Board 43: WIP: The Field of Engineering Education Research as Seen Through the Peer Review Process

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Introduction

This Work-In-Progress paper highlights the work being done as part of an on-going project to explore the field of Engineering Education Research (EER) through the perspective of the peer review process. The overarching objective of this project is to identify the kinds of scholarship readily accepted into the field of engineering education research through peer review processes, and the kinds that are not. By identifying what approaches, topics, theoretical frameworks, and methodologies are accepted and not accepted through the peer review process, the field can be more open to discussion of the advancement of EER. More broadly, identifying such boundary knowledge can facilitate new understanding of how the social construction of knowledge occurs in interdisciplinary fields beyond engineering education. As a first step toward these larger objectives, we review relevant literature and outline our participants as well as our analytic plan.

Background

Disciplinary-specific norms reflect a field's priorities and values, as well as assumptions about what qualifies as rigorous, trustworthy, or quality scholarship [1]. The ramifications of disciplinary normativities include which methodologies are widely endorsed, which questions are investigated, and what is considered knowledge. As such, these normativities set the boundaries of a particular field. For example, Barton et al. [2] argue that the normativities set by the science education community prioritize a different audience as well as a different set of problems and solutions than participatory research. As a result, participatory research is published infrequently in science education and, thus, is not integrated into the science education community's body of knowledge.

While much of the boundary literature focuses on defining what it means to be scientific [3] – [5], additional boundary research has focused on how disciplinary boundaries are socially constructed through the peer review process [6] – [9]. The peer review process can provide insight into disciplinary values, normativities, and boundaries as reflected in the social interactions and deliberations between a field's gate keepers and prospective authors. For the purpose of this project, the "peer review process" is defined as "the whole process between the submission of a paper and its publication, including referees' comments, editors' decisions, authors' revisions and their negotiation. This process consists of partly written, partly oral, partly formal, and partly informal professional discourse that occurs beneath the threshold of publication" [7]. Indeed, published manuscripts which contribute knowledge to an overarching body of literature represent and communicate a field's values and expectations, while discarded, unpublished manuscripts reflect and communicate what is not valued by a field.

Researchers from multiple disciplines have conducted scholarship focusing on the peer review process as providing insight into the normativities, boundaries, and development of a field. For example, Lipworth and Kerridge [10] interviewed a collection of journal editors and peer reviewers in an effort to generate an empirically-grounded understanding of how epistemic authority is enacted through peer review in biomedical journals. Similarly, several researchers

from science education have conducted broad, general analyses of scholars' peer review experiences including documentation of reviewer and editors' feedback and responses to feedback as well as analyses of their personal peer review experiences [11] – [17].

In the context of engineering education specifically, critical analyses of the peer review process have also emerged [18] – [20]. These studies contend that peer review analysis serve as a methodological tool to shed light on the hidden values, beliefs, and practices guiding the development of EER. Exploring the normativities and boundaries shaping the emerging field of EER is particularly important given the field's interdisciplinary nature and the recent increase in scholarship about the status and development of the field. Moreover, scholars have noted a lack of internal consensus concerning the defining features of high-quality EER [21] and how the field should develop [19]. Further characterization of the normativities guiding the field will allow the EER community to critically examine and reflect on how knowledge is regulated in the field and advance beyond the status quo.

The work presented here builds on prior scholarship documenting characteristics of the field as it emerged. Some have noted that most scholars conducting EER were formally trained as engineers, and that there has been an overrepresentation of quantitative methods [22] – [24], perpetuated by EER's primary audiences having historically been engineering faculty members and administrators [21]. An underrepresentation of feminist theories and methodologies [18], [22], [25], [26], and a truncated use of theory overall [27] have also been observed. Although most scholars engaged in EER come from an engineering background, EER is interdisciplinary with scholars coming from education, psychology, sociology, and gender studies, among other fields. As such, academic journal outlets pull from a diverse pool of reviewers, representing a diverse set of expectations and normativities. In response to the interdisciplinary nature of EER, there has been a push in recent years to broaden the boundaries of the field [19]. Through deeper exploration of peer review processes, this project advances this line of inquiry into the development of engineering education research as a field.

Overarching Research Questions:
Research Question 1: What are the topical, methodological, and epistemological norms that exist in engineering education research and how are they enacted through peer review processes?
Research Question 2: What are the norms and values held by the field's "gate keepers"?

Methods

Participants and recruitment

To address the research questions of this project, we are examining the peer review process for the *Journal of Engineering Education. JEE* was selected for its status as a top journal for EER and its function as a research "gate keeper" within the community. Participants were initially recruited using multiple national and international engineering education listservs (ASEE divisions: Bio, CIPD, ERM, FYPD, LEES, & PCEE; Australasian Association for Engineering Education (AAEE); and European Society for Engineering Education (SEFI)) and by distributing flyers at the 2018 ASEE Annual Conference. All ASEE division program chairs were contacted and asked to distribute the survey announcement to their division. The list above is the list of

confirmed divisions that sent out the announcement. Participants completed a screening survey that asked about their experiences submitting and publishing with *JEE*. Seventy-three potential participants responded to the initial survey; 62 volunteered to be interviewed. Two additional targeted surveys were distributed 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. Survey 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, such as researchers from large, for-profit and not-for-profit organizations and educational consultants.

Survey data was used to select 34 authors representing three distinct perspectives to participate in interviews: (1) manuscript authors who have submitted and had a 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 and at least one published in *JEE* in the last five years (n=14). As summarized in Table 1, interview participants represented multiple academic disciplines, as well as various professional backgrounds and career stages.

Table 1.

Participant Characteristics

Characteristic	# Manuscript Authors	# Published Only	# Mixed Experience
Discipline			
Engineering Education	10	4	11
Education	1	3	1
Engineering	1	1	2
Location			
USA	11	8	14
Europe	1	0	0
Position			
Assistant professor	3	2	6
Associate professor	0	2	2
Professor	0	0	2
Non-tenure track faculty member	2	2	1
Postdoctoral Research Associate	2	0	0
Graduate Student	3	0	1
Non-academic Positions	2	2	2

Data collection

Data collection consisted of in-depth, semi-structured interviews conducted in the Fall of 2018 by a trained doctoral student in educational psychology. Each interview lasted approximately one hour. The interviews 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 believe are prioritized compared to those that are not, and what they see 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 *JEE* peer review process. In phase two of data collection, interviews will also be conducted with at least five editors of *JEE* in Spring 2019.

Data analysis

Our analysis of transcripts and other data sources will focus on identifying patterns in participants' peer review experiences related to theoretical, methodological, and topical boundaries. We will employ a three-phased coding system rooted in grounded theory as to not superimpose a preexisting framework on participants' discourse but allow themes to emerge. Data analysis will be conducted using Nvivo qualitative data analysis software and take place during the Spring of 2019. In phase two, comparative analysis will be conducted between editor and author interviews.

Preliminary results will be available for the June presentation. The authors are hoping to get feedback from the broader engineering education community about the initial results by presenting this work in progress paper. We also hope to start wider conversations about the peer review process and the boundaries of the field.

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