COVID-19 restrictions. Some of them are education researchers, and they had planned to do a comparison treatment in courses this semester and the stars just did not align.

Stanley: Even though the collected evidence may be unexpected, the researcher always has the agency to interpret the data and make sense of the results. For me, the whole "experiments didn't work" thing really didn't work for me. But for one of my classmates in graduate school, he thought that was the greatest thing because it's never his fault if it didn't work. So even though there's this external "experiments just don't work" and the "helicopters sometimes cannot fly" element, there's this internal element to it too. So maybe that's one of the things that drew me to BER, because it's less variable in that way.

Rou-Jia: For me, I saw how other people intellectually engaged with bench research, and I felt like that wasn't how I engaged with it. Like getting that one experiment to work, keeps you going for the next one, but that wasn't sufficient for me. I don't dislike my research questions, but I like it more when it's "oh this is a cool project with different ways to work on it for the students to learn on it with". I like it less when it's "oh, I have to go figure it out by myself in the lab". But in BER, I just think the questions are really interesting, and they're more fun to intellectually engage with. My BER projects have all been very collaborative, and it's a lot more fun to work with other people rather than in isolation.

Stanley: Also, in biochemistry, it's like a career stage transition when you have to leave behind direct contact with the data and choose between the bench or the computer. Switching into this field allows me to continue to directly engage in the research while not being at the bench.

> Emily: I also think I felt turned away from my original field of study because it felt really hard to be good and contribute meaningfully. It feels more attainable to make your mark in BER than it does in ecology. Ecology is an old and large field, and there is a lot of stuff that's already been done. Whereas BER feels very new, so you can do some really exciting things and potentially make a difference and explore new ideas.
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> Rou-Jia: I think some parts of science just feel like you're very much in your own little niche, and maybe it has an impact, and maybe it doesn't. But the BER community, it feels like there is an impact. It is helping somebody, like another instructor or people in the discipline; that could then impact how they teach and maybe that can impact their students. The connection between what you're doing and the actual act of helping somebody feels more direct, which is also just nice to feel.

Although our educator identity did feature prominently in our earlier discussions, here we are able to interpret the characteristics of our researcher identity that supported our continued participation in BER. The importance of our perception of the impact of our research was a component of motivation underscored by Davis and Wilson's (2000) and Canrinus et al.'s (2012) work, in which they found a positive correlation between job satisfaction and motivation. Again, Rou-Jia and Stanley shared parallel individual narratives that viewed a lack of agency in their bench research during the data collection process as a feature of their fields. However, Emily disrupted that narrative by pointing out this feature was true across not just their disparate bench research fields but also with BER. This prompted Stanley to move towards a new understanding of agency, defining it less about control during data collection and more about freedom to interpret the data itself. The presence of a diversity of perspectives was thus critical for avoiding parallel talk and theory confirmation and instead fostering the development of new understanding.

> Emily: I'm really curious about what allows people to keep or let go of our former biologist selves, and say "no, I have to be a geneticist forever" or let go and say "I was okay being a geneticist, and I don't really do that anymore". It seems that Rou-Jia was able to let go a little bit because of dissatisfaction, and Stanley was able to let go a little bit because he had new goals, and he wanted more agency in his work. Whereas I just refused to let go.
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> Stanley: Have you read Sally Hoskins' (2019) recent essay in Science? The way you're describing how some people hold on and other people let go, I think something like this happened to Sally. Because of a family situation, it made it impossible for her to continue the inconsistent hours of bench experiments and running a lab. And that's when she developed CREATE (Hoskins et al., 2007), to continue to engage in the science and scientific process but in a completely different setting. She talks about the ingenuity of research, which is what she loves, and through CREATE, she was able to continue that passion beyond the bench and share it with her students in the classroom in a deep and meaningful way.
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> Emily: I did read her paper, and actually one of the reasons why I started doing BER was similarly due to external pressures. From what I read, Sally was feeling like she was hitting her stride and had to step back. While I was about to get started in my research career, I started BER stuff because I had kids, and all of my research at the time was going to these really remote areas that are not great for newborns. In reflection for this conversation, I realized I never really considered myself a researcher-type of a person, but it was my researcher-ness, my researcher identity, that I was unwilling to abandon, that made me force my way back into doing research that I could do, which was BER, despite my situation.
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> Rou-Jia: I think that researcher-ness is an important piece. Thinking about why I still do this now, I think it's fun, fun meaning this curiosity and this desire to keep learning, digging, being engaged, and being unwilling to just sit by the side. And hearing you say it, Emily, makes me realize it has definitely impacted that.

Here, we saw a continuation of a theme touched upon earlier, the importance of both our educator and researcher identities in maintaining our persistence as BER scholars. Furthermore, we saw how this dialogue transformed both Emily and Rou-Jia's prior understanding of our own narratives. Although Emily was aware of a desire to maintain a connection to research by switching to BER ("my researcher identity, that I was unwilling to abandon"), the realization that this was in part powered by the strength of her researcher identity occurred as a result of our duoethnographic inquiry. Much of Rou-Jia's narrative up until this point had been dominated by the strength of her educator identity and her dissatisfaction with her bench research community; however, this discussion led Rou-Jia to realize that her researcher identity was not only still present but also played an important role in her persistence in BER. As we considered our different yet related pathways into BER, we realized the impacts of our initial formative research experiences, as well as the timing of these memorable moments, on our initiation and persistence in the field.

Constructing our BER identities

As earlier conversation indicates, discussing the hows and whys of our journeys in BER also led to reflection on our identities as educators and researchers. We each came into BER with preexisting identities as biology bench or field researchers. How did these identities impact our development and experience as BER scholars?

> Emily: I've always had to be this "either-or". Initially I felt I had only two options: being a biology education researcher or being a lichen ecologist. But I see now through our discussions that I'm a "both". I feel okay being someone who contributes in each field, and I'm probably stronger at contributing in BER at this point of my career. I mentioned to someone at SABER that I had a lichen ecology master's student, and they were like "You can't do both well." And I was like, "I don't really feel like I have to!" I don't have to be a rock star at both of them. But I support lichen ecology graduate students and continue to do lichen ecology research. I continue to teach classes in botany and ecology and keep my foot in that arena. And I feel settled being okay knowing I'm both a biology education researcher and a lichen ecologist.

Rou-Jia: I really like that phrasing! "I'm a both".

Emily: I was also thinking about balancing this idea of researcher and teacher. I've flip-flopped being one or the other through all the different phases of my life. And I feel like that now, I have finally settled into this place where I can do both. I can't imagine myself going to a position where it was just teaching; likewise, I also can't imagine myself being in an institution where research was my bread-and-butter, and that was what I had to do to survive. I don't think that's my strength, and I can see right now I'm a both.

Stanley: In retrospect, I think I have some of that "I'm a both" moment. Currently I feel like I am transitioning into more of an education researcher from BER. My research has been shifting over time to become more independent of disciplinary subjects, like biology or even STEM. A colleague calls me a social scientist from time to time, just for fun. Whereas I might have been surprised by being called a social scientist a decade ago, but now I'm like "Yeah, you're right! That's a good label, and I enjoy it." I think I went through a phase in the last few years where I was rejecting the idea or identity of a DBER person for myself. And now I feel like I can be both. I hadn't thought about the "both" idea until you said it, Emily, but I feel like I can be both BER or DBER and also more broadly education research.

Rou-Jia Why did you feel like you were rejecting it? To me, I feel like the scientific community seems to reward, at least on paper, the idea that you're interdisciplinary and doing multiple things. But at the same time, if you don't specialize in one thing, then there is also a question about your credibility in your research field.

Stanley: I'd never really thought about why. It was just a feeling I had over time. Intellectually I saw the work I was doing seemed to be diverging from BER, like the work you go to SABER to see. But at the same time, I still had the feeling that these were my people. I wasn't sure how to navigate that complexity, and I think the both idea is really helpful to think about it.

Rou-Jia: It's really interesting, the idea that "I'm a both" doesn't mean I'm a both equally or that I am excellent in both. It just means like they're both there. I feel like the identity I was supposed to have for a lot of my professional career was to be a researcher doing that kind of research. And it just never felt like it sat right, like wearing a piece of clothing that doesn't quite fit. The educator identity fit a lot better and felt more like something that I would identify with. And now, I'm trying to figure out where this researcher identity is. You know when you have oil droplets, and you start with one oil droplet, and they can subsume another oil droplet, and a new oil droplet can come back out? I feel like I'm a blob that has subsumed different blobs and am still figuring out how to fit the blobs in. Right now, it feels like the researcher identity is subsumed within the educator identity, like viewing my bench research through the lens of it being an educational opportunity for students helps me integrate that identity in a way that fits. BER feels like a little thing squished somewhere in between those spheres, but I'm not sure where it is yet.

Emily: I like that you are talking a little about this. When you first started talking about your identity, your identity was kind of for someone – it was okay to be this bench researcher because it provided these educational opportunities for your students, and it allowed you to integrate education and your science biology self. And I think that's an interesting idea, who that identity is for.

Rou-Jia: I think the idea of being both is transformative, and hearing someone say "I am both" is also empowering! It makes me appreciate the importance of mentorship, and hearing people's paths and views of themselves, while balancing these different commitments, to see that there are different ways to view this, and do this and that it's okay. I'm curious, if I'll feel differently in the next couple of years.

Emily: I'm under no illusion that this is it. I think that things will change and they will continue for all three of us, and we're just getting to that window.

Rou-Jia: I wonder if the idea of being both feels foreign because I don't think anyone told me that one could change. It's kind of similar to how our students feel when they graduate – they think that whatever they decide is going to be forever for the rest of their lives. And you tell them, no, it's not, it's just for right after you graduate, and there's a lot more time after that, and you can change. But I think this is a really good mindset though, this discovery that we can change, and that we will continue to change, and our interests will shift.

We began many of our discussions with patchwork individual views of our prior experiences that became clarified and solidified through the duoethnography, which allowed us to arrive at truly new and emergent understandings of ourselves. Each of us knew our existing sense of our identities was not quite complete; however, it was hearing Emily describe her sense of identity as "being a both" that was transformative for all three of us. While Emily was cognizant of these separate research strands as important to her, it was through our discussions that she was able to view the melding into one as an identity. Previously, Stanley had a much more amorphous sense of this identity, as a set of vague feelings that were difficult to reconcile. However, engaging with the idea of being a both creates a new way for him to contextualize the balance of still feeling a part of the BER community even though his research was shifting in new directions.

The concept of dual professional identity is discussed in other fields (Johnson et al., 2006; Kluijtmans et al., 2017). Emily's version of being a both involves maintaining two active research programs: one in her discipline-specific field and one in BER. She mentors graduate and undergraduate research students in both fields, presents and publishes work in both fields, and is asked to review and participate as an expert member of both communities. In Emily's case, her discipline-specific research identity has remained consistent with her PhD work in lichen ecology, and BER represents a new identity that developed since her dissertation. In Stanley's case, his research interests have shifted over time to move further and further away from discipline-specific areas. Despite these differences, Stanley's conception of being a both also includes the idea of maintaining two active research programs: one in more general education research and one discipline-specific program in BER. Similar to Emily, Stanley also

mentors students, publishes, and actively contributes as a member in both communities.

It is interesting to consider the impact of our previous field and bench researcher identities on Emily and Stanley's experiences of being a both. In Emily's case, her intellectual interests in lichen ecology and her researcher-ness are features of her previous field researcher identity that continue to sustain her being a both as a lichen ecologist and a BER scholar. In Stanley's case, his ability to comfortably move between and beyond disciplines and his desire to maintain agency in research result directly from his previous undergraduate and graduate experiences. Wenger (1998) used the term brokering to describe individuals who are able to connect elements of one community of practice into another, with the possibility of introducing new possibilities for meaning between these communities. These brokers must also maintain enough legitimacy in these communities to influence practice and address conflicting interests. Both Emily's and Stanley's experiences highlight some of these complexities inherent in being members of multiple communities of practice.

Rou-Jia also responds strongly to the idea of being a both; similar to Stanley, the idea offers a framework with which to contextualize her past experiences. However, in contrast to the clear boths declared by Emily and Stanley above, it is evident that Rou-Jia's identities are still emerging – she has self-described her educator identity as beginning to form when she attended the Summer Institute in 2015 and has been in her role as a pre-tenure faculty member with direct control over her research agenda for only 5 years, whereas Emily and Stanley are both post-tenure and have been in faculty positions for about 10 years. Rou-Jia describes a sense of blobbiness, in which multiple professional identities jockey for position and, in some cases, actually subsume each other. This tension between research and teaching has been highlighted in multiple studies looking at the development of academic identities within university institutions (Wolverton, 1998; Clegg, 2008; Billot, 2010; Skelton, 2012; van Lankveld et al., 2017). Moreover, Clegg (2008) argued that identity should not be viewed as a "fixed property, but as part of the lived complexity of a person's project their ways of being in those sites which are constituted as being part of the academic." This fluid quality is evident in Rou-Jia's description of her struggles to situate each of her identities; however, hearing this idea that it is possible and acceptable to be a both is empowering and offers a future path towards reconciling her identities as they continue to develop. Therefore, for Rou-Jia, the idea of being a both is transformative in not only providing context for her past experiences but also in its potential to actively shape her future professional experiences and identities.

Conclusion

This duoethnography explored the pathways that three tenured and tenure-track faculty took towards becoming BER scholars who crossed over from other biology research fields. Our initial understanding of our entry points into BER was a sense of dissatisfaction or lack of welcome within our bench or field research communities. Through this duoethnography, we formulated a new understanding that what drew us to BER were the elements that made BER a true community of practice that engaged and valued our participation. Moreover, none of us had deeply considered our own reasons for persistence in BER, but through extended dialogues, we were able to arrive at a transformed understanding that our educator identities and sense of agency in our research were driving factors in continuing our participation in BER. Attempts to situate these experiences within BER and our biology research fields within our individual narratives resulted in ideas such as Emily's dueling identities as a BER scholar and lichen ecologist; however, our dialogues to contextualize this within our shared narrative led to a reconceptualization of these shared identities as being a both. How we conceptualize being a both, how this conception of being a both develops, and how being a both intersects with our BER work are questions we plan to continue exploring.

BER is still relatively new compared to other DBER fields in chemistry, engineering, mathematics, and physics (Dirks, 2010; Gül and Sözbilir, 2016; Bussey et al., 2020). In this duoethnography, we used our own experiences as the research site to interrogate how each of us arrived at our current professional states. The pathways identified here can add to the myriad of ways that our community could support graduate and postdoctoral scholars interested in pursuing BER. The questions we asked of ourselves may mirror what will be asked of the next generation of BER scholars. Our collective experiences sit somewhere in between those of the current generation of BER graduate and postdoctoral scholars and those of the early BER scholars, who have been contributing BER scholarship for several decades or more. Despite distinct differences in our career timelines, we each began with training in a biology research discipline, followed by critical interactions with the BER community that seeded our crossover events into BER. This pedigree as a crossover BER scholar is quite common (Lo et al., 2019). Therefore, we hope that the insights generated from this duoethnography will be informative for other BER or DBER scholars, as they consider their own experiences and trajectories compared to our, just as Breault (2016) argued that "[d]uoethnographers hope that their stories will precipitate other stories" and "invite others to explore their own stories."

Limitations and future directions

A core challenge of ethnography is the need for the researcher to gain trust in the community that they are studying (Goodson and Vassar, 2011). While duoethonography solves this problem by having the researchers simultaneously serving as the research site (Sawyer and Norris, 2013), this also means that our own lived experiences are centered and highlighted in the study without the protection of anonymity and confidentiality typical of other ethnographic or qualitative studies. In our duoethnography, we were concerned that references to colleagues and mentors may cast them in an unfavorable light, even though we were careful to conduct member checking by sharing the manuscript with them to solicit feedback and check for accuracy. In addition, Rou-Jia was especially concerned as a pre-tenure faculty if the discussions of her professional identity would hurt her prospects for promotion, and she sought advice from senior colleagues. While Emily and Stanley also shared similar concerns about the public discussions of our professional identities, we were less worried given our security of employment through tenure. Ultimately, these tensions created instances where we had to re-examine whether the narrative was fully honest or if it had been altered or

implicitly censored in some ways. While the participation of three people in this duoethnography provided some checks and balances in this process, we were also the researchers who made the final decisions. This limitation of duoethnography stems from and is inherently tied to its core tenet as a methodology to have the researchers also serve as the research site.

Despite these limitations, the value of this methodology in centering each of us as both researchers and the site of research can be an incredibly powerful tool that dismantles the power dynamics inherent between researcher and participant present in the majority of quantitative and qualitative research protocols currently used in DBER, including BER. The research space that is created inherently prioritizes the agency of each individual while also providing opportunities for new insights and knowledge through the transformed understandings of our collective narratives. Research questions relating to identity, belonging, and pathways towards particular STEM disciplines have been an active area of study in DBER for multiple decades; however, we posit that future research into these questions would strongly benefit from the use of methodologies that promote equitable research spaces that center the individual and support their own agency to explore their own experiences.

Methodically, we made the decision to define the boundaries of our collection to written reflections and discussions of these narratives. It is possible that the use of other artifacts, such as documents and photos (Snipes and LePeau, 2017; Wagaman and Sanchez, 2017), could have helped enrich our duoethnography, Similarly, we defined our guiding questions as how we entered and persisted in BER, ending with how we developed our professional identities as BER scholars. The navigation between our educator and researcher identities was touched on briefly toward the end as Emily introduced the idea of a both but was otherwise not fully explored in this paper. As the three of us are located at vastly different types of institutions, where the tension among research, teaching, and service may differ dramatically, this further exploration, which is beyond the scope of the current study, could yield potential insights into how this dichotomy of educator-researcher identities might have influenced our career decisions.

Finally, we acknowledge the need for more voices and perspectives beyond our own as tenured or tenure-track faculty, of a similar generation, in this narrative. It is our hope that the insights emerging from our experiences will be informative but not necessarily prescriptive. For the three of us, there was a clear value of the type of experiences we had in authentic engagement with the community; however, just as each of our perspectives is limited by our own internal experiences and pathways, there are also potential limitations with regards to our external experiences with the community. As BER continues to mature and grow, it is our hope that the community will continue to maintain practices that foster opportunities for equivalent (but not necessarily identical) experiences for future BER scholars. We suspect the new generation of BER scholars will have a broader range of training. There will still be crossover researchers such as ourselves but also those who will have their first professional identity as a BER scholar. They will need to navigate a slowly changing academic job market that is gradually shifting to include BER as the primary research focus. We strongly encourage the reader to self-reflect or engage in an informal conversation with a colleague, like Emily and Rou-Jia's discussion at the start of this narrative, and consider how your interactions with the BER community have impacted your engagement with BER. What experiences were factors in your entry into BER? What factors have supported your continued participation and development of your professional identity in the field? Do these factors parallel ours? Are there differences? We hope that this duoethnography can provide a starting point for our continuing discussions as a community to support current BER scholars and provide guidance for new scholars entering our field.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

R-JS, EH and SL contributed to the conception, design, and execution of the study as well as data analysis. R-JS wrote the first draft of the manuscript. EH and SL wrote sections of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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