Peering into the Black Box of Peer Review: From the Perspective of Editors

Stephanie Cutler[a,] Yu Xia[a], and Kacey Beddoes[b].

Penn State[a],San Jose State University[b]

Corresponding Author Email: slc5822 @psu.edu

ABSTRACT

CONTEXT

The peer review process plays a critical role in ensuring the quality of work published within a field and advancing the knowledge within the research community. However, for many members of the community, the process of peer review largely remains a black box to many scholars, especially those with less experience within the community. Therefore, there is a need to illuminate the peer review process for the research community.

PURPOSE OR GOAL

To more transparently reveal the contents of the black box around the peer review process, we interviewed editors (associate and deputy editors) for the Journal of Engineering Education (JEE) to provide editor perspectives on the overall peer review process. The goal of this paper is to clearly articulate the behind-the-scenes processes of peer review as well as the expectations and perceptions of the editors with respect to publishing within JEE. By bringing these processes to light, we hope that more members of the field will be aware of the overall process and the associated expectations for contributing to the field.

APPROACH OR METHODOLOGY/METHODS

To meet the goals of this study, we conducted semi-structured interviews with six editors of JEE who worked in the field of engineering education research (EER), as a part of a larger project exploring the boundaries of the field as expressed within the peer reviews process. The interviewer from the research team followed a protocol but also asked additional questions to elicit more details in some cases. The interviews were recorded, transcribed, and thematically coded using an open-coding process.

ACTUAL OR ANTICIPATED OUTCOMES

Based on the analysis of the editor interviews, we present three critical aspects of the peer review process: the types of editors, the process that editors typically conduct to identify reviewers, and the types of decisions through the process. Additionally, we highlight considerations and advice from the editors to help members of the EER community develop.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

The current study makes the editors' perspectives and decision-making processes more explicit to readers. These decision-making processes are full of careful considerations and also challenges. By doing so, we hope to help the members of the EER community gain a better understanding of what is going on backstage of the peer review process.

KEYWORDS

Peer review, engineering education research, boundaries of the field.

Introduction

The peer review process of academic journals is a key way that new knowledge is accepted into an academic field. However, many members of a field may not be familiar with the behind-the-scenes processes that facilitate the peer review process. To help a wider range of scholars within the field of engineering education research (EER) understand these processes and the expectations of the Journal of Engineering Education (JEE), this paper highlights the perspectives of a set of six editors. *The editors* were interviewed as part of a larger study exploring the peer review process. These editor perspectives are focused on *JEE*, which is one of the most prestigious journals within the larger field of engineering education. The perspectives and processes discussed here are not universal across all journals, but do help to provide a general understanding for how the peer review process is conducted at one journal within the field of EER.

This work builds on a number of programs facilitated by multiple journals to help the field of EER become more familiar with the peer review process. For example, the *Australasian Journal of Engineering Education (AJEE)* hosted workshops at the AAEE annual conference in 2020 and 2021 to help the Australasian community understand AJEE's peer review process and how to publish in that journal (Male et al., 2020, Under review). *JEE* has also begun a mentored reviewer program (https://cecas.clemson.edu/jee/) to aid new members of the field in the expectations for performing a peer review for *JEE*.

The purpose of this paper is to clearly articulate the peer review process, challenges, and considerations from editors in one context within engineering education.

Methods

This study is part of the larger project exploring the field of EER by analysing peer review experiences in the publication process for *The Journal of Engineering Education* (JEE). Findings from other parts of the study can be found elsewhere (Beddoes, Croninger, & Cutler, 2020; Beddoes, Xia, & Cutler, Under review; Cutler, Beddoes, & Croninger, 2019a; Cutler, Beddoes, & Croninger, 2019b; Cutler, Xia, & Beddoes, Accepted).

Six editors, including Associate Editors, Senior Associate Editors, and Deputy Editors, were interviewed in the Spring of 2019. Throughout the results, we will not be attributing any quote from the editorial board to a specific editor or editor role (Associate or Deputy Editors) to better ensure anonymity of the participants. It is important to note that these interviews were conducted in Spring 2019. There have been significant changes to the JEE editor board since then including editors stepping down and new editors coming on board. The overall leadership of JEE has been consistent with Lisa Benson acting as editor of JEE. Keep in mind that each individual editor brings their unique perspective and that the information discussed here is subject to change as part of the ever-evolving field of EER as well as continual changes to JEE.

All participants were interviewed individually via Zoom by a trained graduate research assistant. The interviews were approximately one hour long and were semi-structured in that the interviewers followed a protocol but also followed up with additional questions to elicit additional details in some cases. All interviews were recorded and transcribed for later analysis.

For the current study, we conducted in-depth analysis on the transcripts of the six interviews through multiple rounds. The coding results were discussed in our research group's weekly meetings to further develop the codes and reach inter-rater reliability of each code across interviews.

Findings and discussion

To articulate the behind-the-scenes processes of peer review, we organize the findings into the following sections: the types of editors, the process that editors typically conduct to identify reviewers, the types of decisions through the process, and lastly, considerations and advice from the editors to help members of the EER community develop.

Types of editors

To aid in contextualizing the experiences and perceptions of the editors interviewed here, we are providing an overview of the peer review process for JEE. This paper presents one example of the peer review process; however, many of the practices here are standard and used by other journals. The peer review process of JEE involves the following editorial roles: Editor of JEE, Deputy Editors, Associate Editors (including senior Associate Editors), a copy editor, and an editorial assistant. After the author has prepared and submitted the manuscript to the journal, the Editor, Deputy Editors, and Associate Editors take up different responsibility to initiate the review process. According to one of our participants, "by and large, the role of the Deputy Editors is the same, in terms of the review process and the manuscript submission process, as the Editor…the Associate Editors are the one that actually seek reviews and then synthesize the reviews. The Editor is the one that reviews the reviews and makes a decision." The Editor or Deputy Editor reviews each manuscript as it is received. They then decide to either reject the article outright or send it to an Associate Editor for review. The Associate Editor recruits an average of three reviewers for each manuscript, and then reads the article and the reviews to make a summary recommendation to Editor or Deputy Editor. The Editor or Deputy Editor then makes the final decision for the manuscript. The decisions for the manuscript are reject, major revisions, minor revisions, or accept. Once a manuscript is accepted, the authors work with the copy editor and editorial assistant to finalize the article for publication.

When asked about the qualifications for a good editor, the editors responded with the following: First, editors need to have extensive background in engineering education research, more specifically, about theories on knowledge and learning, research methodologies in both qualitative and quantitative approaches, and topics. This background knowledge helps the editors "develop some sense of what are the kind of comments and what are legitimate criticisms and not legitimate criticisms." Effective editors tend to be those who are experienced in the field, especially experience with educational research, rather than novice researchers. Second, it is better that editors have experiences with publishing in the specific journal, as well as remain active in the field to know the landscape, "the big picture", and development of the field. This knowledge can help editors see how the submission/article is situated in the field and beyond, if the article's contribution will potentially push the field forward. Third, editors need to understand the review process and the role of editors in the process. Other qualifications include being fair and open-minded, organized, having good time management skills ("getting stuff back to people in a timely manner"), communication, the ability to synthesize reviews. In synthesizing reviews, they should be able to "reconcile conflicting reviews or come down and make a judgment."

Finding reviewers

One of the author perceptions that the editors were specifically asked about was that "Some authors perceived that reviewers were not qualified to review the type of engineering education methods, either qualitative or quantitative, used in their study." Editors agreed that reviewers may not have specific expertise with respect to the methods used in the article they are reviewing. This is a challenge that may be unique to engineering education as new interdisciplinary field and may not be as much of a challenge for more established disciplines. Specifically, one of the approximately three reviewers may not be qualified to comment on all elements of the article. Editors also believed that the responsibility lies more with the editors, who faced the challenge of finding reviewers who have the needed

qualifications. When talking about the challenge of finding reviewers, one editor stated that "I think as our field tries to move to understanding different things and welcoming more things, it is challenging." In addition, editors when communicating with authors also need to weigh in to send a message, talking about reviewers' backgrounds and expertise.

Diving deeper into the challenges of finding qualified reviewers, editors were specifically asked about their process for identifying reviewers for a manuscript. The peer review process is reliant on identifying and recruiting appropriate reviewers. Most importantly, all editors highlighted that author recommendations are very helpful in the reviewer identification process. One editor suggested that "we just require everyone actually upload a cover letter to help editors identify reviewers that are the most likely to give helpful reviews." However, author recommendations are not helpful when there is a conflict of interest, and the recommendation cannot be used. If there is no conflict of interest, the editors tend to choose one or two from the suggested reviewers, but recommended reviewers will not constitute all reviewers. That is, even when editors choose from the reviewers recommended by the author, they will make sure to include at least one reviewer who was not on the recommendation list.

Other approaches Associate Editors use to identify reviewers include: using the reference list of the manuscript to identify names that have relevant research background; use the journal's manuscript management system ScholarOne that contains a database that recommends reviewers; ask colleagues they personally know to suggest reviewers; search Google or Google Scholar for reviewers with expertise in the area of the manuscript. ScholarOne does not work well for every editor and some editors sometimes "include a message with people I'm asking to review to ask them to suggest people if they're not able to complete the review themselves."

All of these considerations around reviewers are intended to help the review process by giving constructive feedback to authors and help develop the submitted manuscripts. Recently, JEE has started a mentored reviewer program (https://cecas.clemson.edu/jee/) to aid new members of the field in developing their reviewer abilities and grow the pool of potential reviewers for JEE. As a field, EER creates new knowledge through the peer review of manuscripts. Each member of the field, especially authors who publish within the journal, should see their participation as a critical service to the field and regularly act as a reviewer. The field of EER is not as large as many others, which places a higher responsibility on each member to contribute through the review process. One important tip (from personal experience) is to make sure that your email is up to date in the ScholarOne system. If you change institutions, you may never know that you were asked to review because it was sent to the wrong email.

Types of decisions

There are multiple types of decisions from the editors at the end of a round of peer review, including Reject, Major Revisions, Minor Revisions, and Accept. Generally, most papers complete multiple rounds of reviews to move the paper forward through the process. JEE is a highly competitive journal with a high rejection rate of approximately 90% over the last 5 years (personal communication with Lisa Benson, Editor of JEE). Many manuscripts submitted to the journal will be rejected. For the rest of this section, we will be reporting the editor perspectives on each type of decision.

Reject decisions fall under two typical cases. First is called a desk rejection, where the manuscript is rejected by the Editor/Deputy Editor without sending it out to reviewers at all. Second includes those manuscripts that are sent out for reviews and then ultimately rejected. There are a few types of articles that are commonly not sent out for reviews, but some editors try to be open and to give authors the opportunity to revise and improve the manuscript.

The submitted manuscripts that editors decided not to send out for reviews but reject right away tend to have the following challenges. The manuscript may have challenges that are too severe and determined to be "not savable." A first type included manuscripts that are about topics that have nothing to do with education at all, for example "traditional engineering research like developing a new widget or research about something totally not related to education." That is, the article discusses research that is completely outside of the scope of the journal. A second type were articles about interventions but they "may or may not even have any kind of data about how good it is" or it is hard to "understand the relationship between the intervention and the outcome." A third type of challenge included articles that were perceived to have "fundamental flaws" and thus not to be high-quality enough, for example, "a fundamental flaw in the design and implementation of the study that you are not going to be able to overcome," or "it's the way the data was collected or what was collected in the data, it's just not ever-- that data, you are never going to be able to answer those research questions." That is, if the design and methodology are perceived to be flawed, the article is not considered to be salvageable. A fourth type of challenge concerns the overall organization of the manuscript. In short, "the research doesn't include the key elements of an actual research project." These key elements include theoretical frameworks, or solid research questions, or research methods well-aligned with the question(s). Or, "there's no solid chain of reasoning between the beginning and the end of the article."

However, editors said that they tried to be supportive of authors, when possible, by trying to provide opportunities to address reviewer concerns using the major revisions decision to allow for a second-round submission. There are a few different types of common problems in submissions that were recommended major revision. Initially, the first submission lacked the necessary details to make an informed decision, "you can't even tell if it's a poor research design or if it's just written up poorly." In this case, editors said they made the decision of major revisions based on the reviews with the intention of giving the authors a chance to clarify what they did in the paper, and then during the next round of reviews "we [editors and reviewers] might have a completely different set of feedback and questions for you [author(s)]." Second, the key elements of a research paper were included but not strong, that is, "If it's that the lit review is off, or the discussion is not strong, or the writing is not clear, or there's a bit of a mismatch, or you didn't fully talk about trustworthiness, or maybe you needed another calculation and statistic would really add to this or demonstrate validity or something at that level, then that's going to be a major revision."

One editor commented on how reviewers did not necessarily share the same understanding of difference between major revision and minor revision, in terms of how these two decisions are handled when they come back in. This editor stated that "most of the people [reviewers] will say minor revision and I'll say, 'No, let's call that major,'" and further pointed out that "a lot of people don't know what the difference is… Minor revision usually means unblinded and it doesn't go back out for review." Taken together, for submissions that editors decided to send out for reviews, the most common cases would be major revisions. After revisions, if the authors unfortunately showed that "they really didn't understand [the research or literature]" and "there may be additional problems that come up… and it's actually worse," this would lead to a rejection. Also, the submission might be ultimately rejected if the major concerns are not addressed as described by an editor saying "but if that part didn't ever get addressed, I would reject it ultimately. I'm not going to have something go out [be published] that looks like it's giving legitimacy to something that is not." However, if the concerns are resolved and the manuscript improved greatly to meet the criteria, the manuscript would ultimately be accepted.

Considerations for Editors/Reviewers/Authors

As editors noted, there is a need to provide "support and training for the people doing the review process." There has been recent effort to help members of the field learn to be reviewers, but it is still a change that the editors look forward to. Editors believe it is important

to help people understand the point of a peer review and to have resources "so that reviewers knew what a good quality review looked like." As such, for reviewers, learning how to write reviews should be an intentional learning process. Resources such as mentored programs (e.g., https://cecas.clemson.edu/jee/) should benefit the community by providing a space where young researchers in the field of EER learn from experienced researchers how to review peers' work. Besides developing review skills in the long run, for any specific review project, one editor commented that "I think it's part of a reviewer's job to say my expertise is in this part of the paper" to help editors organize the review process.

For authors, one editor talked about the authors' responses to reviews and commented that "there's a really disrespectful way to not do things that people ask you to do, and there's a much more respectful way to do it." This comment highlighted how the review process needed to be a respectful conversation between reviewers and authors toward the same goal of improving the manuscript, rather than a one-way talk. In this conversation, it is author's responsibility to respond well.

As there are often more than one round of reviews, some editors noted that the first round of review would not be helpful to include detailed proofreading comments, since the paragraphs might even be deleted given other comments. The editors advised that reviewers know that in the first round of review, "pointing out typos and word choices things is really not a productive use of your time as a reviewer," and general statement about the overall word choice or clarity is fine.

Toward the end of the interview with editors, we asked them what messages they would like JEE readers to hear and know. The editors talked about the multiple aspects involved in the efforts of publishing in JEE, including the authors' work, reviewers, and editors' responsibility, JEE as one of the top journals in the field, and the field itself, while the comments from editors showed how these aspects were interconnected.

For authors, editors encourage people to try and take risks, and not be overly influenced by others' negative experiences and hard feelings. Authors need to take the responsibility to communicate their work to the audience. At the same time, authors should know that everyone is getting hard feedback from time to time and use reviews to strengthen the work. Untenured faculty might also want to seek other venues when the number of publications is prioritized.

For reviewers and editors, our editor participants believed that they need to communicate feedback in supportive ways.

In terms of the journal (JEE), it is changing and evolving and there is space for change. Multiple editors commented that JEE is welcoming and inclusive of new theories, methods, and topics, but authors need to make sure to communicate the contribution that new work is making to the literature and the field and explain how that effort to push boundaries is useful to advance the field. JEE is not the "end all be all", and not designed to accept everything. It is okay for JEE to "develop a more defined identity and that identity can be complemented by other journals in better ways." In other words, JEE is not the only place to publish in the field. There need to be efforts from the community to create more space for dialogue. The field "opens up opportunities for new journals that may want to be more accepting of these other kinds of papers." That is, the publication venues within the field need to grow and fill those niches.

Conclusion

In this study, we aimed at illuminating the black box of peer review process by eliciting the perspectives of the process custodians, i.e., editors for JEE, for the purpose of informing the members of the field of EER. The editors' perspectives should be able to help the members of the research community, especially novice scholars, to better understand the backstage of the process to help them grow in the community. The findings revealed the responsibility for

members in the EER community when participating in the evolving field, specifically how that responsibility lies with editors, reviewers, and authors. However, as a limitation in this study, we only interviewed a small number of editors and they also have worked for one particular journal, i.e., JEE. Though some of the editors held multiple editorships with different journals, the interviews were oriented around one journal only. Some editors talked about their experiences as editors for other journals but that was not the focus of the interviews. As such, our findings reflect the six editors' perspectives only and should be interpreted with caution against generalizations over the entire field of EER.

First, there are different types of editors with different job responsibilities in the review process. One of the main responsibilities for the editors is to search for qualified reviewers to review a manuscript. As a typical manuscript requires a variety of expertise to review the different elements of the manuscript (topic, methods, theory, etc.), this variation in expertise can create challenges in finding qualified reviewers within the new, interdisciplinary space of engineering education. Additionally, the editors close the communication loop between reviewers and authors by synthesizing and highlighting key elements across multiple reviews. To aid editors in this process, we encourage reviewers to note their expertise in the "Comments to the editor" alongside their review.

When thinking about the reviewers as part of the peer review process, there are a few considerations. First, we would like to encourage members of the field to actively participate in the peer review process, especially those who publish within JEE. With a higher population of reviewers, the field can grow to include more diverse perspectives and gain additional expertise in reviews. We would also encourage reviewers to consider how they compose their reviews. Many academics can relate to the perceptions of "that one reviewer" that feels overly harsh and not helpful in improving the manuscript. We hope to bring attention to this element of academic culture within engineering education and encourage future reviewers to be mindful of their tone. We are currently working on peer review guidelines to help reviewers reflect on this process (Cutler, Xia, & Beddoes, Accepted).

Manuscript authors also play a key role in the peer review process. Common remarks from editors highlighted that authors need to emphasize clarity and transparency in their writing. The authors are very familiar with their study and may develop an expert blind spot in the writing of the manuscript that reviewers often highlight. A related point emphasized by the editors was that clarity and transparency play an even more important role in manuscripts that are presenting new or innovative elements.

At its best, the peer review process should be a developmental process in two senses. That is, it can serve as a development process for the authors to improve their work and hopefully to finally get their work published to a broad readership. At the same time, it is also a developmental process for the research community to disseminate and advance new knowledge. This process involves editors, reviewers, and authors who should have the same goal of advancing the author(s)' research as well as the field's development. With this goal explicitly stated, we feel the need to again emphasize the importance of including positive feedback and using supportive tone in giving reviews and responses. The field could flourish if its members support each other in the peer review process.

Acknowledgments

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