Centering sense of community in professional development for emerging discipline-based education researchers

Christian D. Solorio

Department of Physics, Rochester Institute of Technology, Rochester, New York 14623, USA

Eleanor Sayre

Department of Physics, Kansas State University, Manhattan, Kansas 66506, USA

Scott Franklin

Department of Physics, Rochester Institute of Technology, Rochester, New York 14623, USA

Traditional professional development (PD) often focuses solely on skills and knowledge, without explicitly attending to participants' sense of community. In this instrumental case study, we explore the impact of a community-building PD experience on an Emerging Discipline-Based Education Researcher's (EDBER's) sense of community. We center the experiences of one tenure-track faculty member, James (a pseudonym), who participated in a Professional Development for Emerging Education Researchers field school for EDBERs, an example of PD that intentionally attends to building community around research. We find that the PD experience contributed to building James' lasting of community in education research, and we call for more PD to shift towards being simultaneously skills-focused and community-focused.

I. INTRODUCTION

Traditional professional development (PD) programs, such as those sponsored for an organization's employees or offered for continuing education credits to maintain licensure, focus on building skills and knowledge and often do not directly attend to participants' sense of community. A contrasting model, Faculty Learning Communities (FLC) [1], does focus on community, typically of teachers in a particular school or subject. The FLC model has been incorporated into physics and astronomy faculty PD programs such as the Faculty Teaching Institute (FTI) [2] (previously the New Faculty Workshop), which was originally designed to develop participants' skills and knowledge for physics teaching. Now, FTI participants are invited to join a Faculty Online Learning Community (FOLC) [3] to connect with other physics faculty to build their skills and sense of community around teaching [4] after the FTI.

Analogous PD experiences that work to simultaneously build participants' research skills and sense of community around research are far less common. Such PD can be especially impactful for Emerging Discipline-Based Education Researchers (EDBERs), a portion of whom switch into Discipline-Based Education Research (DBER) mid-career and may not have a local community to support the development of their education research.

While many EDBERs are not new to doing research, they are new to education research, which requires new skills, perspectives, and research relationships. EDBERs may face similar research challenges that new faculty members experience, as both are trying to establish themselves in a field. Gonzalez et al. conducted a study on the supports and barriers that new faculty encounter as they transition from doctoral studies to tenure-track positions [5]. They found that factors like insufficient research training, lack of mentorship and guidance, lack of confidence, and lack of collaborations are barriers that new researchers face. They also identified role models for research, academic freedom to pursue research interests, and resources to learn more about research as effective supports. Traditional PD could address some of the needs of EDBERs, but would not address the mentorship and collaboration aspects, which suggests a need for professional development that centers community.

We define community-building professional development as professional development that explicitly attends to participants' sense of community. One such experience is the field schools and workshops hosted by the Professional Development for Emerging Education Researchers (PEER) Institute [6]. PEER field schools are immersive, multi-day (typically 3- or 5-day) workshops that build the education research skills of EDBERs and nurture community around education research. The field schools are highly interactive environments where participants are constantly engaging with their own research ideas and the research ideas of other participants. Short presentations are interspersed between the activities and are designed to be responsive to the interests and needs of participants. Commonly covered topics include research process models, data collection and access, interview methodology, ethics, and theory.

We present an instrumental case study [7] of one participant who went through a PEER field-school and discuss how that impacted their sense of community in education research. Sense of community focuses on an individual's experience of a community and their belonging in that community [8]. We ask the research question: *How do community-building professional development experiences contribute to an EDBER's sense of community (SoC)*? This research will be of particular interest to PD developers and EDBER mentors and collaborators in understanding how particular experiences contribute to the ways that an EDBER feels (or does not feel) a part of the PER community.

II. THEORETICAL FRAMEWORK

We use McMillan's and Chavis' Sense of Community framework to understand EDBER's sense of community (SoC), which refers to the ways that an individual experiences community and what contributes to their sense of belonging within that community [8]. McMillan and Chavis break SoC into four aspects: membership, influence, integration and fulfillment of needs, and shared emotional connection. One experience might contribute to multiple aspects of one's SoC and the aspects interact dynamically with each other to create and reinforce one's sense of community.

The first aspect, membership, is the feeling of belonging in a community and sense of personal relatedness that an individual has with other people in the community [8]. Membership is broken further into boundaries, emotional safety, sense of belonging and identification, personal investment, and shared symbols. Communities have boundaries of who is and who is not a member and what the subjects of group discourse are. Emotional safety refers to the community's capacity to allow members to be vulnerable by creating an empathetic and caring environment [9]. Sense of belonging and identification are the feelings that one fits (or can fit) in a community and that they identify with that community. Personal investment is the work one puts in to become a part of a community to make their membership feel earned [8]. Shared symbols are the ideas and artifacts that the community bestow a shared common meaning and importance, such as publishing in journals. Similar to the four aspects of SoC, each element of membership interacts with and reinforces each other.

The second aspect, influence, is a bidirectional relationship; individuals should feel that they can impact the community, and the community should be able to impact individuals. Influence between individual and community happens concurrently. The next aspect, integration and fulfillment of needs, refers to the reinforcement of individuals wanting to be a part of a group [8]. An important part of this aspect is that community members work together to meet the needs of individuals and to meet the community's goals. The last as-

pect, shared emotional connections, refers to the shared history, interactions, and common experiences between members. Shared emotional connections are strongest when built through frequent and positive interactions.

III. METHODS

Using a subset of PEER's participation records, we contacted 60 PEER field school participants from 2023 and prior via email. We conducted hour long, semi-structured interviews with 13 PEER participants who first participated in a field school at least one year prior to data collection. The interviews focused on the lasting impact of PEER field schools on participants' professional practices and their sense of community in education research. Participants were asked what pronouns they would like used in referring to them in publications. Seven participants chose to use she/her pronouns and six chose to use he/him pronouns. Of the participants, two were graduate students, seven were tenure-track faculty, and four were instructors. Participants also represented a variety of field schools from 2017 to 2023 with locations throughout the United States and virtually.

Each interview was transcribed by a third-party service. The interviewers independently reviewed interview field notes and transcripts while creating analytic memos [10] to capture their thoughts on the data and analysis. Each author had prolonged engagement with the data and repeated the data review process multiple times. Additionally, we conducted emergent coding on each interview to gain perspective on the larger themes present in the corpus of data.

Throughout the research process, the authors had frequent discussions on their interpretations of the data. The first author is a postdoc with formal graduate training in physics education research and has some experience facilitating PEER workshops. The second and third authors are experienced DBER practitioners and represent two of the three PEER Institute directors. They have facilitated PEER field schools and workshops since 2016. We offer this description of our positionality regarding DBER for the reader to better understand the context of the interpretations we make in analyzing the data. The first author's position as a relatively new DBER practitioner and the second and third author's experiences with EDBERs and DBER offered differing perspectives that led to rich conversations about the data analysis.

To address our research question, we present an instrumental case study of one participant [7]. Instrumental case studies offer insight into a greater phenomenon by contextualizing the phenomenon in a particular case. This case informs us on the impacts of professional development experiences that attend to a PEER participants' sense of community. James (a pseudonym) was selected as the focus of this case study because he was a pre-tenure faculty member switching from a traditional research subfield into DBER. This represents a common pathway into DBER, as observed by PEER Institute directors.

IV. RESULTS

James is a tenure-track faculty member in physics at a Predominately Undergraduate Institution (PUI). His main duty is teaching, but there is some expectation of research as well. His background is in a traditional physics research subfield, but he decided to switch into DBER because of his interests in it and to more easily do research with undergraduate students. While he does not have a local community of other faculty doing DBER, his institution is supportive of education research. He sat in on an undergraduate qualitative methods course and did a small project on math education research. To further build his capacity to do education research, he participated in a two-hour online workshop hosted by PEER and then later participated in a PEER field school in 2022. We present select quotes (in the chronological order that they appeared in the transcript) viewed through the SoC lens.

When talking about local DBER practitioners at his institution, James shared, *"There's not a lot of people... doing the same kind of thing. So we don't have a community set up."* He felt that PEER, though, gave him a community of people "*struggling with the same kind of things and working on such diverse projects.*" Meeting and frequently interacting with people at similar stages in research contributed to building a shared emotional connection. When asked about what some of the lasting impacts of PEER have been, James replied,

> *"Definitely the community, and then also just some confidence because even reading the papers on education research I didn't feel that I got it, that I really was a colleague of that community. And so, I think going to the workshop and getting immersed in it for five days, and talking about different aspects of how do you do this kind of research and what are interesting questions, just helped me feel more comfortable that I can be part of that community."*

James did not feel a strong membership in the education research community before PEER. Reading literature did not build the membership aspect of James' sense of community, but interacting with other EDBERs did and becoming "immersed" in how to do education research did. He gained some of the essential knowledge to doing education research through this experience, which contributed to the integration and fulfillment of his needs. He gave the example of learning about education theories, which *"definitely helped, again, with that confidence that I've been able to look at the literature and have more of a basis to kind of dissect and understand."* The skills he learned from the PD alongside other EDBERs bolstered his sense of belonging and identification in the group, bringing him from feeling like membership within the community was inaccessible to possible.

James shared that PEER grew his confidence several times throughout the interview and that it was an important, lasting impact. He said,

"I would say really just the confidence thing is the key. That hey, I can do this, and I think there, a big part of that is sharing my own ideas, listening to other people share their ideas, and going, 'Hey, we're not crazy. You know, this is really interesting.' "

During the field school, James felt comfortable sharing his research ideas with a group of other EDBERs. The constructive, supportive environment worked to build his confidence. The frequent, positive interactions also built a shared emotional connection between field school participants. James also highlighted how participants were able to shape each other's ideas:

"I think one thing I took away was that we tend to be over ambitious for what we can do at a PUI with however many students and no postdocs and that kind of stuff. So maybe it's also a reality check being with a group of people, so they say, 'Yes, that's a great idea. Wow, you can do this and that and the other thing, but you would never have the time to go through the data'. You know, so I think that was helpful too. "

This "reality check" is an example of influence from the group on an individual. The group of EDBERs, working together, provided James guidance on productive research choices for his institutional context. James experienced the other side of this as well. Providing feedback as a member of the group to other individuals allowed him to feel like he could influence the group.

James was later asked about how someone would know they are in the PER community. He replied,

"Publishing would do a lot and, you know, being successful in that, that it was peer-reviewed and other people said, 'hey, yeah, that's a worthy contribution.' I do worry a lot about, how to say, the generalizability of what I've done that I tend, you know, working with small classes and working with groups [. . .] If I had that written up and people said, "yeah, that's okay. You know, we understand the limitations of what you're doing, but it is valuable to see what you're doing," I think that would make me feel more part of that community and not just on the periphery."

James values publication, a traditional symbol of membership in the community, as a form of influence he could have on the education research community. He highlights the importance of it being peer-reviewed to validate that the publication would be a "worthy contribution". His identification with the education research community is restricted by the fact that he does not yet have a publication, which has caused him to feel his membership in the community is on the "periphery".

Although James has not yet published, he has presented some of his research at a large, national conference. He shared,

I've never done that outside of a class presentation, you know, so that was interesting. I'm really used to the 20 to 45 minute, you know, research talks, yeah. But anyway, it went over very well. [...] People were kind of like, 'yeah, yeah, that sounds really interesting,' you know. So that was reassuring that I'm not spinning the wheels, that I'm doing something that other people would value.

In the interview, James shared that he was concerned if his research would be something others cared about. After his presentation was met with positivity, his research interests were again validated. This contributes to the influence aspect of his sense of community because he felt like what he was doing was valuable to other people in the community. The experiences and knowledge he gained at PEER prepared him for presenting his research at a conference.

After the PEER field school, James felt confident enough to speak to people in other disciplines about education research at his institution, stating:

"You know, I definitely feel more confident talking to people over here in psychology and say, 'Hey, I'm looking at this. What can you tell me?' You know, I think PEER did contribute to that, this kind of idea that there are multiple. . . Even though we're working in different areas, we still have common interests, and have knowledge that is useful across different groups."

He identifies the field school as making explicit that collaboration can happen across disciplinary boundaries. His idea of membership within education research expanded to include fields he may not have previously considered, which helped him access some new resources at his own institution.

James has maintained contact with some of the participants in the field school, but mostly in a social capacity. He noted that there was one participant that he has talked to about research, and that he feels like he could reach out to any of the people he maintains contact with for feedback on his projects. The shared emotional connection that started at the field school has been maintained and the connections he made are a potential resource for him to access.

V. DISCUSSION AND CONCLUSION

We investigated how professional development experiences that consciously attend to participants' sense of community, exemplified by PEER field schools, contribute to emerging discipline-based education researcher's sense of community. Our findings highlight the significance of community-building PD initiatives in addressing the unique challenges faced by EDBERs, particularly those transitioning from traditional research fields into DBER.

Aspect	Description
Membership	PEER grew James' confidence in his skills and his place in the education research community. He feels on the periphery of the community though because he has not yet published his work.
Integration & Fulfillment of Needs	James did not feel like he could do education research after just reading the literature. At PEER, he learned fundamental education research skills and perspectives from PEER.
Influence	Working in a constructive and supportive environment with other EDBERs allowed the group to guide James to productive research choices. James values publishing as a form of influence he could have on the community.
Shared Emotional Connection	Interacting with the same people at a similar research stage over multiple days helped James to feel a part of an education research community.

TABLE I. A summary of James's sense of community organized the aspects of McMillan's and Chavis' Sense of Community framework.

Initially, James had a weak feeling of membership in the education research space. The PEER field school brought together a group of EDBERs at similar stages in an environment where they can focus solely on research. The participant-driven, multi-day format facilitated a shared emotional connection between James and the other PEER participants. The emotional connections bolstered his feeling of membership in the community by validating his research interests and creating a space for collaboration.

The PEER field school experience built the membership aspect of James' SoC. His confidence in his abilities and his sense of belonging in education research increased from being in a supportive environment of other EDBERs and experienced DBER practitioners (the facilitators). The integration and fulfillment of his needs alongside the shared emotional connection with other PEER participants contributed to his sense of membership. His research interests were validated and his sense of belonging grew from the experience. He credits PEER as an important factor in making him feel like he could be a part of the education research community. PEER grew his sense of community during the field school, and now he continues to utilize the skills he learned to advance his research after the field school.

PEER contributed to the integration and fulfillment of James' needs by providing him with some of the fundamental education research skills and perspectives that education researchers commonly possess. This helped James to better understand education research literature and perspectives, which reinforced his sense of belonging and opened new resources for his growth after PEER.

James' research ideas were shaped by PEER participants and PEER facilitators. He was also provided suggestions to others' research. Unlike the unidirectional influence of literature, the field school facilitated bidirectional influence. It served as an accessible environment for participants to apply their new knowledge and collaborate with others. Despite the experiences of influencing and being influenced by other EDBERs, he felt on the periphery of the education research community after the field school. Publishing felt like a gate he had to pass through to fully enter the community. Four other interview participants voiced a similar sentiment. This notion of publication as a critical form of influence could be shaped by his upbringing as a researcher.

The community-building professional development experience of the PEER field school contributed to a lasting SoC for James by addressing the four aspects of McMillan's and Chavis's framework: membership, integration and fulfillment of needs, shared emotional connection, and influence. Table I provides a summary of each aspect of James' SoC. For James, these four aspects interacted with and reinforced each other to foster a sense of community while also building his education research skills. Community-building PD in James' case was successful not only at providing him the tools to start education research, but also the community to continue doing education research. PEER's community focus built James' confidence in his education research abilities, connected him with other EDBERs and DBER practitioners, and made him feel belonging within the community.

We offer some takeaways and recommendations for readers. PD that focused on building skills and community helped James feel like a member of the PER community by giving him the tools and the people to support him. We recommend PD developers further incorporate community-building elements into PD to have a simultaneous focus on skill development and community building. Influence was a particularly salient aspect of James' sense of community. While the PD experience supported this aspect in some ways, there were gates preventing James from feeling fully a part of the PER community. We recommend PER community members to help EDBERs navigate some of these gates by offering mentorship and collaboration opportunities.

[1] M. D. Cox, Introduction to faculty learning communities, New Directions for Teaching and Learning **2004**, 5 (2004).

[2] Faculty Teaching Institute (n.d.).

[3] Faculty Online Learning Communities (n.d.).

[4] E. Price, A. C. Lau, F. Goldberg, C. Turpen, P. S. Smith, M. Dancy, and S. Robinson, Analyzing a faculty online learning community as a mechanism for supporting faculty implementation of a guided-inquiry curriculum, International Journal of STEM Education **8**, 17 (2021).

[5] L. M. Gonzalez, K. L. Wester, and L. D. Borders, Supports and barriers to new faculty researcher development, Studies in Graduate and Postdoctoral Education **10**, 21 (2019).

[6] PEER Institute (2024).

[7] R. E. Stake, *The art of case study research* (Sage Publications, Thousand Oaks, 1995).

[8] D. W. McMillanand D. M. Chavis, Sense of community: A definition and theory, Journal of Community Psychology **14**, 6 (1986).

[9] D. W. McMillan, Sense of community, Journal of Community Psychology **24**, 315 (1996).

[10] J. Saldaña, *The coding manual for qualitative researchers*, 3rd ed. (SAGE Publications, Los Angeles, 2015).