

LEARNING TRANSFER, PEER FEEDBACK, AND MASSIVE OPEN ONLINE COURSES

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ABSTRACT

Peer-to-peer interaction is a key component of learning across nearly all educational contexts, from face-to-face and hybrid courses to flipped, online, and distance education. Peer feedback on writing is a form of peer interaction that has been shown across learning contexts to have considerable positive impacts. The potential for peer feedback acquires heightened potential and complexity in Massive Open Online Courses (MOOCs) due to their scale and learner diversity. One ongoing concern surrounding peer feedback involves negative attitudes about whether peers have the capacities needed to provide meaningful, reliable response to one another. Such a problem is, arguably, magnified in a MOOC with the diversity of learners. This study proposes refocusing this problem by exploring instead the learning outcomes learners gain from *providing* peer feedback. This paper will present the background, methods, and emerging results of an IRB-approved qualitative coding study of over 6,000 discursive comments from students enrolled in a MOOC about what they learned from providing peer feedback.

Keywords: Peer Feedback, Learning Transfer, Writing Transfer, Massive Open Online Courses, Pedagogy.

1. INTRODUCTION

Peer-to-peer interaction is a key aspect of learning across nearly all educational contexts [1]. It has been shown to improve quality of instruction and to positively influence retention and students' social and academic integration [2]. Across many disciplines, peer-to-peer interaction involves peer feedback and peer review on writing, where students provide feedback on peers' writing, for both formative and evaluative purposes [3]. Peer feedback on writing has been shown across learning contexts to have considerable positive impacts for many learning objectives [4]. Peer feedback on writing is particularly beneficial for writing-related learning outcomes [5]. One challenge, however, surrounding peer feedback involves negative attitudes over whether peers have the capacities needed to provide sufficient responses to one another [6]. Another challenge surrounding peer feedback is that faculty must be intentional with how to integrate and structure peer review within their courses [7].

These questions about the efficacy, uses, and value of peer review operate across all learning contexts, but gain particular charge within the context of MOOCs. [8] By their scale and learner diversity, MOOCs vastly increase the potential of peer interactions. Earlier approaches to teaching

at scale, termed cMOOCs, were in fact grounded on connectivist pedagogy and created ample spaces for peer interaction. However, with peer review in MOOCs, the challenge of defining and connecting peers becomes even more complex given the vast range of preparation, skills, motivations, and experience of MOOC learners. Perhaps in part for this reason, as cMOOCs have given way over the past several years into xMOOCs, the peer interaction that characterized cMOOCs has in many ways become reduced. [9].

xMOOCs have curtailed formal opportunities for peer interaction by largely avoiding open-ended assessments. These forms of assessments, such as short- or long-answer essay questions and writing project assignments, are known as "constructed-response or open-ended questions" and stand in contrast to "selected-response or closed-ended questions," such as multiple-choice and true-false test questions [10]. Because of their scale and their investment in ensuring validity, reliability, and credentialing, many MOOCs rely on selected-response assessments because they can be scored automatically. This is not exactly a negative approach. While much research argues that constructed response questions have more validity because they call upon higher order cognitive processes, research also suggests that "well-crafted" selected-response questions can be equally valid assessment measures [11].

One wonders, though, what the potential costs are of avoiding greater exploration and integration of constructed-response assessments across MOOC learning contexts.

Open-ended assessments such as essay responses and writing projects have been shown to be of enormous benefit in the form of writing across the curriculum and writing in the disciplines [12]. However, the challenges of crafting valid and reliable peer review, and the limitations of current Automated Essay Scoring (AES) capabilities, have posed barriers to more robust integration of writing in MOOCs.

Taking up this challenge, this study explores the learning outcomes learners gain from *providing* peer feedback. This research, is relevant for educators considering the types and number of constructed-response assessments across all contexts, including but not limited to MOOCs.

This article presents the background, methods, and preliminary results of an IRB-approved qualitative coding study of over 6,000 discursive comments from students enrolled in a writing-based MOOC, English Composition I, about what they learned from providing peer feedback.

Primary research questions include the following:

- In what ways can peer review operate as an engine for writing and learning transfer?
- What self-reported writing gains emerge for the reviewer in peer review?

This study builds on the small set of prior research about the benefits of peer review by using a larger dataset than has heretofore been examined. This larger dataset of over 6,000 responses provides more detailed, nuanced, and wide-ranging insights into possible learning outcomes from providing peer feedback. In so doing, this paper also demonstrates the value of big data across disciplines, including humanities-related disciplines, an area less commonly integrated with big data.

An inquiry into learning outcomes from providing peer feedback has particular relevance now, partly because MOOCs are expanding [13]. But, the study has even more broad applicability within the context of the larger higher education landscape. Calls are emerging with more rapidity and greater intensity for those in higher education to increase access and diversify, particularly, but not exclusively, in the United States [14]. As student populations across many post-secondary contexts become increasingly diverse, educators must innovate with strategies to facilitate productive communication across difference. Doing so will increase the capacities for students to communicate meaningfully and to become more self-driven, lifelong learners.

2. PEER REVIEW AND WRITING TRANSFER

Peer review is a staple educational practice across many disciplinary and learning contexts [15]. Research has emphasized the contributions of peer review toward achieving learning outcomes [16]. Most related research focuses on the validity and reliability of peer review, as well as best instructional practices to optimize the quality of the feedback. For instance, researchers have examined, in the context of evaluative assessment, the validity of peer review [17]. And, researchers have, in the context of formative peer review, examined strategies for instructor-mediated approaches that can facilitate student investment, heighten motivation, and maximize substance [18]. These studies, by and large, focus primarily on the value of the feedback received and the impact on the learner receiving the feedback.

In the context of MOOCs, carefully scaffolded peer evaluation assessments (grading) have been shown to be valid for open-ended writing projects [19]. However, with formative peer feedback, students have indicated that the peer feedback they receive can be uneven [20]. These student attitudes reflect a continued presence of negative attitudes reported by students regarding peer feedback [21]. These reports have raised questions about the costs and merits of implementing peer feedback in MOOCs. Such hesitations make sense, but they also run the risk of creating a context where constructed-response assessments are eliminated altogether from, or become largely absent from, MOOCs. Such an outcome, given the established value of well-designed writing integration across disciplinary pedagogies, would place unfortunate limits on the kinds of

writing possible in MOOCs, and ultimately on the kinds of higher-order learning that MOOCs can make possible.

These stakes suggest that it is worth asking how peer feedback impacts the providers of the feedback. Doing so might be understood as operating within approach to education grounded on learning transfer. As a component of learning transfer, writing transfer involves the processes and practices students bring from one learning and writing occasion to others, including that which they might apply, reconsider, change, or otherwise modify [22]. Considerations about how learners articulate learning gains from providing peer feedback rests on the assumption that students will be applying and adapting what they have learned from providing peer feedback to subsequent writing and learning occasions, whether it be revising a particular writing project, or with writing and learning writ large.

The processes shaping writing transfer are often conceived of as operating along several continuums: near/far and high road/low road. Near and far refer to the degree to which any two learning situations resemble one another and the ways in which learners engage with transfer within those parameters [23]. High road/low road refers to the degree of abstraction required for the transfer (high road) or the degree of specificity and skill required (low road). Finally, transfer can occur in the form of positive transfer (what to transfer) or negative transfer (unsuccessful moments of transfer that highlight what not to transfer) [24].

Writing transfer research also helps illustrate the individual dynamics that can shape student learning gains with regard to transfer from producing peer feedback. Among the most important aspects of transfer that researchers have discovered is the role of agency: students must be provided the space and structure to engage actively in their own transfer-related processes [25]. A key component of this agency involves reflection and meta-awareness; students must learn to be aware of what they have learned and how they might apply it in order for any transfer-related learning outcomes to be realized [26]. Significantly, learners can be more or less inclined toward, and more or less effective with, transfer based on shifting individual dispositions, influenced by both academic and nonacademic experiences [27].

These elements of writing transfer illustrate the range of transfer opportunities and the complexities involved with transfer. Exploring the transfer-based learning outcomes emerging from occasions of providing peer feedback becomes even more complex in the context of a MOOC, where learners have widely heterogeneous aims, backgrounds, and educational levels.

To date, very little research has examined peer feedback from the perspective of the providers' learning transfer. Research has been conducted on the benefits of peer tutoring for the tutor, which include gains in listening, acquiring new perspectives, and better problem-solving capacities [28]. Other relevant research identifies the benefits derived from peer writing groups, which include increases in learner motivation, accountability, and empathy [29]. And, research has also explored the process of providing peer feedback, through a case study approach, to demonstrate that learners can become better at this skill over time [30].

Prior research that is related more directly to the benefits of providing peer feedback has found promising results, although with comparatively smaller subject populations. A small study of physics students, for instance, found that learners make more progress toward course learning outcomes by producing peer feedback than they do from receiving peer feedback [31]. Building on this research, a study of 82 engineering design students found that students made process-related and higher-order learning gains from providing peer feedback [32]. And, more recently, a study of 744 data points from students in an Introduction to Psychological Science course found that providing peer feedback confers many benefits, such as strategy selection writing ability, and task awareness [33].

Researchers have also found that particular student characteristics impact the gains made from producing peer feedback. Studies have found, for example, that learners for whom English is a second language (L2) make gains in such matters as self-assessment and awareness of assessment by providing peer feedback, even more so than they do from receiving peer feedback [34]. Researchers have also determined that learners who have less experience with or knowledge about course content make larger gains from providing peer feedback than do those who are farther along in their zone of proximal development (ZPD) [35].

A larger dataset, such as one generated at scale in a MOOC, with widely diverging learner characteristics, can build valuably on this knowledge about the potential learning gains generated from producing and providing peer feedback.

3. PEER FEEDBACK AT SCALE

As indicated earlier, most MOOCs rely primarily on selected-response assessments. MOOCs that opt to integrate open-ended, constructed assessments such as essays or writing projects generally choose between automated essay scoring algorithms or calibrated peer review (CPR) [36]. Both approaches have limitations. AES technology is becoming more sophisticated and can yield positive results in some cases and in relation to some aims [37]. However, it continues to produce significant errors and limitations [38]. Moreover, AES is designed to work alongside, not in place of, human response to writing [39]. This human interaction enables the highest degree of the social communicative function of writing, a crucial aspect of writing's role in student learning outcomes [40].

CPR, on the other hand, does achieve more consistent validity and reliability, and has a positive impact on educational outcomes, particularly for writing but also for discipline-based content [41]. These benefits, however, must also be considered within the larger aims of the course. CPR is highly time consuming, thereby limiting the quantity of open-ended assessments that can be assigned within a given course, and limiting the length of each assessment itself.

Both AES and CPR, moreover, tend to emerge from a perspective focused primarily on evaluative peer assessment rather than formative peer feedback for revision purposes. AES and CPR, therefore, limit the potential of students' learning with regard to many writing-related outcomes,

including sustained attention through drafting and revising to content, argument, structure, and organization.

These types of complex writing-related outcomes were central to the first-ever writing-based MOOC, titled English Composition I and which launched in March 2013 (funded largely by the Bill & Melinda Gates Foundation and developed in partnership between Duke University and Coursera). For an eventual enrollment in that first iteration of over 80,000 learners from around the world, lead faculty member Denise Comer and colleagues designed the course to facilitate open-ended assessments through carefully constructed peer formative feedback and peer evaluative feedback. CPR was not an option for this MOOC because the course had four major writing projects, each of which went through a drafting and revision process. CPR would have focused attention too heavily on evaluative feedback, obviating the importance of formative feedback, and the time involved with deploying CPR would have made it impossible for learners to complete four major writing projects in the span of 12 weeks. AES was not an option because of the errors it conveys, its focus on evaluative feedback, and the ways in which it stymies the human connections that can be forged around writing, which were a central aim of the course. The hypothesis was that peer review could be developed carefully even without CPR, and that refocusing attention on the benefits afforded learners from providing peer feedback would offset any negative attitudes about the reliability and validity of peer feedback.

After that first iteration, English Composition I proceeded through three subsequent session-based iterations between 2013 and 2016, enrolling a total of over 240,000 learners. In 2017, the course migrated to the on-demand format, in which learners enroll each week.

English Composition I includes the following learning outcomes, developed in alignment with officially recommended writing pedagogy outcomes [42]:

- Summarize, analyze, question, and evaluate written and visual texts
- Argue and support a position
- Recognize audience and disciplinary expectations
- Identify and use the stages of the writing process
- Identify characteristics of effective sentence and paragraph-level prose
- Apply proper citation practices
- Discuss how to transfer and apply your writing knowledge to other writing occasions [43]

Across the course, learners worked toward these learning outcomes by writing four writing projects, each of which went through a drafting and revision process grounded on peer feedback.

The drafting and revision process included the following two stages for each of the first three writing projects (the fourth was compressed and did not have a formal drafting stage): In the first stage, for drafting and formative feedback, learners prepared a draft of a writing project and submitted it to the English Composition I course site by a stated deadline. The course system would then distribute that learner's draft

randomly to three other students who had also submitted a draft. Learners would then have one week to provide feedback on the drafts they had received.

The second stage of the peer feedback process involved revision and peer evaluation. After learners received the peer formative feedback on their drafts, they would have a week to revise their writing projects. Then, learners would submit a revised, final version to the course site, which the system would then send out to four other learners who had also submitted final versions.

To guide peer feedback throughout these two stages, Comer and colleagues designed a set of detailed peer feedback rubrics aimed at encouraging learners to provide specific suggestions and to focus attention toward aspects of writing aligned with the learning outcomes for that particular assignment. Models of feedback, both formative and evaluative, were also provided for students on the course site. The evaluative rubric included a 6-point scale, roughly divided into halves, whereby the upper half (4-6) indicated various versions of success, and the lower half (1-3) indicated various versions of lack of success. Learners' grades on the writing projects were calculated through averaging these four peer evaluative scores, and dropping the lowest of the four.

The formative peer feedback rubrics were tailored for each writing project to include particular areas of focus aligned with the learning outcomes of the assignment and of the course more generally. With Project 3, for example, which asked students to write a case study on a topic of their choosing, the formative rubric asked learners to respond to such questions as the following:

- Where does the writer offer details about the case study? Is this sufficient to convey the important aspects of the case study to readers who may not be familiar with this?
- Where does the writer go beyond description to pose a question about expertise or to show how the case study reflects, contrasts, or modifies ideas about expertise?
- Summarize in a sentence or two what the writer is arguing, if you can. If you cannot, say what the writer might do to make the argument more clear.

The formative peer feedback rubric also included two important elements specifically related to transfer since transfer was an explicit learning outcome for the entire course. First, the following statement appeared in bold at the top of every formative rubric: **“****Reading and Responding to Other Writers Makes You a Better Writer and Will Also Improve Your Own Project Draft****”** Second, the formative feedback rubric included not only such questions as the ones listed above, but also a question asking the providers of feedback to reflect on transfer-based learning outcomes from providing peer feedback: “What did you learn about your own writing/your own project based on responding to this writer’s project?” [44] The responses to this question, which appeared on every formative and evaluative rubric, are the data being coded.

In keeping with the transfer learning outcome, the evaluative rubric also included an opportunity for learners to reflect on

how providing peer feedback would help them grow as writers. Here, as with the formative rubric, the evaluative rubric emphasized in bold at the top through the following statement that the focus of the activity should not only be on the feedback and scores one receives, but also on what one gains from providing peer feedback: **“****Reading and Responding to Other Writers Makes You a Better Writer****”** Additionally, again directing learner attention to the benefits of providing peer feedback, the evaluative peer feedback rubric asked learners to respond to the following question: “What did you learn about your own writing based on reading and evaluating this writer’s project?” [45]

These multiple occasions emphasizing the benefits of providing peer feedback and asking learners to reflect on what they learned from providing peer feedback was a way of recognizing that formative peer feedback in a MOOC

might be uneven. According to survey data compiled by the Duke University Center for Instructional Technology, the course had enormous learner diversity: Learners ranged in age from under 20 to over 80, and had levels of education spanning secondary through post-graduate. Learners had experience across an enormous range of industries and professional fields, all over the world, and had training across nearly all disciplines. 77% of learners specified that English was not their first language.

In this heterogeneous learning context, the learning outcomes associated with peer feedback needed to be recast as not only, or even primarily, about the feedback itself. This is not to say that the feedback one received was not also important. In fact, subsequent research found that peer evaluative scores were valid, and that they were on par with the scores expert raters would have given out [46]. The emphasis on learning gains from providing peer feedback encourages learners to consider the many dimensions that can influence learning and transfer. This emphasis also helped learners see the value in this course activity. Since learners were engaging in such a large quantity of occasions for providing peer feedback (25 separate feedbacks across the entire course), the feedback needed to be reframed as not only about service to peers, but also as directly beneficial for the providers.

4. METHODS

The study’s 6,250 comments on learning outcomes from providing peer feedback come from a sample of 250 learners who completed the course and agreed to participate in the IRB study. Their materials were collected and deidentified by members of the Duke University Center for Instructional Technology, and then placed in secure folders on a Sakai project site, and numbered 1-250. These materials included the learners’ drafts and revisions, as well as the feedback they provided to others for each of the four major projects. Learners responded to seven other learners for each of the major projects one, two and three (totaling 21 feedbacks), and they responded to four other learners for major project four. This brings the total number of feedbacks, where they were asked to articulate what they had learned from providing peer feedback, to 25 for each of the 250 learners, yielding a total of 6,250 discrete data points in the form of

sentences or phrases where learners reflect on what they have learned from providing peer feedback.

Qualitative coding was approached using methods adapted from a prior coding study of English Composition I forum data [47]. The coding protocol was developed by adapting the coding protocol used in the former study, and through a preliminary analysis of the current data under consideration. The coding protocol for the current study, funded by the Duke University Center for Instructional Technology, includes the following main categories:

- Affect/Emotion, such as admiration, frustration, competitiveness, and gratitude
- Area of Writing, such as argument, clarity, genre, style
- Length by Word Count (0, >10, 10-30, >30, Exceptionally Substantive)
- Main Area of Focus
- Tone (positive, negative, neutral)

Note that the affect/emotion category includes both emotions and behaviors, negative and positive, in keeping with research on dimensions of affect and emotion [48].

Coders reviewed the protocol, and then participated in a calibration phase using a subset of the data, followed by adjustments as needed for the coder and/or the protocol. Inter-rater reliability was assessed and discussed during the calibration phase. Because the coding nodes were primarily topical and descriptive instead of theoretical, coders could achieve higher inter-rater reliability [49]. Coders used NVivo software.

There are several study limitations. The data included could be skewed since all learners in the study completed the course. As with MOOC completion rates more broadly, most learners enrolled in English Composition I did not complete the course. Perhaps those learners who finished the course already had higher dispositions toward transfer, which might be reflected in the data results. Another limitation is that peer feedback rubrics asked learners what they had learned from providing peer feedback, not whether they had learned anything or not from providing feedback. The logic behind this question was that learning transfer requires reflection. And, learners could have chosen to leave that question blank, or say that they had not learned anything. Finally, at the time of this publication, coding is still in process and so full data results may confirm, reshape, or negate currently emerging patterns or preliminary insights. Still, the emerging patterns discussed in the following section are significant, and deepen and extend prior research about the learning gains possible from peer feedback.

5. EMERGING PATTERNS

Emerging patterns and results indicate that learners acquire a wide range of important benefits from providing peer feedback. These learning gains are related to course content, writing, and to learning more broadly.

Most posts were coded either positive or neutral in tone, suggesting that the general demeanor surrounding peer feedback was productive. The most commonly coded length

of the reflection response on what a learner gained from providing peer feedback was medium (10-30 words), suggesting that learners did engage in reflection. The main area of focus most commonly coded was “longer-term self as a writer,” followed closely by “learning in general” and “writing project” in particular.

The most commonly coded nodes for affect and emotion included self-reflection and self-critique:

“I would like to learn to write out a hypothesis as clearly as this writer.”

“The way the reviewer links the key ideas and evidences lead me to make my own should be better.”

Self-reflection and self-critique are critical for learning. Research suggests that reflection is highly correlated with increased learning gains [50]. As such, the gains learners make from peer feedback in self-reflection are likely to be associated with increased learning gains in the course.

For areas of writing coding nodes, learners made many gains in course content from providing peer feedback. Course content, in the case of English Composition I, included two components: 1. Writing and 2. An exploration of expertise and how people cultivate talent, which was the theme for the course. Regarding the latter content area (expertise/talent), learners expressed that providing peer feedback had fostered for them greater critical understanding:

“old people can be talented too.”

“This project made me think about the connection between talent and success, and it adds a lot to my own view on the text.”

Comments such as these indicate that peer review helps learners discover insights about the texts or ideas under consideration in a given course.

The learning gains related to writing-based content were many, and might be usefully differentiated into global concerns, such as structure and argument, and local concerns, which include sentence-level features and grammar/usage [51]. The global writing features coded most heavily to date include argument, structure, and evidence. For argument, learners conveyed that they had learned such reflections as the following:

“more focus on the argument”

“I need to make sure my argument is clear.”

Gains related to evidence often appear in considerations about the quantity of evidence to include and how to most effectively integrate evidence:

“I could have probably done a little extra research for my argument.”

“I need to focus more on citing and integrating evidence.”

Comments related to the global writing dimension of structure address such matters as organization and cohesion:

“This project made [me] think about the importance of the coherent representation of your ideas. Even if you have interesting thoughts, without logical structure your arguments can’t be effective”

Learners also reported that providing peer feedback prompted gains in sentence-level writing aspects, including most frequently such dimensions as title, clarity, conciseness, and style:

“While evaluating your text I learned that ... title crafts a strong impact on the readers [*sic*] mind throughout the text.”

“Write clearly and say exactly what you mean” “I have learned that I can be too wordy.”

“Sometimes my writing is pretty simplistic, and I'd like to be able to write in a more academic way such as this.”

Other reported learning gains from providing peer feedback suggest that students make gains in stylistic choices for writing. These constitute what might be considered low-road, near forms of transfer, whereby students are acquiring a repertoire of writing skills that they can use in subsequent writing occasions. One learner, for instance, appreciated the way an author had posed questions:

“The essay raised many valid questions ... worth pondering. I like discussion questions.”

Another student noticed an effective writing move for conclusions:

“I like the conclusion with ‘I am curious...’ – I will keep in mind this stylistic choice for my future work.”

Comments that gravitated toward higher-road, or “far,” writing transfer involved discoveries about more abstract approaches to writing. One learner, for example, writes the following about incorporating personal perspectives in writing:

“My case study is also about a topic that is part of my experience/daily life but I haven’t mentioned it in my paper as I didn’t want to sound too personal/self-involved. I---, you have shown me that it is possible to write about something that is part of your life and keep a “healthy” distance.”

In this case, the provider of feedback has learned that it is possible to write about personal matters in a way that can still be effective and not be perceived as inappropriately subjective or skewed. Notably, this learner has, through providing peer feedback, been inspired by another learner to have the confidence and courage to approach writing in a new way. Such an outcome is illustrative of what is known as positive interdependence, a beneficial characteristic of productive communities of practice [52].

Providing peer feedback, according to the data, also facilitates gains in genre awareness and task understanding. For a writing class, task understanding with regard to the writing projects requires keen insights into the intended learning outcomes of a project, including explicitly or implicitly, a knowledge about the genre of writing for the final product. In their comments about what they learned from providing peer feedback, learners frequently reference increased awareness of genre and, thereby, greater understanding of the task:

“My review is unbalanced: too much ...summary ..., too little ... evaluation”

“op-eds must focus on current events.”

Learning gains such as these indicate that peer review contributes to what is known as genre uptake, or the ways in which students understand and engage with genres of writing [53]. But these comments also suggest that peer review can contribute more broadly to students’ abilities to understand an assessment’s aims, purposes, and criteria. One learner revealed the following assessment plan based on having provided peer feedback:

“I should always read carefully the criteria and goals of a particular project and try to meet them.”

This discovery indicates that the learner has made highly transferable learning gains, which will be of benefit for many subsequent learning occasions.

Learners also reported specific learning gains in relation to the writing process. In writing studies, the writing process, generally considered to consist of pre-writing, drafting, revising, and editing, is often a central learning outcome [54]. One learner, for instance, made a discovery about pre-writing:

“I should have done an outline ... This ... included everything we learned that an op-ed should have.”

Another learner notes that providing peer feedback highlighted the importance of revision:

“I must reread my writing to make sure it conveys what I want.”

These process-based learning gains suggest that peer feedback encourages learners to reflect on higher-order learning capacities that can then be transferred to other learning occasions. While process is central to writing pedagogy, it is also important to the learning outcomes of many other disciplines, from gender studies [55] to psychotherapy [56]. Learners in disciplines that include methods courses, such as in the sciences [57], can also, therefore, derive potential gains in process-related knowledge from providing peer feedback.

One final area of learning gains resulting from providing peer feedback has to do with peer interaction and connectedness. Learners reported in a number of instances that providing peer feedback enabled them to discover a

shared area of potential improvement or revision. For example,

“We both chose an image as starting point to introduce our argument ... but our area of expertise is ... not visible. I have found this element in common.”

Identifying these common areas for revision or improvement suggests that providing peer feedback can aid in the development of cooperative communities of practice [58]. These communities of practice, characterized by positive interdependence and empathy, have been shown to be of central importance to meaningful pedagogy. Discoveries of shared struggles also constitute a cultivation of greater self-compassion, a recognition that at least some of one’s own limitations or areas for growth are reasonable and common. This self-compassion has been shown to lead to greater degrees of subjective well-being, which in turn also increases learning opportunities and potential [59].

6. CONCLUSIONS

Asking questions that are predominately focused on the validity of peer feedback runs the risk of missing one of the most important areas for peer-review outcomes: benefits from providing peer feedback. The data in this study suggest that learners acquire a wide range of benefits from providing peer feedback, from content and global and local dimensions of writing, to process-related gains, task awareness, genre uptake, and learning strategies. Perhaps most importantly, providing peer feedback increases connectedness among learners.

Significantly, meta-cognitive awareness and reflection are key to learners harnessing what they have learned from providing peer feedback.

More questions remain. These emerging patterns will need to be verified, negated, or adapted as the full dataset becomes coded. Another key area of additional research will involve how these learning gains intersect with learner demographics, such as age, facility with language, self-efficacy, and education level. Questions also remain over whether students’ reporting of these gains will in fact be translated into actual learning gains on subsequent learning and writing occasions.

The gains resulting from providing peer feedback should generate pause on decisions to use machine scoring. The efficacy of peer feedback is not only based on the quantity or quality of the peer feedback. Instead, these data suggest that the efficacy of peer feedback should be considered and assessed from the perspective of the provider of the feedback.

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