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# I'm not half and half: navigating being a "both" in discipline-based education research

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**Introduction and methods:** Through years of conversations, three discipline-based education researchers used a duoethnographic process to interrogate their own discipline-based education research (DBER) identities. We present a description of how these individuals navigate being a "both," gathered through reflections, discussions, and deeper research to explore perspectives of our professional identities and what we perceive those identities look like to our peers, supervisors, and trainees.

**Results:** Our own definitions and eventually realized identities as a "both" emerged through this research process. We envision that science faculty have multiple roles, demands, and identities; at the most basic level, they are "both" an educator and a researcher. In the unique case of discipline-based education research (i.e., scholars studying the teaching and learning of science often in science departments), some faculty find an overlap between complementary yet sometimes competing research agendas (i.e., biology research (BR) and discipline-based education research (DBER)), of which they do "both."

**Discussion:** This article has two key contributions. First, it articulates this side-glancing process of our navigation of being a DBER "both," leveraging each of our unique perspectives and the literature. Second, it represents how such an exploration may be useful to other interdisciplinary researchers in understanding and embracing all parts of their identities.

## KEYWORDS

discipline-based education research, duoethnography, faculty, narrative identity, figured world

## 1 Introduction

Identity is a concept that figuratively combines the intimate or personal world with the collective space of cultural forms and social relations... Identities are a key means through which people care about and care for what is going on around them. They are important bases from which people create new activities, new worlds, and new ways of being (Holland et al., 1998, p. 5).

Successful academics must navigate multiple figured worlds, the socially organized, culturally produced activities in which we engage with others (Holland et al., 1998), and move through different communities with different norms, languages, and people. Our multiple identities in these different communities are dynamic and evolve complex dimensionalities (Trowler and Knight, 2000) because some of these identities dovetail one another while others

conflict. A “fundamental dualism” described in the literature, i.e., splitting time and effort among obligations (e.g., teaching and research) and its implications for our professional selves (Kim et al., 2021), is felt by many tenured/tenure-track academics (McCune, 2021; Murray et al., 2009). Exploration of this dualism and identification of other dualities helps clarify and unpack pressure points that could guide professional development and mentoring and highlights the benefits of being multilingual among several figured worlds.

Discipline-based education research (DBER) scholars offer an intriguing site of exploration because these multiple figure worlds are even more numerous and complicated for these academics. As an emerging interdisciplinary field, the experience of these scholars may have broader applicability to a range of fields. DBER is “defined both by the focus of the research and by the researchers who conduct it” (Singer et al., 2012, p. 9). The research investigates students’ conceptual understanding, problem solving, and affect towards science and how our curriculum and instruction affect their learning (Docktor and Mestre, 2014). Notably, the connection between one’s research and teaching is even more explicit than the dualism noted above for most faculty. Meanwhile, these scholars are traditionally trained directly within these disciplines to be “grounded in expert knowledge of the discipline and the challenges for learning, teaching, and professional thinking within that discipline” (Singer et al., 2012, p. 9), which can lead to rapid adoption of efficacious findings (Henderson et al., 2015). These individuals often conduct research in the discipline and “crossover” into DBER at some point in their career (Lo et al., 2019). This crossing-over requires these scholars to train in and navigate one figured world (i.e., often the science discipline) and then build a new figured world (i.e., education research) while still engaging in the first.

We felt that DBER scholars were an interesting intersection because the requisite navigation of multiple figured worlds from the education community and their different research communities (DBER and their disciplinary research) helps focus on professional identities, how we present them, and how we perceive them. The DBER identity represents an interesting case to view identity in higher education. While other work investigates entry points and continuing participation in the DBER field (Sung et al., 2023), little work explores this identity and how these scholars reconcile being situated and engaged in multiple, parallel-figured worlds. As DBER scholars ourselves, we—Emily, Rou-Jia, and Stanley—were curious about how a DBER scholar navigates these multiple figured worlds and identities. Although each of us are biology education research scholars, we acknowledge that our experiences, journeys, and revelations can likely inform the strengths, challenges, and identities of other DBER scholars (e.g., chemistry education researchers, physics education researchers, geoscience education researchers, engineering education researchers). In this study, we asked ourselves: (1) what is my DBER identity? (2) how does my identity in both biology research (BR; our common disciplinary background) and DBER develop and interact with one another?

## 2 Theoretical framing

The central theme of our research questions focused on identity. Specifically, we sought to interrogate our perceptions of our identities, how these identities developed and/or transitioned, and how these identities represented assets or constraints to our professional growth.

One key theoretical framing underlying this study aligns with Stryker and Burke’s (2000) Identity Theory. In earlier work, Stryker and Serpe (1982) describe identity as being molded by society, where the underlying “structured relationships among persons and the social roles that accompany these positions [are] the significant sources of relevant variation in the self” (p. 200). Holland et al. (1998) further articulate that social relationships and roles embed us with others in figured worlds that are peopled by limited actors who participate and value a culturally relevant set of beliefs and tasks.

However, these definitions of identity are complicated because,

Persons typically are embedded in multiple role relationships in multiple groups and they hold multiple identities. These multiple roles and multiple identities may reinforce one another, but perhaps more often do not... When they do not, they introduce identity competition or conflicts that complicate reciprocal relationships between commitments, identity salience, identity standards, and self-relevant perceptions (Stryker and Burke, 2000, p. 290).

As we all hold many identities, we are regularly confronted with this conflict. Stryker and Burke (2000) suggest hierarchical salience aids in ordering identities, so one identity emerges in situations where it is more relevant. Other research suggests that this salience occurs as people shift their effort and quality of performance among identities depending on the situation (Burke and Reitzes, 1981). Our research, however, questioned whether hierarchy always orders identities or whether two competing identities can co-exist as equally salient.

## 3 Materials and methods

### 3.1 Duoethnography as methodology

To investigate the potentially intersecting and interactive professional identities within DBER scholars, we used duoethnography as the methodology. Duoethnography is a qualitative research methodology rooted in reflective and collaborative inquiry; distinct from traditional ethnography, duoethnography emphasizes the dialogic interactions among researchers, offering a unique lens to examine personal and professional narratives (Norris, 2008; Sawyer and Norris, 2013). Duoethnography allows exploration of the dynamics of identity in academic contexts through backward or reflective narratives, sideway or emergent insights, and forward or transformed metanarratives. The methodology allowed for insights to emerge through the methodology, making it particularly suitable for understanding the multifaceted nature of academic identity formation (Sung et al., 2023).

Duoethnography differs from other ethnographic methods by its focus on the relational and interactive experiences between and among researchers; this approach is not just about documenting experiences but critically examining them through dialogues (Norris, 2008). For our study, duoethnography was chosen for its ability to deeply and reflexively explore how identities in DBER and biology research intersect and diverge, thus capturing the complexities of navigating multiple professional worlds (Breault, 2016; Norris and Sawyer, 2012).

## 3.2 Data collection and analysis

Our research incorporated the perspectives of three DBER scholars as researcher-participants: Emily, Rou-Jia, and Stanley, each with a distinct background in BR. Emily was trained as an ecologist, crossed-over into DBER prior to her first faculty position, and has been doing DBER scholarship for over a decade and ecology research for nearly two decades. Rou-Jia was trained as a biochemist and crossed-over into DBER during her first faculty position; she has been doing disciplinary research for over a decade and DBER scholarship for 5 years. Stanley was trained as a biochemist and crossed-over as a research associate in learning sciences at a teaching and learning center prior to his current faculty position; he has been doing DBER scholarship for over a decade. This deliberate selection of the three of us as participants was aimed at capturing a rich tapestry of experiences and viewpoints within the DBER field. By integrating diverse academic trajectories and professional roles, our study sought to encompass a broad spectrum of insights into identity formation and navigation within the DBER community (Norris, 2008; Sawyer and Norris, 2013). Through this research, we are using ourselves as a study site and context. While we all share the background of being biologists, our experience as DBER scholars expands beyond biology across many disciplines.

Duoethnography as a methodology is intentionally structured and fluid, so that the process can be continuously adapted as insights emerge (Sawyer and Norris, 2013). Thus, we began with reflection questions designed to elicit responses about our journeys within DBER. These questions enabled us to explore our professional identities, thus examining how our BR and DBER intertwined. These initial reflections were used to explore our professional journeys, revealing how our identities have changed over time. For further data collection, we combined individual reflections with professional artifacts (such as publications, grants, CVs, and previous job applications) and with our dialogues within the duoethnography process. Professional artifacts can serve as tangible evidence of our academic contributions and engagements (Norris, 2008; Breault, 2016), illustrating the broader impact of our work in DBER. Together, these data sources triangulated to provide a comprehensive view of our professional experiences and identities in DBER.

Data analysis involved iterative and reflexive examination of the data, involving continuous dialogue and re-examination of our data. In regular meetings, we collectively identified themes and patterns, as well as notable divergences in our narratives that allowed for sideways and emergent insights (Sawyer and Norris, 2009). The writing process in duoethnography is a critical component of the methodology to articulate the results. This process involved building our dialogues and reflections into a coherent narrative that encapsulated our journey as DBER scholars in a narrative for the readers; this process was also not linear but involved iterative discussions, reworking of narratives, and careful consideration of how best to present our stories (Norris and Sawyer, 2012). This reflective practice served as a means to deepen our engagement with our professional identities, allowing us to critically examine our beliefs, values, and assumptions, and how these have been shaped by our experiences in DBER (Breault, 2016; Norris, 2008).

## 3.3 Analogous studies using the duoethnographic approach

Similar duoethnographies have been conducted in other academic fields, highlighting the versatility of this methodology. Norris and Sawyer (2012) explored the professional development of writers using duoethnography to understand individual journeys in writing. Eaton and Bailey (2018) delved into the complexities of identity and experience within the field of mathematics education. This latter study provides insights into how educators in mathematics navigate their professional pathways, shedding light on the nuances of teaching and learning in this specific discipline (Eaton and Bailey, 2018). The adaptability of duoethnography across these extremes of academic fields underscores its potential effectiveness in exploring and understanding diverse and intersecting professional experiences and identities.

Furthermore, Sung et al. (2023) utilized duoethnography as a methodology to explore the experiences of researchers in Biology Education Research (BER), which is DBER in the context of biology. This study focused on the overlapping trajectories of researchers in BER, examining entry points and reasons for persistence within the field (Sung et al., 2023). Through collaborative reflections, Sung et al. (2023) formulated insights into how BER functions as a community of practice and how educator identities play a crucial role in the pursuit of BER. The current study, while also employing duoethnography in the realm of DBER, differs from Sung et al. (2023) by taking on a new focus and approach. While Sung et al.'s (2023) work centered on understanding the pathways and identity navigation within BER specifically, the current study broadens the scope to include the navigation of multiple figured worlds and identities in DBER. We explore the complexities of being situated and engaged in multiple and parallel figured worlds, examining how DBER scholars reconcile their dual identities in biology research and DBER. This new focus and approach allow us to uniquely explore the dynamic and evolving nature of professional identities in an interdisciplinary field, offering a broader perspective on the challenges and opportunities faced by DBER scholars.

## 4 Results and discussion

### 4.1 Defining a “both” in DBER

This current exploration was initially seeded by Emily's long-term curiosity about how different DBER scholars navigate more than one research program (i.e., one within DBER and another in biology research, BR), which initiated an informal conference conversation with Rou-Jia. These conversations folded in Stanley, with whom both Emily and Rou-Jia knew from other research settings. These three DBER scholars began the research process, in early 2020, to explore the hypothesis that the interplay of research agendas explained most of the DBER journey and identity. In one of the first data collection efforts of the project, we each wrote personal reflections about “who were we when we started our first faculty positions” and “who do we identify as now” to begin exploration of our experiences. These

reflections formed a starting point for conversation and reflection about these experiences as part of the duoethnographic approach.

*Stanley:* Early on, in my first position, I saw myself mostly as biology faculty who does curriculum work or some education research. When I started my current faculty position, I think I was probably straddling between DBER and education researcher. I remember writing “DBER” on my application file and felt a bit uncomfortable with that. But I also decided it was a term that would make the most sense (or explainable) at least to some people on the search committee.

*Rou-Jia:* When I started my first faculty position, I was definitely searching for something that was not what I had been doing in my PhD and postdoc. I knew I was unhappy interacting with science and research in that context. For the first nine months, the mental and physical energy I spent thinking about my research program was “how do I modify/use it as a teaching tool,” rather than how I did before that was “how do I push on it enough to get a paper.”

*Emily:* At my first faculty position, I was hired as a plant ecologist. I saw myself (even up until I left) as a plant ecologist with an interest in teaching... But now I think I have finally settled into a place being comfortable with being a “both” for several things. When I started my current position, I wasn’t confident that I could successfully support both biology research (BR) and discipline-based education research (DBER). But today, I have done both and continue to be interested in both. Both fields are part of who I identify as. I am a biology education researcher and a biology researcher.

Our backward reflections in defining our own identities leaned heavily on the training we had received and our roles in previous positions (e.g., graduate students, postdocs). However, we each voice ambivalence, discomfort, or interest in those former identities that lead us away from these previous paths and onto new directions in how we view ourselves today.

*Stanley:* Now I definitely see myself as an education-education researcher, not DBER. I think, in part, this change over time, and away from DBER work, is intentional, as I have grown to see education research more broadly and holistically. Some of it is also serendipity, as it is partly where my students are taking me along their journey with their own projects.

*Rou-Jia:* Today I think of myself as a teacher or educator first, and then somewhere a close second is a scientist (or perhaps researcher?). I think I’ve spent most of my career in a scientist environment (i.e., during grad school and postdoc), never quite feeling comfortable in identifying fully as a scientist/researcher in that context. Then the opportunity to transition to a teaching-centered environment was the first time where I felt that “oh, this could be me.”

*Emily:* At this point, I think I have finally settled into a place being comfortable with being a “both” for several things... Years ago, I was at an education conference, and I was telling a colleague about the students in my research lab. I mentioned that I had a

lichen ecology Master’s student and this person smiled wryly and said, “You can’t do both (BR and DBER) *well*.” While it felt like a challenge at the time, I can reflect and say that I am OK not being a top-notch researcher in both fields. While sometimes it can feel like a lot, I want to be “both.”

While all three of us describe the different elements of our identities (i.e., researcher, scientist, educator, BR scholar, DBER scholar, education scholar) as separate entities, only Stanley’s depiction alludes to leaving an entity to capture his current identity. Rou-Jia implies that her entities co-exist; however, she details a critical ordering of these entities when considering her identity. Finally, Emily expresses the idea of being a “both,” where both entities co-occur. While Emily describes that one may be less important or less of a professional strength, both are critical to her identity. This conception of a “both” initially arose in this first reflection, and it was further articulated later as we each described “memorable DBER moments.”

Emily described several scholarly moments as her key DBER memories (e.g., soliciting feedback about research ideas, participating as a co-editor), while Rou-Jia and Stanley reflected about a mix of scholarly moments (e.g., sharing ideas with a supportive research community, gaining insight about difficult analyses) and teaching moments (e.g., applying DBER to your teaching, being a teacher role model, discussing teaching issues with like-minded colleagues; [Sung et al., 2023](#)). So, while Emily initially articulated the idea of being a “both” in DBER as a push-pull between research agendas at first reflection, it was reading Rou-Jia’s and Stanley’s later reflections and years of discussion that the “both” evolved multiple layers that none of us had visualized without the duoethnographic process. The overall “both” that we describe here as the DBER identity meshes two nested dualities. The first broad duality balances the identity as a researcher, regardless of the focus, and the identity as a teacher, which is shared by many faculty. The second narrow duality—nested within the researcher identity—juggles the research identity in the discipline (BR; biology research) and the research identity in education (DBER; discipline-based education research). Through this interrogation, we disentangled the warp and weft of these two dualities that together represent a singular fabric of the “both” DBER experience and identity.

## 4.2 Benefits of being a “both” and challenges of not being a “both”

When we first began this exploration to define our pathways into DBER and describe the unique identity of a DBER scholar, our backward reflection on our individual experiences and sideways interrogation into each other’s experiences centered universally on the idea that being a biology education researcher meant being a “both.” However, from our discussion emerged several detriments and benefits of this duality, which each carry outcomes both professionally and emotionally. While being a “both” caused tension, we resolved that it might also allow us to grow in new and unexpected ways. Our conversation then dissected why straddling two “careers” (i.e., a BR scholar and DBER scholar) as part of the DBER “both” identity can feel disadvantageous. Stanley and Rou-Jia drew on parallel experiences from other areas of their lives to help explain why this tension can be challenging.

*Stanley:* I went through a phase in the last few years ... where I was, like, kind of rejecting the idea or the identity of a DBER person for myself. It's almost like an adolescent phase of rejecting your own heritage.

*Rou-Jia:* Why did you feel like you were rejecting it?

*Stanley:* I don't know, maybe I felt like I had to pick one. I'd never really thought about it.

*Emily:* I want to dig into this "rejecting your own heritage." I love that phrase. Is it a rejection of the heritage or is it a broadening of your perspective? I'm just kind of curious about your language on that.

*Stanley:* I feel like maybe I'm borrowing that from ... social cultural work. I don't know, Rou-Jia, you can speak to that too. Like having grown up in Canada, there is a lot of like Chinese-Canadian/Asian-Canadian discourse about, like, how you almost have to decide, right, if you are Chinese or Canadian ... so I feel like rejecting your own heritage is kind of like—I might have borrowed that from that kind of identity discourse.

*Rou-Jia:* Yeah, it does parallel some things you could switch outwards and it might be descriptive. For example, I took a Chinese language class at Berkeley. I remember the first conversation we had in class was, like, this idea of what do you identify with: Do you identify as Chinese, American, or Chinese-American? All of us identified as Chinese-American, as "both," which was a powerful experience in and of itself to be in a place where everyone has had similar experiences. But part of being a "both" in this case was you never felt like you were enough for either side. You weren't "Chinese enough" to be considered Chinese by Chinese people because the way you spoke and your mannerisms weren't quite right. You also were not necessarily viewed as "American enough" by Americans because of how you look and what-not. Even if you spoke English perfectly well. But I identified as being both because aspects of both cultures are relevant to who I am. It was interesting that it was a balance of what one chooses to identify with, but also the fact that you're kind of excluded from feeling like you fully belong to either side.

*Emily:* Wow, that is really powerful. I never conceptualized a "both" in quite that way. And hearing about it in a different context is really, really useful to me.

*Rou-Jia:* What struck you about these examples?

*Emily:* I think because I understood the "both" as much simpler. I might explain to someone that I don't just do this and this, I do both of them. And it's very simple, right? Whereas I felt you all describe these two totally separate worlds that you can be a part of ... you're this stranger in this strange land ... you're not Chinese "enough" to be considered Chinese by these people, and so on. Really it's the "enough" piece. You're not "enough" to be this one or "enough" to be that one. Putting it into a completely different analogy; whereas, I had been thinking of it from this perspective of, like, this is a career and this is your field of research and it was

simple and that's what it was. Not carrying it to all these other lived experiences.

*Rou-Jia:* I'm listening to you and it kind of sounds like—is it this moment where it ties the idea of "both" to identity rather than just to career and tasks and things you do. But actually is part of who you are?

*Emily:* Yes, I do think so. And maybe that's where the "enough" hit hard. You can do these pieces and you can say "I do this research, and I do that research, and yes I do both of them" but that's it. Whereas you feeling like you are not enough, gets into the heart of what that identity is. I don't feel that I am enough to claim ownership of whatever that identity is.

In the context of racial identity development, research in sociology explores how choosing one identity among many can lead to a feeling of loss of identity and community (Gillem et al., 2001; Shih and Sanchez, 2005). Our interrogation into this loss described the tension of the DBER "both" as belonging and emotional wholeness. Within professional settings, much research on professional/researcher identity more narrowly centers on development of identity (Trede et al., 2012) and how this process is dynamic through time (Castelló et al., 2021). Yet the external tension Rou-Jia describes that analogizes her experience as a "both" in DBER mirrors the "liminality" described in the literature for Scholarship of Teaching and Learning (SoTL) identities, where one's own label and who they see themselves as may represent a divide (Simmons et al., 2013; Manarin and Abrahamson, 2016). Simmons et al. (2013) frame this liminality as an unavoidable challenge inherent in the discipline, yet Manarin and Abrahamson (2016) highlight its benefits in serving as a prism from which to view many facets of teaching, learning, and the academy. Gocłowska and Crisp (2014) further note that duality may benefit not only individuals but their community. In our conversations, we touched on loss felt by the liminality of a DBER "both."

*Emily:* In my career, I've always felt like I had to be "either/or." But with time I have felt more comfortable being a both ... the "either/or" are these two options: a biology education researcher as one option and being a lichenologist/ecologist as another option. But I feel settled being both of those. And I think that that is okay.

*Stanley:* I think for me it was more internal. I feel like there was a, "Who are your people?" kind of thing. I saw that the work I was doing seemed to be diverging or becoming different from the work of my colleagues. But at the same time, I still had the feeling that, like, those are my people. So, I wasn't sure how to navigate that complexity of whether I belong or not, and I think that the "both" idea is really, really helpful to think about it.

*Rou-Jia:* More recently, for me, the idea of a "both" has been really helpful for navigating the idea that I've been doing both, and how to present that externally for my communities.

*Stanley:* I felt like in my early pre-tenure years in a biology department, I needed to do the kind of education research that is curriculum-focused, so my colleagues would understand it. Over time, still before I was up for tenure, I realized that I was giving up

on a number of important intellectual ideas that I would like to pursue in my research, so I started to do them anyway. I also started to strategize with senior colleagues to learn how to better communicate this research to a biology colleague audience, while maintaining my own research ideas and identity as an education researcher.

Stanley and Emily noted how during early phases of their careers they felt obligated to immerse in just one strand of research, or likewise dedicate little focus to research in teaching-heavy positions and felt as though they were “giving up” pieces of their identity and community. However, we collectively resolved that being a DBER “both” helped mitigate this loss, especially later in our careers. Our discussions provided the space to share our struggles, discover our shared experience, and recognize the benefit of being a “both.” We recognized the potential conflict of being a “both” and the hierarchical salience one feels to jettison one identity (e.g., BR) to feel greater belonging in another (e.g., DBER). Stanley’s experience may reflect this constraint that may be felt by other DBER scholars. Alternatively, Rou-Jia’s acceptance of being a “both” helped her articulate the wholeness of her career to others.

### 4.3 Our own constructions of a “both”

*Rou-Jia:* It’s not the same for each of us. It’s that this idea of a “both” is a good framework for us to situate how each of us feels but like, it’s different for each of us. There’s obviously similarities—enough that when we said the word “both” all of us were like, “Yeah, that’s capturing something about ourselves,” even though all our trajectories may be different, and kind of how it has manifested is different.

The specific teacher–researcher duality, which partially contributes to the “both” we describe here, has been described in other literature (Aydeniz and Hodge, 2011; McAlister et al., 2022). Prior to this research, each of us individually understood that our research and teaching contributed to our pathway into the DBER field (Sung et al., 2023). Having multiple work-related identities, similar to the educator–researcher balance of most academics, has been documented in other fields (Dickinson et al., 2020; Johnson et al., 2006). Clinicians who are jointly educators (Adams, 2011) and researchers (Kluijtmans et al., 2017) similarly balance professional activities, which each carry their own identities. Johnson et al. (2006) juxtapose identity tied to an individual’s professional roles or duties with their sometimes-conflicting identity associated with their professional organization. Rou-Jia describes how, “today she thinks of herself as a teacher or educator first, and then somewhere as a close second is scientist or perhaps researcher.” However, the value of demonstrating training in a science disciplinary research followed by adoption of education research practices and entry into a second research field can create overlapping identities. Moreover, the skills and knowledge of DBER scholars can be an asset to improving teaching in science and rigorous scholarship of teaching and learning. Our discussions dug into how our DBER identities fit within this teacher–research duality; the process of identifying where DBER fit required some reconciliation

with how we each balanced our teacher–researcher selves and progressed through our conversation (Figure 1).

*Rou-Jia:* I think my DBER identity is tucked away somewhere in between my teaching and research identities—almost like the intersection between the two circles of a Venn diagram, but it is its own circle.

*Emily:* I see your Venn diagram of identities as maybe two different models of being a “both.” In one model, someone has an educator circle and a researcher circle (doing biology research), but because they’re an educator, they have this overlap. And that overlap is really the opportunity to do biology education research (DBER). In this model, biology education research only exists because there is this overlap. As an example, maybe this applies to Rou-Jia as a “both.” She is an educator and she is a biology researcher, but the space for her to be a biology education researcher exists because she has this overlap into researching biology education.

*Stanley:* But I feel like that’s the same for me but in reverse. Like, I’m a biology researcher because of that opportunity, through teaching biology. Whereas for Emily, it is different. Right, like you do your lichen research not just because you do it in the classroom.

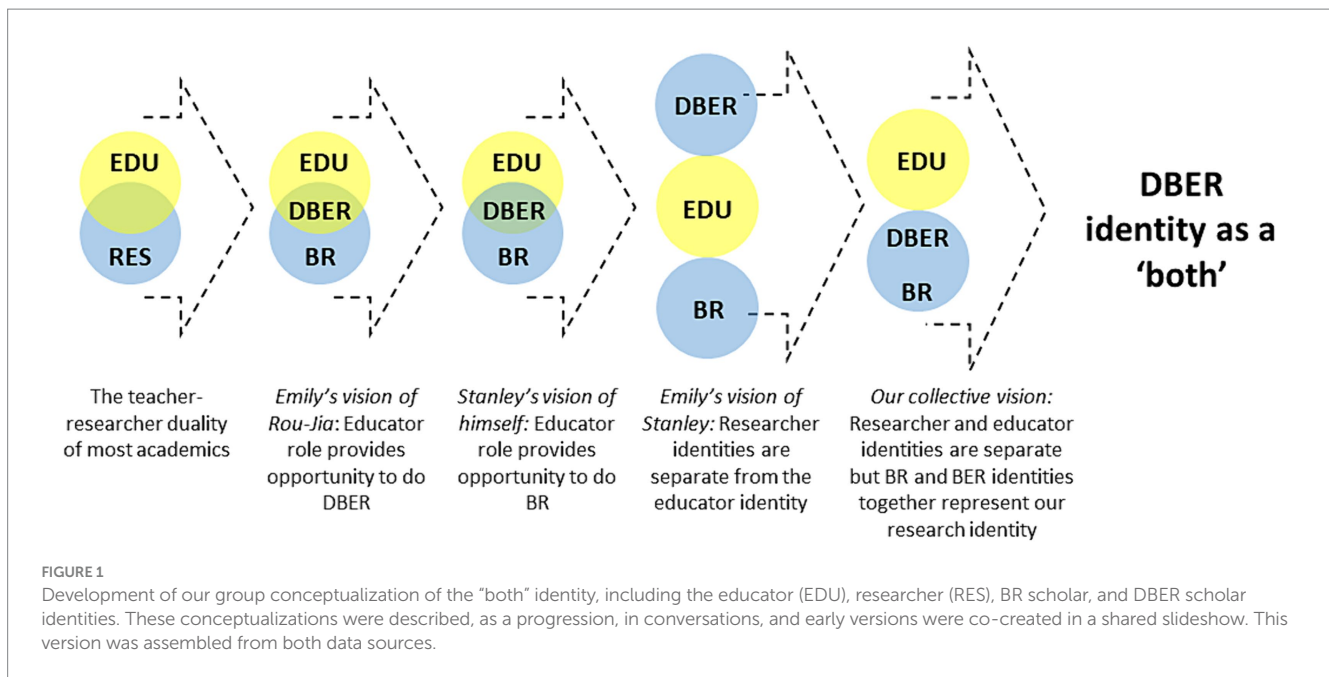
*Emily:* Yes, well in this second model, there doesn’t need to be this overlap so the circles just sit side-by-side to make someone a biology education researcher—more like I see Stanley and I—so they have their researcher-self, which is separate from their educator-self. But I also feel like Stanley and I should have different models, but I don’t know how to make them into different models.

*Stanley:* Maybe it could be that the three of us have three different models and two of them are more similar than one of them. I was wondering if the researcher circle could be divided somehow into biology education researcher and biology researcher. And in my case ... my DBER researcher identity is more removed from my educator identity than my biology researcher identity.

*Emily:* So, the portion of your DBER researcher identity that is in the shared, overlapping space between the circles is dependent upon you being an educator, but the portion that doesn’t overlap in the Venn diagram is you being a DBER researcher that is not dependent on you being an educator.

*Rou-Jia:* I think it’s just the fact that we all have the DBER researcher and BR researcher present on the diagram is emblematic of the “both.” It’s just how those manifests that differs, like, where does that exist relative to different things?

From our discussions emerged a transformed understanding that our DBER identities were an intersection of our teacher–researcher identity and our researcher (DBER-BR) identity. The nested dualities, i.e., DBER-BR within teacher–researcher, more richly contribute to our overall identity as a “both.” We described that being a “both” in DBER is the convergence of several realms of our professional selves. This



“both” reflects multiple identities of which some subsume others, others that walk side-by-side, and all that make for a messy understanding of what a DBER scholar is. So, while we each shared these two nested dualities as DBER scholars, they interacted in different ways to reveal our different trajectories of the shared DBER “both” identity (Figure 1).

#### 4.4 Different trajectories of the “both”

When we first began this exploration, Stanley noted that he “had always imagined that [his] DBER experience was special or different from other people. But upon reflection, it seems that while [his] experiences are obviously unique to [him], overall, they seem to follow a pretty ‘normal’ trajectory.” While our three unique journeys have shared several overlaps (Sung et al., 2023) and being a “both” is our shared experience of being a DBER scholar, it is through this study that we looked sideways to reflect on each other’s experiences to better articulate that there might not be a “normal” trajectory at all.

*Emily:* We all first developed as BR scientists. Then our development into biology education research, for all of us, came a little bit after-the-fact. So, it was kind of a two-step development process. And how uncoupled or overlapping these processes were in time, differ for each of us.

*Rou-Jia:* Each of our development processes sounds more-or-less linear. For example, Emily had a researcher identity, then gained a teaching identity, and now they coexist; Stanley had a biology faculty identity that has gradually morphed into an education researcher identity. It feels like mine is less fully formed, which probably makes sense, given my more recent starting point relative to you both, and it feels like mine is in the process of being reinvented.

*Emily:* Now that you say that ... my first vision was that we’re just different points along the same DBER trajectory and then I was like, “No, we’re not! We’re three different DBER trajectories.” But maybe we’re actually three different trajectories at different time points along them. Which kind of explodes this idea of a “common experience” but also allows, or maybe encourages, everyone to tell their own story.

Following the first revelation that we all held a “both” DBER identity, our discussions crystallized that we each represented different trajectories of a “both.” These three trajectories correspond with our individual experiences and perspectives, and they will continue to evolve through each of our careers. Moreover, our identities are dialogic and contingent upon interactions we individually experienced (Gardner and Willey, 2018). In trying to articulate the difference in our three “boths,” our conversation veered to explore physical evidences that might clarify the different types of “boths” we each represent.

*Stanley:* I had a colleague who said, “where you publish, sort of, defines the kind of researcher you are,” and it, like, signals who are your people and what community you’re a part of.

*Emily:* I like the idea of using physical objects as artifacts, and I like the task of thinking about what could be useful artifacts for us and our exploration.

*Rou-Jia:* I was thinking about the artifacts piece ... I was trying to think of things that would capture, sort of, at that moment, information about what I was thinking, or at least presenting myself to be, or my perspectives at the time.

*Emily:* It’s interesting because Sawyer and Norris (2013) and Eaton and Bailey (2018) use a lot of photos.

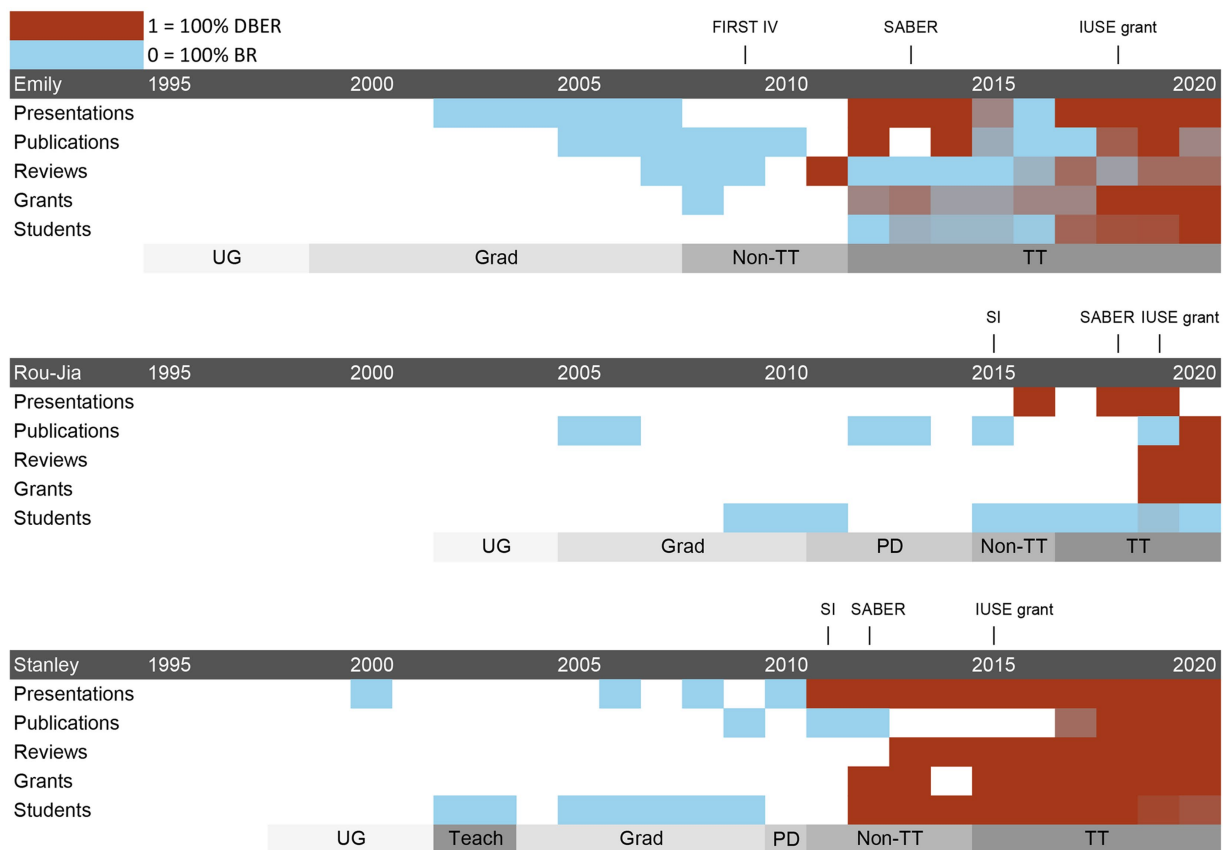
*Stanley:* We don't have photos, though. We can use our posters, our talks, our papers.

*Emily:* I had originally thought of, like, using publications themselves as artifacts. But I don't know that that's going to be really useful. Maybe looking at a list of the publications—when they are published, what topic they're on, where they're published—might be interesting. I think that simply a list of courses, presentations, or papers is not very telling. I mean, it could be ... You could number them and code them according to discipline: bench/field BR or DBER.

*Rou-Jia:* I don't know if it is possible to make it as a figure, because we've been talking about this idea of, like, timelines and transition points and when different moments occurred. And where we think we are, where we're going. I was wondering if it'd be possible, like, to kind of like map some of these artifacts onto that just to see our discussion as a visual. I think it might be neat to see, like, is there like a transition? Like say BR in blue and DBER in, like, a different color—do you see a transition, do you see sort of parallels, do you see a scramble of colors?

As we reviewed these timelines charting our careers through 2020 (Figure 2), when this exploration began, differences in the DBER “both” emerged. While we all were trained in BR and began our academic journeys strictly in BR, we all transitioned into heavily educator roles and DBER during our non-tenure-track positions. A clear divergence is that Stanley seems to cleanly transition his investment as displayed in his abrupt shift in the research focus of his currency (i.e., presentations, publications, reviews, grants, and students), while Emily is a splitter who divides her time more evenly between BR and DBER. Stanley represents the shifting trajectory, during roughly the same time frame as Emily's training, where prior to his postdoc he engaged entirely in BR and shifted nearly wholesale to DBER and has mostly continued in that research area (Figure 2). Alternatively, Emily represents a more parallel trajectory of a “both” (Figure 2), whereby after beginning her DBER work at the end of her non-tenure-track position she has continued to carry currency in both fields ever since. Rou-Jia marveled at Emily's splitter trajectory, commenting:

*Rou-Jia:* What strikes me is how having Emily's central focus was shifted in different directions, then coalesced towards her desire



**FIGURE 2** Timeline of Emily, Rou-Jia, and Stanley's contributions to their fields (as presentation authors, publication authors, article reviewers, grant primary investigators, or student mentors) coded by the research strands (i.e., discipline-based education research, DBER, or biology research, BR). Boxes of pure light blue or pure dark brick red represent a year's worth of contributions that were entirely BR or entirely DBER, respectively. Gradations between these ends represent years where the contributions were divided between the two research strands. Several critical pivot points (i.e., first SABER meeting attended, first NSF IUSE grant awarded, key professional development in teaching [FIRST IV and SI: summer Institutes on Scientific Teaching]) are also noted on the top of each of our individual timelines. Black and gray horizontal boxes define the timelines by year and career stage (UG, undergraduate; Grad, graduate; PD, postdoc; Teach, teaching; Non-TT, non-tenure-track; TT, tenure-track position), respectively.



to be both, and how it wasn't necessarily a transition between different identities (as perhaps Stanley's is in terms of different fields) nor was it the subsuming/integration of different identities with each other (as perhaps mine feels like), but that it is a true coexistence of both.

Rou-Jia's development, being the earliest in her career, is more nascent and represents a coalescent trajectory where her teaching and scholarship (in both BR and DBER) overlap. The years beyond this point in time will clarify Rou-Jia's trajectory of her "both" and whether it overlaps with Stanley's, Emily's, or represents an entirely new trajectory.

*Rou-Jia:* My first foray into DBER was during my postdoc, and at the time I just thought it was an interesting thing to try—a new type of research approach and question that was interesting because it was still research but related to teaching; as I left my postdoc and moved towards teaching, I liked the idea of being able to use tools and skills from DBER to assess my own teaching or to develop as a teacher.

*Stanley:* I think even as a bench scientist in graduate school, like, I was always looking forward to the stage where, like, I didn't have to be at the bench and I could be just at the computer. Like, in some sense, right, like switching into DBER allows me, like, to continue to, like, directly engage in the research while, like, not being at the bench ... It's almost like a career stage transition, right like, you move to the computer and you have to leave the direct contact with the data and research behind. And so you have to, like, almost like choose one versus the other. But DBER allows me to actually do both, be in the classroom and ask questions about it.

Our timelines highlight these different trajectories of a "both" but also underscore important elements of becoming a DBER scholar that are consistent across the three of us (Figure 2). Notably, we all share critical pivot points from BR into DBER, where shifting foci and trying new things was acceptable (Sung et al., 2023). Each of us participated in professional development programs which seeded our interest in evidence-based teaching [i.e., FIRST IV program for Emily (Ebert-May et al., 2015) and summer Institutes on Scientific Teaching for Rou-Jia and Stanley (Pfund et al., 2009)]. Our first attendance to the SABER conference (i.e., Society for Advancement of Biology Education Research) provided a community of DBER scholars, encouraging our participation across a range of academic currencies. Then finally securing our first National Science Foundation Improving Undergraduate STEM Education (NSF IUSE) funding was recognition of our capacities, which propagated through our contributions as a DBER scholar. The timeframe required to complete projects may also play a role when one "crosses over" from BR to DBER or has the ability to split between research types.

## 4.5 Being a "both" to others

### 4.5.1 Narrative identity of a "both"

The above conversations helped to describe a DBER "both" as unique intersections of our professional roles and research strands.

Initially, our definitions of ourselves as "boths" centered on our own perception of self. However, our discussion clarified a transformed understanding using the comparison with one another's "both" experiences.

*Rou-Jia:* Maybe initially, as the most recent one of us into the field of DBER, my DBER research is completely folded into my educator role because everything is still so new. But with time, there is this potential to develop my DBER research to mature in a direction that is still dependent on my educator role but I can begin to build parts of my research that are independent of my teaching. So, if you are starting in the DBER field, linking it to something that you might already be doing or thinking about could be easier as an entrance.

*Emily:* The comparison of the three of our models is confounded by two factors: where we are in our trajectories, and the kind of institution that you are at.

*Stanley:* Agreed, some of it has to do with the institution and the role that we're in. For me, some of my BR research is actually my educator role. I actually only do it because my department views me this way, and that work exists but I don't see it as my researcher identity, I see it as part of my educator identity.

*Emily:* Along these lines, I developed Figure 3 to build off of the other two Figures 1, 2 and do a direct comparison of the three of us to clearly see that our identities look different. In creating them, I was like "Ah, there's this extra dimension that I can add on there." I didn't feel like we had any visualization and only minimal data reflecting on a narrative identity and thinking about how we view how others think of us.

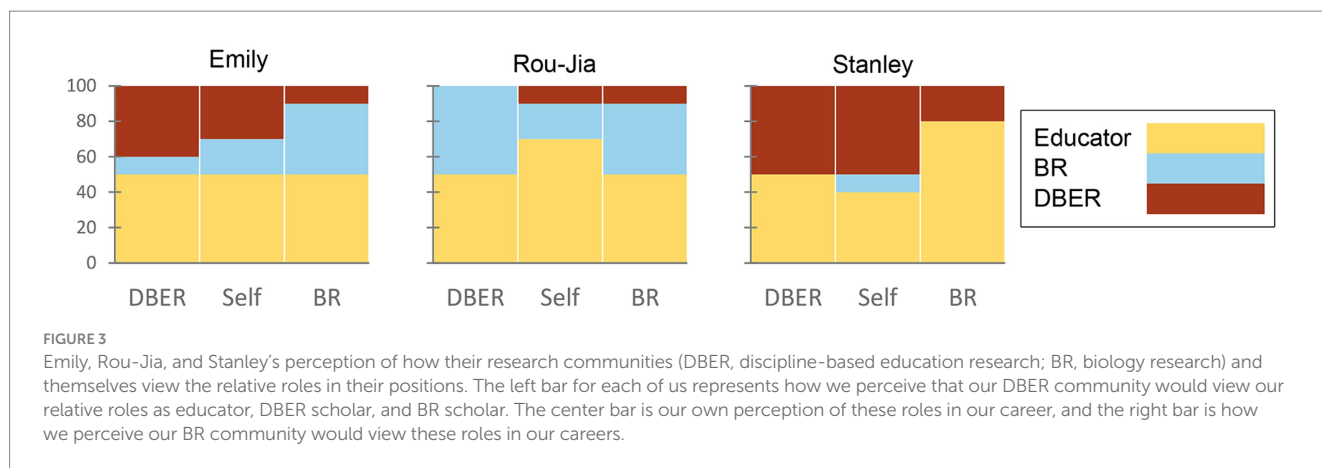
*Rou-Jia:* I haven't had those kinds of conversations with colleagues to get a sense for how they viewed me and my research.

*Emily:* I think the idea was thinking about this as narrative identity and who we present to others and our perceptions of how others view us.

*Stanley:* I think you'd get a different answer if you ask different people. If you ask my department, they would say that I am 90% an educator and 10% a DBER scholar, but if you ask SABER folks it will probably be 60% educator, 15% DBER, and 25% BR.

*Emily:* And that's why I included two "external perceptions" on Figure 3 because there are different audiences that have different perspectives. So, for me one is supposed to represent my colleagues in my biology department or other lichen ecologists who I consider have one perception of me. While the other one is my perception of how the SABER community or other biology education researchers view me.

*Stanley:* The stories that we tell about ourselves or others tell about us can reify from stories into actual identity of what kind of person someone is. And I think as one navigates transition into DBER, there is going to be a lot of configuring and refiguring of ourselves!



*Emily:* Indeed! As “boths” we are balancing the fact that different people are seeing us in very different ways. Being a DBER scholar, in many cases, often means that these views don’t match up.

Our discussions revealed that our descriptions of self are part of a larger story that we represent as a narrative that we create and share with others. This narrative identity gives meaning to the reconstruction of one’s past, development of identity through time, and imagined future (McAdams, 2011). How we present ourselves to others may also differ depending on which field they participate, i.e., biology or education. This liminality, the space between who you see yourself as and what you are labeled (Kensington-Miller et al., 2015), is noted elsewhere in the literature. Kensington-Miller et al. (2015) describe being a “chameleon on a tartan rug” where she is constantly trying to blend in with ever-changing expectations in different contexts. Aitken (2010) makes two distinct self-representations of her identity in the same set of tenure documents to seek success by others and from herself. It is notable that in our own descriptions of how we view our own roles (as educators, as DBER scholars, and as BR scholars), we see ourselves differently than we perceive that our peers view us (Figure 3). This narrative becomes even more complicated as we further perceive that our two communities (BR and DBER) view us differently (Figure 3). Thus, “Our identities are not equally valued in all the communities we inhabit” (Simmons et al., 2013, p. 17).

#### 4.5.2 Navigating figured worlds

According to Holland et al. (1998), identities are situated in complex sociocultural contexts called figured worlds, which are defined as “socially and culturally constructed realm [s] of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others” (p. 52). The actors or participants in a figured world behave in ways that they believe have been deemed acceptable within that particular figured world, and others within the same figured world interpret and recognize these actions through the accepted norms of that figured world. An important consequence of the figured world construct is an individual’s agency or the ability to figure and re-figure themselves. As Urrieta (2007) described, “[t]hrough participation in figured worlds people can reconceptualize who they are, or shift who they understand themselves to be, as

individuals or members of collectives” (p. 120). As “boths” we found ourselves situating these conflicting identities in multiple figured worlds.

*Rou-Jia:* I remember trying to contort myself into the identity I thought the jobs wanted me to be. For example, emphasizing the chemistry aspects of my PhD in order to convince a department that I could teach intro chem (in retrospect, I think I could, but there is no way I would identify as a chemist). On one hand, I could see these factors pushing us to strive harder to help us figure out our identities by sheer contrast to what we are asked to be; on the other hand, I wonder if it narrows us down into a lane that isn’t the identity we want or have.

*Stanley:* So, this multiple identity thing is interesting, and it reminds me that when I first started my current position, I remember writing DBER on my application file and felt a bit uncomfortable with that but I also decided it was a term that would make sense (or explainable) at least to some people on the search committees. I still did that in my tenure file this year, but you know, just gotta write to the audience!

*Rou-Jia:* Similarly, when people ask me what I do, I say I teach biology at [Institution] and I do research on “blank” (the latter half of that statement largely depends on the audience I’m interacting with).

*Emily:* But my real question is: what *is* that blank? While it may also depend on the audience, it may be very telling as to what you fill into that blank. Is it BR? Is it DBER? Is it some combination of both? We show a face to conform to the identities that are expected of us. But is this bad? Stanley and I have both done it because we did identify as DBER scholars at some point ... we may be shifting, but it represents a piece of us.

Not only did our conversation braid together the common thread of our experiences as “boths”, but it also burst it apart as multiple trajectories of a “both” emerged and the complex narrative we each construct to successfully navigate as our own trajectory of a “both” was deconstructed. We found ourselves as actors in multiple figured

worlds (e.g., BR and DBER). Each figured world contains its own cultural expectations that influence our behavior and identity (Gonsalves et al., 2019). Within these sites of identity formation, we realize that we are creating a narrative to be recognized by those in that world (Urrieta, 2007). While navigating a figured world is difficult, we uncovered that it is even more challenging to be navigating multiple figured worlds simultaneously, whose identities and responsibilities may sometimes be in conflict. This tension arises as we strive to "... neither abandon our pre-[DBER] identities ... nor cling to them so tightly that we miss opportunities" (Simmons et al., 2013, p. 17).

A central challenge of this navigation of more than one figured world is the expectation to "be one thing," despite the implicit demand to be both, i.e., have expertise in a basic science yet be a strong discipline-based education researcher. While the multiple strands of research in discipline-based education research scholarship, including DBER, does not always necessitate a career change, which brings its own pressure and risk (Ibarra, 2002), it often requires selecting a primary strand for review, promotion, and tenure activities (Dolan et al., 2018). Or at least preparing multiple outward-facing identities of our past, current, and future selves that can be burdensome.

*Emily:* Certainly, for the last 8 years I have had two labels neatly tucked in my own pocket ... but as I reflect, I rarely wear them both simultaneously. Although I feel my DBER and Lichen Ecologist labels are both appropriate for me (similar to my Teacher and Researcher labels), I think I rarely wear both at the same time because I feel it can degrade my credibility in either one. For example, I interviewed a prospective grad student earlier this week who is looking to do lichen ecology work, but I had to explain my "both" because it can be shocking for new grad students to come into my lab and find people doing such divergent kinds of research. But it makes me feel like I am explaining a flaw.

*Rou-Jia:* Similarly, in liberal arts institutions I feel like they want you to be able to teach broadly ... you have to be specialized, but also, like, you get extra points if you can teach into other areas that are tangential to your specialization. For example, if I was a biochemist and I could speak some cell biology language that would be considered a positive. But that's still within biology as a discipline. But I feel, like, if I can also speak social science talk, I don't think that would be viewed in the same way or as a positive. It's almost like you're rewarded for certain types of struggling but not all.

*Emily:* Yeah, I was offered a job where this happened. They were like "it's great because you can do this science-thing. But we would love to have someone come in with this education background." And I really got the sense that they didn't really care that I do education research. My value was more me being the kind of person who works as an instructional advocate or as a teaching resource. But they didn't really care for the DBER research that I would do.

*Stanley:* I have arguments with my colleagues about where someone's value lies. Like we hired an electron microscopist, actually we hired a few of them now, and nobody is like "these are

our electron microscopists to run images for the rest of the department and they don't count as their own scientists." But that's how we are viewed.

*Rou-Jia:* There's like reinvention, like, on your own level ... I am reinventing how I am because what I feel of myself, it doesn't quite fit the way it was ... I feel like sometimes, there's an aspect of forced reinvention, like when you're like, "Oh, I can do--I can teach chemistry" ... I think there can be pros in forced reinvention, it does push you to be like "okay well maybe I could do this." I sometimes think in pushing us to think about ourselves in that way, it's like you might learn like, "Oh, I can do this."

*Emily:* I was never really asked to do exceptional things as an ecologist, but I was asked to do a lot of things as an education person, you know, 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.

While this exploration into the DBER identity and what it means to be a "both" was sown by curiosity about ourselves and our peers' perceptions of us, our discussions revealed how this experience both pushes and challenges us. These elements further represent additional assets and constraints we as DBER scholars bring to our communities. Stanley noted that "how do we narrate our own identity and how do our institutions narrate our identity may be different or the same." Alignment or misalignment between our narrative identity and what we believe is expected in our multiple figured worlds invariably contributes to whether we cherish or banish being a "both."

#### 4.5.3 Interplay of figured world and narrative identity

Undoubtedly, the separate, BR and DBER, worlds in which we exist help formulate our narrative identities that are constantly evolving. Not only do we view our roles differently than we perceive that our different peer groups perceive our roles (Figure 3; "self" bars differ from BR and DBER bars), but our perceptions of how each figured world views us can differ.

*Emily:* I noticed that the relative educator/researcher split between peer groups for Rou-Jia and I was the same (i.e., our DBER and BR peers saw us as 50% educator and 50% researcher). However, Stanley perceived that his peer groups saw this split differently (i.e., his DBER peers saw him as 50% researcher while his BR peers saw him as only 20% researcher).

*Rou-Jia:* I guess I'll say that I think it is a neutral to positive thing for me that both communities see that I am equally an educator and a researcher, and that identities get acknowledged in professional spaces. And that I feel both groups, DBER and BR, see that I do both, rather than me seeing the absence of that balance in their views.

*Stanley:* For me, it might be the departmental and institutional view of my "teaching professor" position was based on naming, the focus is highlighted on teaching? At my institution, it is an on-going structure for people in this position to get "colloquial"

recognition for our research work, even though it is a requirement for promotion and tenure.

We all acknowledged that we situate ourselves in these shared figured worlds and create our own narrative identities. However, our sideways reflection upon sharing differences and similarities in how we believe our communities perceive our educator and researcher roles further cements that personal experience and context helps craft our individual identities as a “both.” Further spiraling to interrogate the nested “both” of our researcher role, we further noted that the DBER-BR split as we perceive that our peer groups view us also differed.

*Emily:* Stanley’s peer groups (BR and DBER) see him as only a DBER scholar (i.e., his research portion is 100% DBER). For me, both my peer groups overestimate my scholarship in their own areas (i.e., BR peers think I do more BR and DBER peers think I do more DBER). Alternatively, Rou-Jia feels her peers all underestimate her scholarship in their own area (i.e., BR peers think she does more DBER and DBER peers think she does more BR).

*Rou-Jia:* This is a really interesting way to put it! I hadn’t thought of this phrasing or how it looks from the point-of-view of those communities until you pointed it out this way. It makes sense that that is what [Figure 3](#) is showing. I am not sure how it makes me feel.

*Stanley:* I think I feel more undervalued because of the differential proportion of the red and yellow portion of the BR bar. The BR peers are really more like my department, as I do not have BR peers outside really.

*Emily:* I wonder if this relates to our individual level of wariness or enthusiasm of being a “both” in the beginning? Specifically, perhaps I first embraced being a “both” and doing both and you all were more tentative because of the perception of your work not being valued?

*Rou-Jia:* I think I was more tentative because I was a little afraid of the consequences of declaring myself a “both.” I also hadn’t really felt established in anything, and so there was some personal hesitancy there. Interestingly, at the time that [Figure 3](#) was first created, several years ago, it felt very accurate. However, since then I feel like my ratios have shifted maybe to look slightly more like Emily’s, like, I think the DBER community sees me as doing some DBER work now. Part of this is because I have published more in DBER and after I somehow got onto the editorial board of BAMBED that has opened additional doors. And it’s interesting because some of these people don’t know my BR side at all, they only know me from my DBER side. So, it’s also been interesting thinking about that, like, how people first meet you and how does that shape their view of you. I think when this figure was originally created, most people had met me via my BR side, and so the DBER side always felt a little hidden; now that people are meeting me via my DBER side, that actually feels really nice to start being known for that!

## 4.6 Developing future “boths”

For years, the three of us explored the complexity of the nested dualities of being a DBER “both,” and how sometimes competing research identities (BR and DBER) are situated within dueling yet complementary professional identities (teacher and researcher). We concluded that being a “both” brings richness, balance, and conflict to our many identities from different figured worlds. Our exploration helped uncover strengths and challenges of such dualism and reflected inwardly and reflected on one another’s experience on how this “both” develops. The deep reflection of being a “both” ourselves helped us also look forward as we envision what the path for future colleagues in DBER may be.

*Rou-Jia:* The timeline in [Figure 2](#) really highlights, like, the changing importance of parts of our identities. This idea that they’re also not fixed—that these identities will shift with time and with career trajectories.

*Emily:* I agree, Rou-Jia, that this represents only a snapshot in time is probably a really critical realization. What we would identify for ourselves at this very moment may have looked different five years ago and may look really different five years from now.

*Rou-Jia:* It would be interesting to ask, like, a current DBER graduate student to draw what they think they are on these diagrams. Or if we, ourselves, followed up on this research, like, a couple years later. How would those things have shifted?

Our forward-looking reflections raised many questions about how other current “boths” whose paths differ from our own are managing this liminal space, and how to further foster and support future “boths”. While we gained notable insight from this exploration that was only contextualized by our conversations and comparisons with one another’s experiences, we are all “border-crossers” ([Singer et al., 2012](#), p. 27), i.e., biology researchers whose training is in biology and entered into DBER after starting our first positions. Yet, the field of DBER has drastically changed in the past decade. Perhaps the emerging nature of the field of biology education research within DBER, and further as an interdisciplinary field, was critical for us being able to navigate our identities as we were, in some sense, growing up with the field. Other DBER fields (e.g., physics education research, geoscience education research) are more or less advanced in their development compared to biology education research; thus, DBER scholars in other disciplines may experience different spectra of the trajectories we describe. In recent history in biology, few opportunities existed to pursue a postdoctoral associate position in DBER, even fewer doctoral programs specializing in programs with a strict DBER focus existed, and most DBER scholarship was conducted by non-tenure-track faculty ([Singer et al., 2012](#)).

*Stanley:* People are going to have different identity forming experiences. For example, postdocs that have a biology PhD, which is presumably an academic identity forming experience, start out as a biologist identity, at some level. Alternatively, people who are now in biology education research graduate programs, that’s their identity forming experience.

*Emily:* I think we all kind of came into our careers as biologists and looking ahead, I wonder about the DBER grad students who are being trained as biology education researchers like they may not have that super, super strict biology identity because they didn't maybe do a whole bunch of biology research. Like I wonder how that—what that means to them, and what that will mean for them.

*Stanley:* I remember the first biology DBER REU grant that was first awarded over five years ago, and one of my colleagues was like, “Is that really a thing? Can you be discipline-based education research if you are not fully in a discipline yet?” It was sort of like a philosophical question, in that sense, right, and at the same time, I was actually running into a naïve, like, early career researcher stumble myself. Where I was working on a learning progression project with an undergraduate on learning progressions for chromosome segregations. And then I realized the undergraduate researchers didn't understand enough about chromosome segregation to build a learning progression beyond their understanding of it. So, then I was like, “okay this is a project that requires like a PhD biologist person.” But then there are other DBER projects that may not require that level of discipline-based knowledge. And so I think that beyond just the three of us, but like as a field, we got to have more conversations ... that are like “what does it mean to train DBER graduate students?”

*Emily:* Right, what does an undergrad student need to have to have the capacity to be a biology education researcher? How much biology do they need to have to be a DBER person? And I think that connection of BR and DBER is an element of it. And I would also argue that there's just like basic things that you learned being a researcher, which just might happen to be a biology researcher that are skills that translate, like knowing how to think about research questions and what are appropriate methods. Things that you as an established BR scholar already had that helped you contribute to you quickly and easily becoming a DBER scholar.

*Rou-Jia:* I'm curious now that we have students who might be constructing both a biology identity and DBER identity at the same time or the order is flipped and how could that be impacting them.

The transformed understanding of what defines a DBER identity as a “both” was further exposed by our reflection forward. If the future generation of DBER scholars includes “cross-over researchers” (Lo et al., 2019) like us, will their timing of transition differ from ours? The implications of an earlier shifting timeline might facilitate more scholars into the field of DBER and broaden participation overall. Will future DBER scholars, in biology or other science discipline, be “boths” similar to those we have described, or will they represent entirely new trajectories? Will their intersecting identities represent different overlaps (i.e., not overlaps of research strands)? Continuing to explore these questions and gaining additional stories from the broader community beyond Emily, Stanley, and Rou-Jia will more richly describe the DBER “both” identity. Continued articulation and revision of what a “both” means in DBER may further build support systems and promote continued participation in the field. A recent presentation on preliminary work on this project at a national

conference prompted an email from an interested audience member, “Thanks so much for your work. As someone who has faced internal struggles of the identity in discipline-specific and biology education research, I gained an enormous sense of belonging as I listened to your stories.” Through sharing stories, we believe we are building a greater network of connections to others with DBER “both” identities, which may increase each of our salience in this “both” identity (Stryker and Burke, 2000). We hope that this work will prompt open discussions of what your experience of being a “both” is like and how it differs from the ones shared here.

*Rou-Jia:* I think the idea of being “both” is transformative, and hearing someone say I am “both” is also empowering, much in the way that hearing about teaching-related career paths was empowering when I was rejecting my researcher self. And it's kind of like looking at a person through a prism—at first it splits the light and you see all these individual colors, and then it turns and you see a new set of colors, and then it spins and you just see all the colors flickering around in this new whole. It makes me appreciate the importance of hearing people's paths and views of themselves while balancing these different commitments, to see that there are different ways to view being a DBER scholar and that *it's okay*.

## 5 Conclusion

Through this duoethnographic process, we, as three DBER-BR scholars, defined that our DBER identity is represented by a nested duality of a teacher–researcher duality and a DBER-BR scholarly duality nested within our researcher identity. The DBER “both” that we describe developed from our own experiences and the dialogue we have with colleagues. By reflecting backward, observing sideways, and synthesizing together ahead, we realized that our navigation within multiple figured worlds sometimes necessitate a discourse about what our identities are that fluidly shape-shift depending on our immediate peers. We also gained an appreciation for the value in being a “both.” We benefit from the knowledge, skills, and experience of both BR and DBER which is an asset to both our fields and practice. More broadly, sharing this process and our findings highlights the power in this type of narrative, where academics, and specifically DBER scholars, can see that everyone's diverse experiences make them belong as opposed to exclude them.

Our exploration is important because this dualism is implicit in the field of discipline-based education research and may help this community better understand challenges experienced by its scholars. In addition to dualism within the researcher identity (DBER-BR), unique to DBER scholars, there are also unique interactions between research and teacher identities within DBER. While the institutional norm in academia is often to keep teacher and researcher identities separate and neither informs the other (Aitken, 2010), the interdependence of teaching and research is explicit in DBER. The DBER duality may also share parallels with Science Faculty with Education Specialties (SFES), which sometimes includes DBER scholars. There is abundant literature about SFES and their identities and roles within their science departments; however, SFES also includes those whose primary focus is teaching science, and they may

not have a research component to their job duties (e.g., Bush et al., 2008; Bush et al., 2011; Bush et al., 2013). The DBER “both” also has overlaps with the experience of academic developers (Little et al., 2018) who are imprinted by and remain “precarious but connected” to their disciplinary fields (Sutherland, 2015). Other work has tried to clarify how these scholars situate their work with other non-disciplinary fields (e.g., cognitive psychology; Mestre et al., 2018), while also navigating how their research compares to peers in their disciplinary departments (Dolan et al., 2018). We hope this study spurs discussion about what it means to be a DBER “both.” These discussions could highlight the assets and strengths of being a “both,” critical to justifying and engendering systemic and institutional value in DBER. Such insights could allow DBER scholars to better support fellow DBER scholars in our shared but diverse experiences. The focus on strengths may open the door for science discipline (e.g., BR) scholars, who interact with DBER scholars as colleagues and reviewers, to become allies to DBER scholars and hear all parts of their story as a “both.” These discussions could underscore challenges of being a “both” to ensure there are community and institutional support systems to help novice DBER scholars become expert DBER scholars. Our backward-, sideways-, and forward-glancing insights suggest that explicit acknowledgment of the complex DBER “both” identity may build stronger bridges of recruitment and retention into the DBER field for emerging scholars. Finally, these discussions could simply serve as a common ground to build community among DBER scholars who share overlapping yet contrasting “both” identities.

## Data availability statement

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

## Ethics statement

Ethical approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent was not required for participation in the study or for the publication of potentially identifying information. The participants in the research have contributed to the article as authors and consented to its submission and publication.

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EH: Conceptualization, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. R-JS: Conceptualization, Formal analysis, Investigation, Methodology, Writing – review & editing. SL: Conceptualization, Formal analysis, Investigation, Methodology, Writing – review & editing.

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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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