Peer Review in an Emerging Interdisciplinary Field:
Identifying Differences in Authors' Experiences and Perspectives

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Introduction

Engineering Education Research (EER) is an emerging interdisciplinary field (Beddoes, 2014a; Jesiek, Newswander, & Borrego, 2009). Having emerged less than twenty years ago, the field's boundaries and normativities are still shifting and being formed. Furthermore, EER is inherently interdisciplinary, drawing on theories and methods from other fields, including education, psychology, and anthropology, among others (Beddoes, 2014b). These characteristics - the age and interdisciplinary nature of the field - make EER a particularly interesting site for examining a discipline in the making.

One process through which the field's boundaries and normativities are being formed is peer review (Beddoes, 2011). Therefore, the overarching goal of this project is to identify the kinds of scholarship that are readily accepted into the field and the kinds that are not. Examining this boundary work can produce new insights into the social construction of knowledge in EER, as well as in other interdisciplinary fields. As a first step toward the overarching goal, this paper presents preliminary findings that address the question: What differences exist in the experiences, perceptions, and understandings of those who have submitted articles to the *Journal of Engineering Education* (*JEE)* within the past 5 years?

Methods

Participants and recruitment

The focus of this study is *The Journal of Engineering Education. JEE* was selected for its status as the top journal in the field of engineering education research and its function as a research "gate keeper" within the community. Participants were initially recruited from multiple national and international engineering education listservs and distribution of flyers at the 2018 American Society for Engineering Education Annual Conference. Participants completed a screening survey that asked about their experiences submitting and publishing with *JEE*. Seventy-three potential participants responded to the initial survey of which 62 volunteered to be interviewed. Two additional targeted surveys were distributed in order to recruit a representative sample of experiences. The first targeted survey was distributed to authors who had published in *JEE* in the past five years. The second targeted survey was distributed to early career faculty holding positions in engineering education departments across the United States. Respondents were a mix of Assistant, Associate, and Full professors as well as non-tenure track faculty members, academic administrators, and individuals holding non-academic positions. They came from departments of engineering education, educational psychology, higher education, and engineering.

Survey data was used to select 34 authors representing three distinct perspectives to participate in interviews: (1) manuscript authors who have submitted and had at least one manuscript rejected from *JEE* in the last five years (n=12), (2) authors who have submitted and had a manuscript published in *JEE* in the last five years (n=8), and (3) authors who had at least one manuscript rejected as well as at least one published in *JEE* in the last five years (n=14). Further details can be found in (Cutler, Beddoes, & Croninger, 2019a).

Data collection

Data collection consisted of in-depth, semi-structured interviews conducted in the fall of 2018. Each interview lasted approximately one hour. They were audio recorded and later transcribed. During the interviews, participants were asked about their experiences submitting to *JEE*, their perspectives on the field's theoretical, methodological, and topical boundaries, and their experiences as a reviewer. Questions about participants' experiences submitting to *JEE* included, but were not limited to, why they choose to submit to *JEE*, what were reviewers' primary critiques, how consistent were reviewers, and what did reviewers like the most about their paper. Questions pertaining to participants' perspectives on the field's boundaries consisted of which theoretical frameworks, methodologies, and topics they believed are prioritized compared to those that are not, as well as what they saw as the possible implications of those boundaries. Finally, participants were asked to compare their experiences as a reviewer to the reviews they received when they submitted a paper to *JEE*. In addition to participating in semi-structured interviews, participants also shared any documentation they had from their peer review process.

Data analysis

Preliminary analysis of nine interviews was conducted using NVivo version 12. Three participants were randomly selected from each experiential category. Open coding was used to look for emergent themes related to the kinds of knowledge that is deemed acceptable within the field of engineering education research in respect to theoretical, methodological, and topical foundations. What emerged were inconsistencies and lack of consensus across several leading themes around which we organized the results for this paper. Those themes were: 1) In/consistencies across reviewers; 2) perceptions of methodological preferences; and 3) understandings of theoretical frameworks.

Results

Participants (P) 1, 2, and 3 are in group 1 – manuscript authors (i.e., those who have submitted but never had an article published in *JEE*). (Further details about Group 1's perspectives can be found in Cutler, Beddoes, & Croninger, 2019b.) Participants 4, 5, and 6 are in group 2 – mixed experience authors (i.e., those who have had at least one article published and at least one article rejected by *JEE*). Participants 7, 8, and 9 are in group 3 – published only authors (i.e., every article they have submitted to *JEE* has been published).

1. *In/Consistency across reviewers*

Participants reported two categories of experiences regarding consistency across reviewers: 1) reviewers were consistent or 2) reviewers were not consistent, with manuscript authors experiencing inconsistencies and mixed and published only authors experiencing more consistency. Several different types of inconsistencies were noted by manuscript authors. For example, while all three manuscript authors described reviewers as inconsistent, P1 and P2 described conflicting feedback and P3 described an inconsistency between the scores they initially received on their manuscript and the Editor's final decision. Furthermore, P1 also detailed an inconsistency between the overall timeline and the Editor's final decision. Specifically, P1 was surprised to have their manuscript rejected following several rounds of revisions. The following statement is representative of this inconsistency:

> … I do want to know more specifically when is the point where… it is obviously a waste of time. I wish someone had told us sooner, or we had known then it was the same reviewers, or we knew that they were going to maybe bring in [new] reviewers in which case it's like a new whole set of complaints about the paper…

The remaining two experiential groups on the other hand, reported more consistency across reviewers from the original review to publication. Participants with mixed publishing experiences, however, did sometimes report being surprised by the consistency, noting that this particular experience was an outlier among their overall experiences submitting to *JEE,* as well as other journals.

2. *Perceptions of methodological preferences*

When asked about the field's methodological boundaries, specifically which methods are welcome or not welcome in engineering education research, participants gave one of three responses: 1) quantitative methods were favored over qualitative methods, 2) qualitative methods and mixed methods have gained a better reputation over the past 10 years, or 3) qualitative methods were gaining recognition but the field's standards of rigor in both quantitative and qualitative methods were also increasing. Specifically, the three manuscript authors reported that quantitative methods were favored over qualitative methods, while participants from the mixed and published only groups reported either category two or three or a combination of the two. The following statement is indicative of responses in the final category: "We are starting to see an evolution of even the quantitative where even the low-level quantitative stuff is no longer accepted and published in places like *JEE*"

Six of the nine respondents also specifically mentioned sample size as a methodological barrier to publication. In particular, that reviewers who were trained as engineers demonstrated some bias toward studies with large sample sizes, which lend themselves to quantitative methods, creating at least an implicit if not explicit desire for quantitative methods.

3. Understandings of theoretical frameworks

There was variation in how participants from the three experiential groups discussed and understood theoretical frameworks. When asked about theoretical frameworks, two of the manuscript authors responded in terms of methodologies. Specifically, that quantitative methods were more welcomed than qualitative methods. P3 named welcomed theoretical frameworks (e.g., motivation, community of practice, identity) and linked them back to widely accepted constructs. All three participants with mixed experiences stated that while it is not acceptable to *not* have a theoretical framework, all frameworks are welcome as long as they are well argued. The following response is representative of mixed experience respondents: "So, the long and short of it is that I think any theoretical framework is going to be fine as long as you argue for it well and justify it accordingly and cite the people that you need to cite within it."

Interestingly, P7 and P8 from the only published group seemed to combine the thinking of the manuscript authors and mixed authors by stating that quantitative methods are highly accepted but going on to say that all methods are welcome as long as they are argued. The final participant (P9) stated that the argument is what truly determined how welcome a particular framework was as long as there was no empirical research *debunking* it (e.g., learning styles).

Conclusion and Future Work

The differences in experiences and perspectives identified here indicate that EER is a field whose norms and boundaries are neither well-established nor consistently shared by those submitting to its leading journal. Consequently, the findings also reveal opposing experiences in terms of consistency between reviewers, with inconsistency most often leading to a manuscript's rejection. Finally, the findings indicate that theoretical frameworks are not understood by everyone in the field. These differences in experiences, understandings, and perspectives are important because: 1) they further our understanding of areas that lack consensus in engineering education research as an emerging interdisciplinary field, 2) they allow us to reflect on and potentially change boundaries and normativities shaping the field, and 3) they identify areas in which particular groups in the field can benefit from further professional development.

While this paper presents preliminary findings from early interviews, the study is on-going. Data collection and analysis will continue through fall 2019. Coding will continue and include the remaining interviews as well as the review documentation. Additionally, interviews will be conducted with at least five editors of *JEE*, and comparative analysis conducted between editor and author interviews. Ultimately, by opening the black box of peer review (Beddoes, 2014b), this study aims to increase access to, sociological understanding of, and transparency in engineering education research.

Acknowledgments

References

Beddoes, K. (2011). *Practices of brokering: Between STS and feminist engineering education research.* (Unpublished doctoral dissertation). Virginia Tech, Blacksburg, VA.

Beddoes, K. (2014a). Methodology discourses as boundary work in the construction of engineering education. *Social Studies of Science, 44*(2), 293–312.

Beddoes, K. (2014b). Using peer reviews to examine the micropolitics and disciplinary development of engineering education: A case study. *Discourse: Studies in the Cultural Politics of Education, 35*(2), 266–277.

Cutler, S. L., Beddoes, K., & Croninger, R. M. V. (2019a). *WIP: The field of engineering education research as seen through the peer review process.* Presented at the annual conference and exposition of the American Society for Engineering Education, Tampa, FL.

Cutler, S. L., Beddoes, K., & Croninger, R. M. V. (2019b). *Manuscript authors' perspectives on the peer review process of the Journal of Engineering Education.* Paper presented at the meeting of the Research in Engineering Education Network, Cape Town, South Africa.

Jesiek, B. K., Newswander, L. K., & Borrego, M. (2009). Engineering education research: Discipline, community, or field? *Journal of Engineering Education, 98*(1), 39–52.