Manuscript Authors' Perspectives on the Peer Review Process of the *Journal of Engineering Education*

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Abstract: Research communities often emphasize theoretical frameworks, methodologies, and topics that appeal to particular subgroups of scholars within the community. Therefore, one of the challenges associated with the peer review process is ensuring that innovative ideas are not rejected simply because they live outside the conventional paradigms of the community. Determining why manuscripts are rejected from premier outlets, which influence the norms of a field, can further our understanding of existing disciplinary boundaries and how to increase the diversity of perspectives and the participation of scholars with views outside the conventional paradigm in the community. However, much of the literature on disciplinary boundaries focuses on the reliability of reviewers themselves and published manuscripts. As such, this paper focuses on the experiences and perspectives of scholars who have submitted to but not published an article in the Journal of Engineering Education through in-depth, qualitative interviews.

Context

Academic journals are the traditional medium for sharing research findings and disseminating new knowledge within and across research communities. Academic journals serve as warehouses where the knowledge of a discipline can accumulate and develop over time. Editors and peer reviewers are charged with ensuring that published manuscripts adhere to a set of characteristics or norms agreed upon by the research community for that particular field of study. Published manuscripts, therefore, communicate disciplinary values in terms of theoretical frameworks, methodology, and topics while unpublished manuscripts provide evidence to what is not valued by that research community. Unfortunately, the peer review process can lead to homogeneity of research paradigms which fundamentally shapes the questions that are posed, how results are interpreted, and subsequently, what knowledge accumulates over time (Amsterdamska, 2005).

Engineering Education Research (EER) is an emerging, interdisciplinary field that draws on a diverse set of research paradigms from multiple disciplines such as education, psychology, and sociology. As an emerging field, EER is still forming the specific research expectations of the field and has been transitioning to focus on the importance of theory and implications beyond an individual classroom for over a decade (Baille & Bernhard, 2009; Borrego, 2007; Felder, Sheppard, & Smith, 2005; Nyamapfene & Williams, 2017). As the field develops, manuscripts published in the *Journal of Engineering Education* (*JEE*) should reflect a heterogenous set of theoretical frameworks, methodologies, and topics (Wankat, Williams, & Neto, 2014; Kloot, 2017). However, prior work has documented homogeneity of theoretical frameworks (Beddoes, Schimpf, & Pawley, 2014), an underrepresentation of qualitative

methods (Beddoes, 2012; Borrego, Douglas, & Amelink, 2009; Douglas, Koro-Ljungberg, & Borrego, 2010), and a lack of engagement in feminist methodologies and theories (Beddoes, 2013) among other trends. Nevertheless, the extent to which the peer review process in EER has influenced and perpetuated the characteristics and boundaries of the field is unknown. As such, analysis of the peer review process at *JEE* can offer insights into the development of EER and expand our understanding of the theoretical, methodological, and topical boundaries of the field. This project focuses specially on the peer review experience of authors who have submitted a manuscript to the *JEE* that was not accepted for publication by the journal. We refer to this group as *manuscript authors* throughout this paper.

Research Question

This paper addresses the following research question: What do members of the EER community who have submitted to, but never published in, *JEE* see as the topical, methodological, and theoretical boundaries of engineering education research? The rationales of this research are: (1) that identifying the theoretical, methodological, and topical boundaries of engineering education research will facilitate a continuous dialogue around the ways that knowledge enters the field of engineering education research, and (2) such a dialogue can help advance the development of the field.

Methods

Larger study

The data analyzed for this study were pulled from a larger, on-going project aimed at exploring the field of EER through the community's peer review experiences. *JEE* was selected because it is widely recognized as the premier engineering education journal (Pawley, Schimpf, & Nelson, 2016), and thus, functions as a primary gateway for new knowledge within the EER community. Participants were identified through a series of targeted surveys and contact information included in *JEE's* table of contents between 2013 and 2018. A purposeful sampling approach was used to identify 35 authors representing three unique perspectives to participate in semi-structured interviews: (1) manuscript authors who have submitted and only had a manuscript rejected from *JEE*, (2) authors who have submitted and published a manuscript in *JEE*, and (3) authors who had at least one manuscript rejected and at least one published in *JEE*. Importantly, while manuscript authors in the first category have not published an article in *JEE* specifically, many of them have published articles in other academic journal outlets. The authors who were selected to participate in the larger study represent a range of theoretical, methodological, and topical perspectives and had documentation of their review process to supplement interviews. As such, data was collected through multiple sources.

Semi-structured interviews were conducted in the Fall of 2018. The interview protocol was pilot tested and refined before the interviews were conducted (Singleton & Straits, 2010). Questions included but were not limited to participants' experiences and perspectives on the peer-review process of *JEE*, their perspectives on the theoretical, methodological, and topical boundaries of EER, and their experiences reviewing potential articles (see below for more detailed description of interview protocol). In the Fall of 2019, we will conduct a second round of interviews with the fields' "gate keepers," including associate editors, senior associate editors, and/or deputy editors of *JEE*. The interview protocol will be based on the findings from the author interviews and focus on editors' beliefs regarding the findings, as well as their own perspectives on the peer reviews process, and changes they believe are needed in the field.

Participants

The sample for this study was recruited through the distribution of two screening surveys. First, a screening survey was distributed to the EER communities in Australia, the United

States, and Europe through national and international engineering educational listservs and flyers at the 2018 ASEE Annual Conference in order to identify potential participants for in-depth interviews. Sixty-two potential participants indicated that they would be willing to participate. Of those, only ten respondents were eligible to be included in the analytic sample of the current study given that the restricted nature of the sample. Two additional participants were recruited through a second, targeted screening survey which was distributed to early career engineering education faculty members across the United States. Thus, the final sample included 12 manuscript authors who had submitted and had a manuscript rejected from *JEE* in the last five years.

The study participants were 58% female (n = 7) and represented a mix of graduate students, postdoctoral research associates, assistant professors, and individuals holding non-tenure track faculty or staff positions in the United States and Europe (see Table 1). The majority of participants (n = 10) reported engineering education as their primary disciplinary association. One participant reported their primary disciplinary association as education and one participant reported their primary disciplinary association as engineering. Fifty percent (n = 6) of the sample indicated that they have served as a reviewer for *JEE* in the past.

Table 1: Participant Characteristics

Characteristic	Number of Manuscript Authors
Discipline	
Engineering Education	10
Education	1
Engineering	1
Location	
USA	11
Europe	1
Position	
Assistant professor	3
Associate professor	0
Professor	0
Non-tenure track faculty member	2
Postdoctoral Research Associate	2
Graduate Student	3
Other	2

Data collection

All participants were interviewed individually via Zoom by the principal investigator or a trained graduate research assistant in the Fall of 2018. Each semi-structured interview lasted approximately one hour. All interviews were video recorded and transcribed for later coding. Verbal consent was obtained at the beginning of each interview. During the interview, participants were asked about their experiences submitting to *JEE* as well as their perspectives on the EER community's theoretical, methodological, and topical boundaries and their experiences reviewing for *JEE*. Participants were asked questions about why they

choose to submit to *JEE*, the extent to which reviewers were consistent in their feedback, and what reviewers liked and disliked most about their paper. Questions about the theoretical, methodological, and topical boundaries of EER, however, were refined after the first three interviews to clarify the meaning of the questions and accommodate participants' understanding. The original language prompted participants to describe the current state of the fields' theoretical, methodological, and topical boundaries and norms as well as what, if any, changes they would make to those boundaries and norms. The revised language prompted participants to describe which theoretical frameworks and methodologies are welcome in the field of EER and which are not, as well as identify which topics are prioritized and which topics are undervalued. The revised language continued to prompt participants to consider the implications of emphasizing theoretical frameworks, methodologies, and topics as well as what changes they would like to see implemented in those areas in the future. Thus, while the language of these questions was revised, the questions were still aimed at participants' perceptions of the boundaries of EER. Finally, participants compared their experiences as a reviewer to the reviews they received when they submitted a paper to *JEE*.

Data analysis

Given that this paper is a preliminary analysis with limited page allotment, we focus here on presenting the manuscript authors' perspectives. A more critical discussion of those perspectives will be presented in subsequent journal articles.

Analysis of 12 interviews was conducted using NVivo version 12 utilizing a grounded theory coding system. An a priori coding system was not superimposed in favor of emergent themes (Strauss & Corbin, 1998). Emergent patterns were used to identify themes at two levels. At level one emergent patters were used to identify possible theoretical, methodological, and topical boundaries and themes in participants' peer review experiences and beliefs that were explicitly referenced in participants' discourse. At level two emergent patterns were used to identify themes in participants' perceptions that were not explicitly stated in participants' discourse.

Findings

Our findings are divided into two sub-sections. The first sub-section presents two themes that emerged directly from participants' perspectives on the peer-review process in EER and the field's boundaries. The findings presented in the first sub-section indicate that manuscript authors: (1) perceive an unwillingness to publish qualitative methodologies, specifically, single case studies and grounded theory; and (2) experience difficulty publishing theoretical frameworks, methodologies and topics not traditionally prioritized by the field. The second sub-section presents a theme not directly identified by participants themselves and, thus, represents a different level of analysis. Specifically, the findings presented in the second sub-section indicate a need to define the differences between a theoretical framework, methodology, and topics.

Participant perspectives

Acceptable methods. Participants' responses for the methodological boundaries of EER revealed three themes: (1) that participants felt quantitative methods, particularly studies with large samples, are valued and understood more than qualitative methods, (2) that participants felt both quantitative and qualitative methods are valued and welcome, but single case studies and grounded theory are undervalued and misunderstood, and (3) that participants felt there is a bias toward "rigorous" research in comparison to research conducted by practitioners in their own classrooms.

Four of the participants expressed that they felt quantitative methods are very accepted among the engineering education research community over and above qualitative methods. One participant said, "…just some statistical thing. I think they are definitely more interested in quantitative than they are in qualitative." There was, however, some variation in the

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reasons participants identified for valuing quantitative over qualitative methods. For example, one manuscript author felt that the field preferred quantitative over qualitative methods because, "…engineers need statistics and numbers to be convinced of things," while another participant felt that:

> When it comes to qualitative data, people not only aren't as interested in the articles, but they also aren't as familiar with the research methodology and what makes the analogs of validity and reliability in qualitative research. So, I think a lot of times, reviewers who are normally used to quantitative methods are unprepared to review articles related to qualitative methods, and then that ends up being kind of a biased. It's like a vicious cycle of more and more quantitative articles get published and people don't kind of raise up those qualitative ones.

The majority of participants, however, felt that while qualitative and quantitative methods are both welcome, case studies and studies utilizing grounded theory are hard to publish. For instance, one participant perceived that, "…quantitative methods are very accepted. I think that's not a surprise. Qualitative methods are too…I don't know if the case study would be accepted like it is in business. I'm not seeing many at all of articles of a case study." Similarly, another participant who fell into this category of responses said that:

> I do think that because a lot of us started in engineering, we're just more comfortable with quantitative data and in analyzing it in that way. I personally haven't felt the, 'Oh, you haven't produced new knowledge because you're doing qualitative work.' I haven't felt that at all. I'm actually really surprised that I didn't feel that because entering the field, that was one of my big fears was that wouldn't respect me because I was doing qualitative work. People in engineering education don't-- I don't get that from them.

At a different time during the interview, however, the same participant said that, "… the only [method] that's kind of a little weird is grounded theory because I don't think people have an appreciation or really understand what it's going for. So, I think grounded theory is something that the field hasn't quite accepted yet in terms of 'yes, that's a valid way to do things.'"

The majority of participants also noted a bias toward "rigorous" research in comparison to research conducted by practitioners in their own classrooms. Specifically, participants perceived that the EER community was more accepting of research systematically conducted by trained scholars aimed at describing, predicting, improving, or explaining a phenomenon than research conducted by practitioners in their own classrooms. For example, one manuscript author stated, "the place where I feel like in education there's a big difference between sort of teacher research and then the stuff that gets published in the journals. And the stuff that gets published in the journals tends to be fairly large or else fairly lengthy in various ways, and so potentially more rigorous." One participant did note, however, that while there has traditionally been a bias against claims based on accounts of personal practices, that bias may be changing, "So, it's changing…We're starting to see more practice papers which I find really interesting. It is almost a bit confusing because I don't think they go [in *JEE*]."

Publishing innovative research. Manuscript authors also perceived difficulty publishing theoretical frameworks, methodologies, and topics not traditionally prioritized by the field (e.g., "I think methodological innovation is also not accepted. So, methods that don't conform to our definition of what a method is or that are trying to push the boundaries of it are difficult to get in."). Participants also noted that they felt is it difficult to publish papers that reconceptualize a popular theoretical frame or topic. For instance, one participant felt that they had difficulty publishing their manuscript because it discussed issues related to diversity and inclusion in a way that challenged mainstream views on underrepresentation in colleges of engineering.

Of those who discussed the difficulty of publishing innovative research, some participants indicated how this trend has impacted their professional development. For instance, one manuscript author noted that it was hard to recall traditional theoretical frameworks because he did not use them in his own work, "If you can cite what's considered the classics in your paper, then you'll have a good foundation of getting accepted. I can't even remember [them] because I found them really so unuseful for me." In contrast, another manuscript author felt that pushing boundaries may have negative professional consequences for her: "But maybe just to an earlier career person like me, it feels a little bit I have to be swallowing a certain carrot to be able to be successful here. And I guess seeing the same things being published and presented and stuff makes it seem like they're trends, and it makes it seem like I have to adhere to those."

Other emergent findings

Need to define theoretical and conceptual frameworks. When asked about which theoretical frameworks are welcome within the EER community and which are not, all but two of the manuscript authors conflated theory with methods or topics, or stated that they were not sure they understood the question. Frequently, participants' responses to questions about theoretical frameworks involved statements about quantitative methods being preferred to qualitative methods. For example, when asked about which theoretical frameworks were welcome one participant said, "So I would say that there's definitely a focus on quantitative research methods, so any kind of statistical methods that you're going to be using, or a focus on large data sets, or large sample size. People love that and hope for that." It was also common for participants to reference popular or undervalued topics such as retention, diversity and inclusion, undergraduate students, or student performance. For instance, one participant expressed that one thing that is, "…lacking is conversations on cost and the economics of interventions, and what we do in the classroom."

In addition to responding to questions about theoretical boundaries with perceptions regarding methodological and topical boundaries, several manuscript authors felt that they did not know how to answer the question or which theoretical frameworks were accepted or not accepted. Furthermore, one participant explicitly mentioned the need to define theoretical and conceptual frameworks as well as the purpose of each:

> I think we need to have a discussion of what is a conceptual framework, what is a theory, what is a theoretical framework. I think the advantage to what other fields, like education or behavior have, is that their journals have kind of defined that. Like, this is the theory journal. This is the systematic lit review journal. This is the quant journal. You sort of see that they've defined the boundaries of the things in their field based on the journal framings, and I think we're still deciding what that means.

Discussion and implications

The overarching goal of this project is to facilitate a discussion about the field's theoretical, methodological, and topical boundaries which influence which questions are posed, how questions are addressed, and potentially, engineering education practices. As an emerging interdisciplinary field, EER aims to draw on a diverse set of research paradigms from multiple disciplines. However, the findings presented in this paper build on the findings of others (e.g., Beddoes, 2012; Douglas et al., 2010) who have suggested that EER is limited in both scope and methodological diversity. More specifically, the findings align with prior studies documenting limited understanding of grounded theory (Beddoes et al., 2014), an insufficient number of reviewers capable of adequately reviewing qualitative research (Beddoes, 2012), and a dominant emphasis on "rigorous" research (Beddoes, 2014).

By including the perspectives and experiences of scholars who are members of the EER community but never published in the premier engineering education journal, this project offers new material for the EER community to consider as the field develops and further advances its practices. Our sample contained primarily early career scholars (e.g., graduate

students, post-docs, and early-career faculty) who struggled to identify and successfully navigate the theoretical, methodological, and topical boundaries of the field. This may be due to the fact that such boundaries are not consistently applied, universally agreed upon, or well-understood within the field. Further critical reflection on these issues needed.

That said, the findings presented in this paper represent the perspectives of the manuscript authors we interviewed. All of these perspectives may not accurately represent the current goals or intentions of *JEE* or the boundaries of engineering education. Rather, they point to potential incongruences with respect to where the current boundaries of the field are across different members of the field. For example, the growing number of authors who have published qualitative research in the journal in recent years may not share the same perspective on the methodological boundaries of the field. These are types of issues we will explore as data analysis continues.

The findings point to a need for spaces aimed at facilitating emerging scholars' understanding of engineering education research as a field and how to advance it. New professional development materials and workshops could further novices' understandings of EER norms and expectations. Additionally, their perceptions and experiences highlight issues in need of reflection and discussion by the wider community.

JEE is currently undertaking its own efforts to improve peer review and to help potential authors. While our project is separate from their efforts, and our findings independent, we hope to identify and undertake synergistic initiatives with the journal in coming years. The journal's editor serves on our advisory board and we will work with her to identify ways our findings can best contribute to *JEE*'s other efforts.

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