

## **A Growth Mindset for Peer Review: Guidelines for writing constructive peer reviews**

### **Introduction**

Academia and the peer review process is notorious for being highly critical. Through years in academia and conversations with faculty across disciplines, the authors have observed that the peer review process is rarely discussed in a positive, constructive light and is usually filled with horror stories of that one reviewer that tore my manuscript to shreds and left me feeling like a failure within my field. In 2018, we embarked on a study to examine the peer review process within the field of engineering education research (EER) as an exploration of how new knowledge is or is not accepted within the field. However, when discussing the project with peers, many of them commented on the need to change the way we conduct peer reviews. To explore this, we started exploring the documentation (actual reviews) from our study for a constructive or dejecting “tone.” However, this proved much harder to do than initially anticipated as each member of our team interpreted the tone differently. Our inter-rater reliability scores were very low. This highlighted a large part of the challenge in writing a “constructive” review. A reviewer may think they are writing a constructive review, but the author may interpret it as condescending or negative.

When thinking about how to address this challenge, the concept of fixed/growth mindset cultures provided a new perspective for moving forward. Fixed and growth mindset refer to beliefs about the malleability of intelligence (Dweck, 2008). Someone with a fixed mindset believes that they have a set amount of intelligence that cannot be changed, whereas someone with a growth mindset believes that their intelligence can change with practice and effort. Mindset culture applies the concept of fixed/growth mindset beyond an individual to explore how broader environments (such as companies or classrooms) promote a fixed or growth mindset (Murphy & Dweck, 2010; Canning et al., 2019; Murphy & Reeves, 2019). For example, companies that promoted a growth mindset were found to be more collaborative, ethical, and innovative than companies promoting a fixed mindset (Murphy & Reeves, 2019), and instructors who had a growth mindset with respect to their students (felt their students could improve their ability in their course) had half the racial achievement gap when compared to instructors with a fixed mindset with respect to their students (Canning et al., 2019).

The idea of broadening the application of fixed/growth mindset to systematic elements sparked the idea of how these concepts could be applied to peer reviews. The purpose of this paper is to outline guidelines to promote a growth mindset perspective during the peer review process. In this context, a fixed mindset would be a reviewer believing a manuscript could not be improved no matter how much time and effort the author put into revisions. A growth mindset would be a reviewer believing a manuscript could be improved with time and effort. We place the manuscript at the center of the mindset perspective as we believe that should be the true focus for a peer review. We hope these guidelines will help peer reviewers to check their perspective/tone to create a more constructive environment within the culture of peer review.

### **Methods**

The analysis and findings presented in this current study are part of a larger project on the boundaries of engineering education as a research field (Beddoes et al., 2019, Under review; Cutler et al., 2019b, 2019a). We identified and recruited authors who had submitted manuscripts to a leading journal in the field through two surveys. Each participant was interviewed and asked to send associated documentation (manuscript, multiple rounds of reviews, emails with the editor(s), and responses to reviews) for any peer review process that they discussed during the interview. The sample included both documentation for articles that were rejected as well as those that were eventually accepted for publication.

The data in this paper is part of the documentation of peer review experiences of the author participants in the larger project. To better understand how to create a peer review experience that will help the EER field to grow, we open coded the actual reviews written by the reviewers and editors, including ten sets of reviews for nine different articles that were rejected by the journal, and twelve sets of reviews for six articles that were eventually published by the journal.

Each manuscript on average included three to five reviews, including those from associate editors (usually at the beginning) and the editor (usually at the end). Using a growth/fixed mindset framework, we coded the reviews at two levels. First, we read each review holistically and rated each review on a 5-point scale for the following two statements: 1) The Reviewer thinks the Manuscript they reviewed is set and the authors can't really do much to change that [promoting a fixed mindset perspective]; 2) The Reviewer thinks the Manuscript can be improved with additional work and effort from the authors [promoting a growth mindset perspective]. The scoring on these two items reflected a holistic experience of reading the overall review. We then conducted a second round of coding to examine specific comments and how they related to tone and mindset. That is, we also open-coded more locally on paragraphs and sentences and two major aspects emerged: content and tone; along with contributing characteristics related to content and tone that reflect the mindset of reviewers on the manuscript under review. We will expand on these findings in the following section.

## Findings and Discussion

We present the Growth Mindset Review Framework in Table 1 as a major finding from the analysis of a total of twenty-two reviews. The top row shows a continuum from fixed and/or deficiency-orientation to growth and/or improvement-orientation based on the Dweck's mindset construct (Dweck, 2008). In the leftmost column of Table 1, our data yielded four categories that fall under the two aspects of content and tone: content and challenges, tone (point of view), tone (corrective), and tone (condescending). There could be various combinations of these dimensions that contributed to the extent to which the overall review was more fixed- or growth-mindset oriented, as reflected in the score of overall review using the two scale-based items.

Table 1. Growth Mindset Review Framework.

	<b>Fixed and/or Deficiency orientation</b>	←————→		<b>Growth and/or Improvement orientation</b>
<b>Content and challenges</b>	Identifies problems only	Offers broad suggestions	Offers concrete recommendation	Offers concrete recommendations with explanations or justifications
<b>Tone (POV)</b>	Uses “You” frequently	Uses “the authors” frequently		Uses “the manuscript” frequently
<b>Tone (Corrective)</b>	Presents problems in corrective, authoritative way	Presents problems as opportunity for peer improvement		
<b>Tone (Condescending)</b>	Makes notes that appear as if the reviewer is in higher social/ professional standing than author(s)	Treats review as discussion between equal peers		

Content-related elements noted if the reviewers and editors devoted the whole review to the problems or challenges that they thought the manuscript had. This indicated that the review was not focused on the manuscript being able to be improved - a more fixed mindset or more of a deficiency orientation.

Likewise, some reviewers and editors gave concrete recommendations and further justified or explained their recommendations for how the manuscript could be improved, helping authors to not only understand what would need to be done but also why - promoting a more growth mindset.

Within tone-related elements, there are three distinct types of reviews. First, the reviewers used “you” throughout the review when writing comments, which created a tone of blaming and/or criticizing the authors when combined with identifying problems or criticisms of the manuscript. On the other hand, some reviewers referred to the manuscripts or certain sections/parts of the manuscript, e.g., the literature review or a specific paragraph, when stating a comment. While we would all agree that the authors wrote the manuscript, focusing on the manuscript rather than the authors allows for a more objective tone when the review is being read by the authors. When reviewers speak directly the manuscript as epistemic objects, the tone shifts away from critiquing the authors and more to improving the manuscript. Second, when presenting problems and questions, there were again broadly two different underlying tones; one is corrective and authoritative, whereas the other is presenting the problems as opportunities for improvement. Third, the reviewers sometimes mentioned some information in reviews that signaled a higher social or professorial standing than the authors, thus presenting very condescending tone. On the other hand, some reviews were worded in ways that showed the reviewers treated review as a conversation where reviewers and authors are on equal standing. More details and examples of the categories of content-wise and tone-wise are included in Table 2 and Table 3.

Table 2 provides a comprehensive picture of “Content” subcategories: identifying problems only, broad suggestions, concrete recommendations, and concrete recommendations with explanations or justifications. For each subcategory, we provide their descriptions, examples from our dataset, and possible revisions crafted by the research team. The category of “Identifying problems only” refers to cases where large chunks of comments pointed out only problems within the manuscript. While in some cases, there were problems only, sometimes the reviewers added one or two sentences of broad suggestions without mentioning potential ways to carry out those suggestions or even what they mean exactly. In other cases, the reviewers gave concrete recommendations, based on which the authors could potentially form actionable strategies to address concerns and improve the manuscript. The last subcategory that falls on the rightmost end of the continuum and thus we believe works well for improving the manuscripts is concrete recommendations with explanations or justifications.

Table 3 provides a comprehensive picture of “Tone” subcategories: point of view within the review, corrective tone when giving recommendations, and condescending tone when critiquing. The first category refers to cases where overall the reviewers direct the comments to the authors, frequently starting the comments with “you”, and sometimes “the author(s).” When the comments were all about problems with the manuscripts, a repeated use of “you” tends to read as if putting the blame on the authors for not doing good work. A second prominent type of tone that emerged from our second round of analysis includes cases where the comment was written as a suggestion but in a corrective tone, which often gave a very blunt and uncomfortable feeling in the readers. A third type, which is relatively less commonly seen, is a condescending tone when critiquing the authors or the manuscripts. This category includes examples in which reviewers explicitly expressed that they are more experienced and know better in ways that could make the authors feel like they are less than the reviewers.

Table 2. Content categories, their descriptions, examples, and possible revisions

Considerations in peer review			
Categories	Descriptions	Examples	Possible revisions
<i>Content</i>			
Identifying problems only	The comments are focused on what the problems are without giving recommendations, leaving it to authors to interpret and figure out what to do moving forward.	Findings are discussed in the context of prior literature that has demonstrated that in engineering interdisciplinarity is conceptualized as teamwork. They found that students think of id [interdisciplinarity] as teamwork too. So, I'm struggling with what value this adds. There doesn't seem to be an issue that needs to be addressed. The finding that engineering students think of id as teamwork, when many others have already shown that engineers think of id as teamwork, doesn't seem to advance that literature in ways that warrant publication.	Findings are discussed in the context of prior literature that has demonstrated that in engineering interdisciplinarity is conceptualized as teamwork. They found that students think of id [interdisciplinarity] as teamwork too. The findings in this work align with the literature. Thus, the findings in this current work need to focus more on XXX [concrete points in the manuscript].
Broad suggestions	It is common that after describing how parts of the manuscripts have certain problems, the reviewer makes one or two comparatively brief suggestions. The following example was placed after a long paragraph of describing the problems of the manuscript.	Please recognize that while elements of your story are interesting, it is complex and so you should only unpack things that I as a reader really must know and understand.	The elements of your story are very interesting. However, it is complex and it would help readers to understand more clearly if you unpack those elements, such as XXX [critical elements in the manuscript].
Concrete recommendation	Sometimes the reviewers give direct, concrete recommendations, but do not add explanations or justifications. While explanations or justifications might not be necessary all the time, often they are helpful.	Table 1: The authors may want to include what happened in the control group in another column in Table 1.	Table 1: The authors may want to include what happened in the control group in another column in Table 1. This would give readers a bit more contexts for the comparison of two groups.
Concrete recommendations with explanations or justifications	The reviewers provide concrete recommendations and also explanations about the recommendations.	A more thorough description of the study participants (more specifically age and ethnicity) should be included on p 10. The sample was good with respect to size and inclusion of two student cohorts, but the relative composition is still important when making decisions regarding generalizability of findings.	

Table 3. Tone categories, their descriptions, examples, and possible revisions

Categories	Descriptions	Examples	Possible revisions
<i>Tone</i>			
Point of view within the review	The use of “you” in the review, versus, “the authors”, “the manuscript”, or a specific part in the manuscript. A repeated use of “you” tends to read as if putting the blame on the authors for not doing good work, whereas framing the sentence around the manuscript puts emphasis on the current challenges of the manuscript that can be improved with provided concrete recommendations and explanations for the recommendations.	"The student who contributed at such low levels..." - You can't say this. You just finished saying how Erin didn't feel imbalanced when she should have, so you can't really say the other student did feel the imbalance without any evidence. It's counter to the point you JUST made.	"The student who contributed at such low levels..." This statement seems to be contradictory to an earlier point. [quote]. It seems that the two students had different experiences. It would be better to clearly present evidence to support how Erin didn't feel imbalanced when she should have and evidence to support [the other student].
Corrective tone when giving recommendations	The way that reviewers give suggestions can read like an authoritative teacher correcting their student. The suggestion itself could be very helpful in improving the manuscript, but the way it's communicated can create a negative emotional response.	A paired-sample t-test should not be used because the sample groups include different students. This test is only used to compare groups of the same students. The authors needed to use an independent sample t-test instead.	As the sample groups included different students, an independent sample t-test is appropriate here for comparison.
Condescending when critiquing	The way the critique or suggestion is worded makes readers feel like they are less than the speakers. While the reviewer may be more experienced or senior in the research community, they also may not be. The <i>peer</i> review implies equal standing that should be exemplified in the review process.	The authors assert that they focused their course redesign on support for autonomy and considered support for relatedness as tertiary. Of course, I cannot speak to the authors' intention(s). That being said, as an expert in self-determination theory there appears to be (more or less) equivalent support for autonomy, competence, and relatedness in the course redesign.	on page XX, it is stated that [focused their course redesign on support for autonomy and considered support for relatedness as tertiary]. However, there appears to be (more or less) equivalent support for autonomy, competence, and relatedness in the course redesign. [quote]

## Conclusion

This study adopts the concept of mindset culture to create reviewing guidelines based on the findings from analyzing twenty-two sets of reviews with the goal of identifying patterns in actual reviews, which improves the peer review process by facilitating a growth mindset among reviewers. Our findings present two critical aspects to consider: content and tone; namely, what is in the review comment and how to say it. We further present the patterns as shown in the subcategories. Those patterns denote good practices as well as ones that we believe do not contribute to a growth mindset perspective for improving

the manuscript. Taken together, we recommend reviewers, editors, and authors consider the peer review process as a way to facilitate knowledge construction and advancement through constructive dialogue. That is, we recommend the reviews be focused on improving the manuscript and reviewers and editors be mindful of the tone in critiquing the manuscript. The findings above are not the only ways to be constructive in a peer review but instead provide guidelines to aid in reviewing with respect to being constructive both in content and tone. While we believe there is likely more general application of these guidelines, they were developed from an engineering education disciplinary perspective.

We encourage all members of academia who participate in peer review to start a discussion with colleagues about creating a positive and constructive peer review experience. We encourage faculty to talk about peer review with their graduate students to help inform the next generation of reviewers on how to construct a peer review that will help the manuscript move forward and improve the new knowledge being created within our fields. Editors and reviewers who would like a 1-page pdf of the guidelines presented in Table 1 can access it here: <https://sociologyofengineering.org/wp-content/uploads/2021/07/Mindset-framework.pdf>

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