Quality of Peer Feedback in relation to Instructional Design: A Comparative Study in Energy and Sustainability MOOCs

Josemaria Elizondo-Garcia
Tecnologico de Monterrey, Mexico, *josemaria.elizondo@itesm.mx*

Christian Schunn
University of Pittsburgh, United States, *schunn@pitt.edu*

Katherina Gallardo
Tecnologico de Monterrey, Mexico, *katherina.gallardo@itesm.mx*

Peer feedback has become a common practice in MOOCs for its capacity to scale formative assessment and feedback on higher-order abilities. Though many practices for improving peer assessment have been examined, there is a lack of knowledge of how instructional design and platform features affect the quality of peer assessment and the relative frequency of different types of peer feedback comments. This study aimed to improve understanding of the relationship between quality of feedback and peer-feedback' pedagogical design. Peer feedback instructional design and peer feedback comment data were examined from two MOOCS in a similar domain of personal relevance but with substantially different designs. Country of origin of the feedback provider was also examined to control for cultural/linguistic effects. Differences between the two courses were observed in both the pedagogical designs and in the focus of peer comments, suggesting that peer feedback design is an important guide for the focus of peer feedback comments. Furthermore, the results support the idea that instructional design features, mainly the guide' structure and focus, determine the type of comments that participants will produce and hence receive.

Keywords: peer feedback, peer assessment, peer interaction, MOOC, quality of feedback, instructional design

INTRODUCTION

Peer assessment refers to the processes in which students take part in evaluating the quality of their colleagues' learning task performances (Sadler & Good, 2006; Topping, 2009). This type of assessment is a complex learning task that requires high-level cognitive processing (Gielen & De Weber, 2015). In MOOCs, it is usually conducted

anonymously and supported by a grading rubric and a set of detailed instructions (Dawson, 2017; Usher & Barak, 2017) for reviewing an assignment submitted within the MOOC platform.

Peer assessment has become a very relevant learning activity in MOOCs. Due the by-definition large number of students in such courses, the instructor has a very limited capacity to assess, provide elaborated feedback (Neubaum, Wichmann, Eimler & Kramer, 2014; Falakmasir, Ashley & Schunn, 2013) and to have interpersonal contact with every student (Comer, Clark, Canelas, 2014), even within the more limited set of students who complete more substantial tasks. Thus, peer feedback has been found to be an effective alternative (Kulkarni *et al.*, 2013; Yousef *et al.*, 2015). MOOCs offer a significant opportunity for peer-to-peer interaction in the form of dialogic, networked learning experiences (Clarà & Barberà, 2013).

By contrast, peer *feedback* refers to the formative function of assessment (Admiraal, Huisman and Pilli, 2015). Peer feedback is information communicated to the learners in order to modify their thinking or behavior, or otherwise increase student knowledge and skills (Shute, 2008). A typical sequence of activities in peer feedback are task performance and submission, reading each other's tasks, writing and submitting feedback, receiving feedback from others, and task revision (Comer, Clark & Canelas, 2014). In other words, peer assessment is about producing numbers that represent the current quality of a submitted object whereas peer feedback is about producing comments that help the document author improve.

Peer feedback has been widely studied and found to facilitate learning in diverse learning settings (e.g., Cho & MacArthur, 2010; Topping, 2009). However, in MOOCs there is still relatively little research on peer feedback (Yousef et al., 2015). Early studies on peer feedback in MOOCs focused on the system components that can help improve the validity of peer assessment, whereas more recent research has focused on it as a method for structuring collaborative learning (Ortoleva & Brètancourt, 2016).

When deployed with best practices, peer feedback in MOOCs has been found to be highly effective (Comer & White, 2016). By engaging in giving and receiving feedback, students became more aware of their own learning and the learning of others around them (Wasson & Vold, 2012). Engaging in peer review typically involves critical thinking and the implementation of higher order cognitive skills, such as argumentation and reasoning (Yurdabakan, 2016; Usher & Barak, 2017). Peer feedback enhances learner understanding, creates links to course learning objectives, and generally contributes positively to the learning environment (Comer, Clark & Canelas, 2014). Furthermore, it helps to generate diverse ideas (Hew, 2018).

By contrast, when not properly supported, peer feedback activities are often considered time-consuming and unnecessarily complicated, and they are not taken seriously by most students (Usher & Barak, 2017). Hew (2018) found that one of the main reasons for student disengagement within MOOCs is related to the use of (poorly designed) peer review activities. Students reported being frustrated with the superficial or inconsistent comments they received from their peers. Moreover, Onah, Sinclair and Boyatt (2014)

argued that courses relying on peer feedback often have lower completion rates because participants have been disheartened by unhelpful or dismissive comments on their work, lack of response, or discovery of plagiarism in peers' work.

Interestingly, Usher and Barak (2017) found that MOOC participants provided more feedback comments and volunteered to assess more assignments than did participants in face-to-face or small and private (i.e., not massive and open) online courses. However, face-to-face students provided higher quality feedback and their peer grading was better correlated with the grades assigned by the teaching assistants. Therefore, the quality of the peer feedback in MOOCs is still a challenge (Yousef et al., 2015).

Quality of peer feedback in MOOCs

Variations in peer feedback has been linked with students' perceived improvement in their writing (Cho, Schunn, & Charney, 2006; Van der Berg, Admiraal & Pilot, 2006) and actual improvement on writing assignments (Noroozi, Biemans & Mulder, 2016). Further, the benefits of higher quality feedback are observed in both providers and receivers of the feedback (Noroozi et al., 2016). Types of peer feedback comments and the design features of peer feedback activities have each been examined in terms of their capacity to improve students' performance. However, the relationship between these two factors have not been explored.
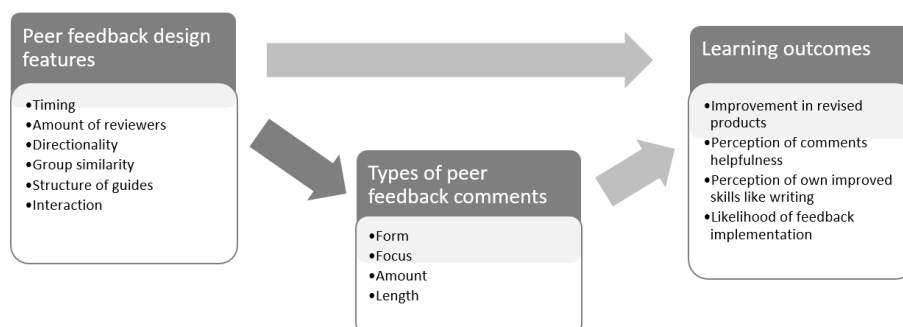

Figure 1
Design features for supporting high quality peer feedback in MOOCs

Types of peer feedback comments

For measuring the quality of peer feedback in online courses, researchers have identified features or types of peer feedback comments and related them to the improvement in the revised products (Patchan, Schunn & Correnti, 2016; Van der Berg, Admiraal & Pilot, 2006), the students perceptions' of the helpfulness of comments (Cho, Schunn, & Charney, 2006; Van der Berg, Admiraal & Pilot, 2006) and the progress in their skills, like learning to write (Van der Berg, Admiraal & Pilot, 2006) and the likelihood of their implementation (Patchan, Schunn & Correnti, 2016). In the current work, we focus on the types of peer feedback produced based on its centrality to the learning opportunity for both reviewer and writer.

The main types of peer feedback comments that researchers have examined within peer assessment activities are the focus, form, length, and amount of comments (Cho, Schunn, & Charney, 2006; Van der Berg, Admiraal & Pilot, 2006; Nelson & Schunn, 2009; Neubaum, Wichmann, Eimler & Kramer, 2014; Gielen & Weber, 2015; Patchan & Schunn, 2015; Ortoleva & Brètancourt, 2016). Van der Berg, Admiraal and Pilot (2006) distinguished between content, structure and style as focus type of comments in peer feedback. Furthermore, Cho, Schunn and Charney (2006) identify specificity, criticism, summary, praise and solution as form peer feedback comments features. We based on these focus and form distinctions in our study, since they are generally relevant to the type of assignments students are asked to revise in MOOCs.

Concerning the types of peer feedback comments, Van der Berg, Admiraal and Pilot (2006) found that, after having received peer feedback, students use about one-third of the suggestions to revise their work, and the writer rarely use the suggestion when students comment on structure. In their study, most peer feedback comments were related to the style, rather than the content of the draft. Moreover, it has been demonstrated that feedback is significantly more effective when it includes information about how to improve, instead of only stating if something was done well or not (Coll, Rochera & De Gispert, 2014).

Peer feedback design features

The design of peer feedback activities has been found to affect the quality of peer feedback. For example, it has been found that the same student can produce feedback that differed in their level of elaboration across different contexts (Ortoleva & Brètancourt, 2016). A number of peer feedback design features have been researched in order to improve the quality of feedback and participant interaction such as timing, size, directionality (Van der Berg, Admiraal & Pilot, 2006), structure of peer feedback guides (Gielen & De Weber, 2015), group similarity (Lynda, Farida, Tassadit & Samia, 2017) and interaction (Wasson & Vold, 2012; Lin & Yang, 2011; Gao, Samuel & Asmawi, 2016).

When setting up a peer-commenting activity, usually epistemic and social scripts are adopted. Epistemic scripts structure knowledge construction, while social scripts facilitate the interaction among students (Weinberger et al., 2005). Two main peer feedback design features related to these scripts are the structure of peer feedback guides and peer feedback interaction. Thus, in our study we focused on these two design features. We review studies that relate to these design features and the resulting quality of peer feedback.

Structure of peer feedback guides. Rubrics are useful guides that enhance peer feedback in MOOCs, and the structure of these guides can affect peer feedback comments' features. Gielen and De Weber (2015) analyzed three peer feedback structure conditions: no structure, basic structure, and elaborate structure. In a wiki environment with 168 bachelor students, the no structure group only received the list of criteria, the basic structure group received the criteria list and two extra guiding questions, and the elaborate structure group received a template that was structured according the

principles of feed up, feedback and feed forward (Hattie & Timperley, 2007). They focused on elaboration within feedback because Topping (2010) suggested that elaborate feedback results in better performance. They found that the proportion of elaborations within comments for the basic structure group and the elaborated structure was significantly lower compared to the no structure group. These findings suggest that providing a higher degree of structure in a peer feedback template does not necessarily results in a higher proportion of elaborations; adding only a few guiding questions can significantly increase the elaboration proportion in peer feedback comments.

Interaction. In peer feedback activities, participants often collaborate with others, and such a social dimension can be a great motivator for students. Within collaborative writing, productive interactions have been observed when students provided concrete suggestions or reported personal experiences in similar situations than their peers (Van der Berg, Admiraal & Pilot, 2006). Furthermore, students are able to come up with new solutions in peer feedback activities that allow questions and discussion (Ortoleva & Brètancourt, 2016).

Peer feedback interaction has been promoted within many new learning environments. A wiki environment, which allows participants to invite peers to conduct online writing, comment and add new content, was found to help users to understand the differences between modified and original writing. Students reported that they used peers' work for inspiration and model learning (Lin & Yang, 2011). It has been demonstrated that a formative assessment tool that focus on giving playful, quick feedback, on a learner created product can contribute to engaging and motivating students to give and receive feedback (Wasson & Vold, 2012). Moreover, an online environment that includes quotation for mutual feedback, emoticons, and instant messages may enhance communication for critical peer feedback (Gao, Samuel & Asmawi, 2016).

The current study

While peer feedback design features and types of peer feedback comments have been examined in isolation, there are still insufficient research on the relationship between peer feedback MOOC design features and the types of comments that participants produce. It is likely that a number of pedagogical design features influence the types of feedback comments, which is important to understand because the types of feedback comments shape the better opportunities for improving performance and skills of who receives and produce the feedback.

The aim of the current study is to better understand the ways in which instructional design affects peer feedback comments. This overall research focus was divided into two research questions:

1. How did instructional designers structure peer feedback activities in a MOOC context?
2. What was the relationship between instructional design features and the relative frequency of different types of peer feedback comments?

We studied two courses with a roughly similar topic (and hence likely to draw similar kinds of participants) but with different instructional designs and then compared the differences in the types of peer feedback comments that participants typically produced. Furthermore, we interviewed instructional designers and participated in the course to produce a detailed description of the pedagogical design features of both courses. Thus, we could relate peer feedback design features to the types of peer feedback comments.

Based on the literature, we expected that more structured peer feedback guide results in less elaborated comments, which we examine in terms of comment length and comments with multiple components. In addition, the literature suggests that designs which support more interaction during peer feedback will promote more solutions being offered.

METHOD

To answer the two research questions, an equal status and sequential mixed methods design was chosen (Johnson and Onwuegbuzie, 2004). The qualitative research was carried out first, followed by the quantitative research. The qualitative approach focused on revealing the instructional designers' intentions and describing peer feedback design features. The quantitative approach focused on comparing both courses according to the types of peer feedback comments.

Context

The Disaster Preparedness course was a Coursera MOOC developed by University of Pittsburgh, in which 13,125 participants enrolled. Approximately 37% of participants were from United States and this course had participation from more than one hundred countries throughout the world. The Energy Saving course was a MexicoX MOOC developed by Tecnologico de Monterrey. In its first implementation, 4,402 participants enrolled. Most of the course participants, 97%, were Mexican but widely distributed across the states of the Mexican Republic. The rest of the participants resided in Spanish-speaking countries such as Colombia, Ecuador, and Argentina. Both courses involved a topic of general relevance to everyday life and did not require specific prior coursework or being within a particular profession.

Participants

The current study focused on the participants who 1) completed peer assessment activities, 2) completed the demographics survey in order to determine country of origin, and 3) were from the country in which the MOOC was produced. As is typically the case, many students who enrolled in the MOOCs did little active participation such as the peer assessment activities and survey tasks. The focus on the 'home country' was made to avoid second language issues, which preliminary analyses suggested had a large effect on peer feedback content. However, we added, as a third contrast group, the participants from Latin America in the Disaster Preparedness MOOC in order to rule out cultural issues in the contrast between participants in each MOOC. Thus, there were three groups of participants: 108 US participants from the Disaster Preparedness MOOC, 10 Latin America participants from the Disaster Preparedness MOOC, and 112 Mexican participants from the Energy Saving MOOC.

Instruments

For the qualitative research, a semi-structured interview was used with instructional designers from both courses. The semi-structured interview consisted of ten questions regarding the instructional designers' intentions for the peer assessment activities. In addition, participant observation was conducted by enrolling in the courses and completing some of the peer assessment activities in order to obtain a detailed description of the pedagogical features of each of the peer assessment and feedback' activities. For the quantitative research, we collect participants' demographic data via surveys and the peer feedback comments in peer assessment activities from both courses.

Data analysis

We analyzed interviews transcripts and notes that described instructional design features in both courses. Then, we compared instructional design features of peer assessment activities and categorized them according to structure features in the reviewing guide's and interaction features. The Energy Saving MOOC interview was conducted in Spanish; translations are presented in the results.

Individual peer feedback comments were used as the unit of analysis. In the Disaster Preparedness MOOC, the US participants made 242 feedback comments and the Latin American participants made 23 comments. In the Energy Saving MOOC, the Mexican participants made 543 comments.

For our analysis, we adapted Van der Berg, Admiraal and Pilot's (2006) distinctions for the focus of peer feedback comments and Cho, Schunn and Charney's (2006) distinctions for the form of peer feedback comments (see Table 1). Adaptations were made based on variations that were observed within the current dataset.

Table 1

Peer feedback comments features, with definitions and multiple examples of each type (with translated examples shown in italics).

Type	Definition	Examples
Form		
Praise	Positive comment	Good work. / *It includes a detailed list of contents.*
Problem	Comment that show a lack in the assignment	*Your assignment didn't meet requirements.* / You haven't stick to given format.
Solution	Comment that tells what to do to improve the assignment	May I suggest that you don't forget diapers for the baby / Be more specific about which foods you will include.
Mitigation	Comment that presents a problem and praise (generally to mitigate the negative connotation of the problem)	*You did a good job, but there still some changes that you need to do.* / You need more reading on this topic. Anyway good attempt.
Focus		
Generic quality	Comment that express an assignment non-specific quality (generally the length of this comment is short)	Good job. / Perfect. / The best plan. / Good attempt.
Criterion meeting	Comment that express whether an assignment fulfilled or not the criteria	*Only two strategies were presented.* / You haven't stick to given format.
More specific than overall criterion meeting	Comment that focus on the criteria achievement in more detail.	*It was good to show charts, anyway written analysis is missing.*

Type	Definition	Examples
Gives specific content feedback	Comment that talks about the content (related topic), what writer told about.	*I think your resolution to use more public transport is very good.* / You could include your pet for the jump kit.
Quality aspects not named in criteria	Comment that focus on comment quality aspects not included in criteria and also is not focused on content	*Redaction was poor.* / I liked the clear narrative and use of bullet points. / *You should analyze it using your experience.*
Personal aspects	Comment that talks about or assess the participant rather than the assignment	I can tell you are more trained than the average person in emergency preparedness. / *This person did not take the course seriously.*
Length		
Length of comment unit	Amount of words of every comment unit	-

FINDINGS

Design of Peer Feedback Activities

Interviews and participant observation with the courses revealed the key design features for the peer feedback components of the two courses (see Table 2). Differences in guide structure were shown according to the use of rubrics for providing feedback. Differences in interaction were shown in terms of anonymity and opportunities to reply.

Guide structure. Disaster Preparedness participants were asked to use a four-level-per-criterion rubric, and this rubric was used only for scoring. For choices per criterion were presented: Missing response, Needs improvement, Sufficient, and Exemplary. For providing feedback comments, participants were provided a text box at the end of peer assessment under the title "Comments", without any instruction. So, they were not explicitly directed to provide feedback of relevance to each criterion. In sum, they had an unstructured feedback guide.

Table 2

Comparison of peer feedback design features within each course

Feature	Disaster Preparedness MOOC	Energy Saving MOOC
Guide structure	Unstructured peer feedback guide Rubric was used for scoring, not for feedback. Feedback text-box per overall criteria	Structured peer feedback guide Rubric also guided feedback Feedback text-box per criterion
Interaction	Non-anonymous Opportunity to interchange comments about the feedback	Anonymous No opportunity to reply to feedback

In the Energy Saving MOOC, when assessing an assignment, participants were simply asked to select Yes or No for five different rubric criteria. Then a text-box was shown for adding a comment after every criterion. Thus, the peer assessment interface allowed six comments, one for each of the five rubric criteria and a sixth one for overall comments. This resulted in a structured guide for producing comments. Participants used the two-option-per-criterion rubric for both scoring and producing feedback. The instructional designer for the Energy Saving MOOC explained: "we decided to include a dichotomous rubric to avoid having participants produce 'non-subjective' assessment" /

"decidimos usar una lista de cotejo para evitar que los participantes fueran más subjetivos en su evaluación."

Interaction. In the Disaster Preparedness MOOC, participants knew the name of their peers and had the chance to reply to the feedback. Some reviewers described how they had revised in the feedback comment. This feature, shown in the comments, produces a feel of having a conversation about the reviewed assignment. Peer interaction was a relevant issue for the instructional designer of the Disaster Preparedness MOOC since she thought "learning from others is a cornerstone in MOOCs". Peer assessment activity allowed participants to know who they received feedback from, and to reply to the received feedback.

In the Energy Saving MOOC, participants had no information about who they were evaluating and they had no opportunity to reply to the feedback. According to the Energy Saving instructional designer, they opted for anonymous and one-way feedback in order to avoid negative comments and off-topic evaluations. Concerning peer feedback, she said: "it is a two-edge weapon, since you can identify who assess you and then, if they give you a bad note, you may give them a bad note, and that causes trouble among the participants" / "pero es un arma de dos filos porque a veces se reconoce quien te retroalimentó, entonces si a la siguiente a mí me toca calificarlo yo lo califico mal, y eso causa problemas entre los participantes."

While the Disaster Preparedness MOOC instructional designer mentioned the possibility of participants learning from their peers, the Energy Saving MOOC instructional designer was concerned with the risk of participants complaining about their peers due a low rating or a negative comment. Moreover, it is important to point out that the instructional designers noted limitations placed upon them regarding possible designs of the peer feedback activities. For example, some features related to guide structure and interaction were predetermined within the platform, and the instructional designers could not change this aspect.

Peer Feedback Content

The peer comments made by the US participants in the Disaster Preparedness MOOC were longer than those from the other two groups of participants. Unsurprisingly, the LA participants writing in their non-native language in the DP MOOC wrote much shorter comments (M=17.3 words) than the other two groups (US M=34.7 words and MX M=26.4 words, $t(60)$=4.29, p<.01, and $t(37)$=-2.49, p<.05, respectively). Further, the US vs. MX contrast across MOOCs was also significant and still large ($t(449)$=2.71, p<.01), but it may be, in this case, that much of the differences in comments length were shown according to cultural aspects rather than the feedback design.
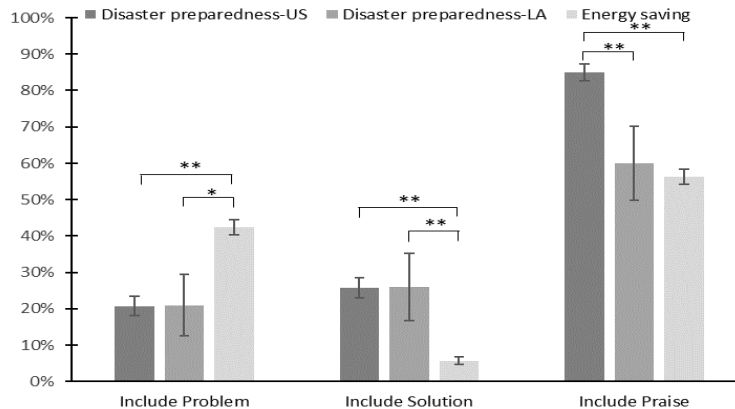
Figure 2
Percentages of comments (with SE bars) of each form for each group. **p<0.01. *p<0.05.

Figure 2 shows the percentages of peer feedback comments falling within each type of comment form, and the significant differences based on chi-square contrasts of number of comments including/not including a comment form within each of the contrasted groups. Most of the comments given in both courses included Praise. However, US participants included significantly more Praise in their comments than did Latin America participants and Mexico participants. Thus, the amount of Praise is likely not explained by the instructional design but rather by cultural features.

Disaster Preparedness participants included less Problems in their comments than did the Energy Saving participants. US participants and LA participants included significantly fewer Problem comments than did the Energy Saving participants. Furthermore, US and Latin America Disaster Preparedness participants included significantly more Solutions in their comments than did the Energy Saving participants. Thus, the amount of Problem and Solution comments may be explained by instructional design features of the peer feedback activities.

Figure 3 shows the percentages of peer feedback comments with each given comment focus along with information on which contrasts were statistically significant using chi-square tests. There were no significant differences in the rates of Generic quality comments. However, the Energy Saving participants made much more General criterion meeting comments than did the US and Latin America Disaster Preparedness participants, showing a clear effect of the design features. By contrast, the pattern of differences for Detailed criterion comments may involve a mixture of design features and culture effects given the middling level (but not statistically significant) for the Latin American Disaster Preparedness participants.
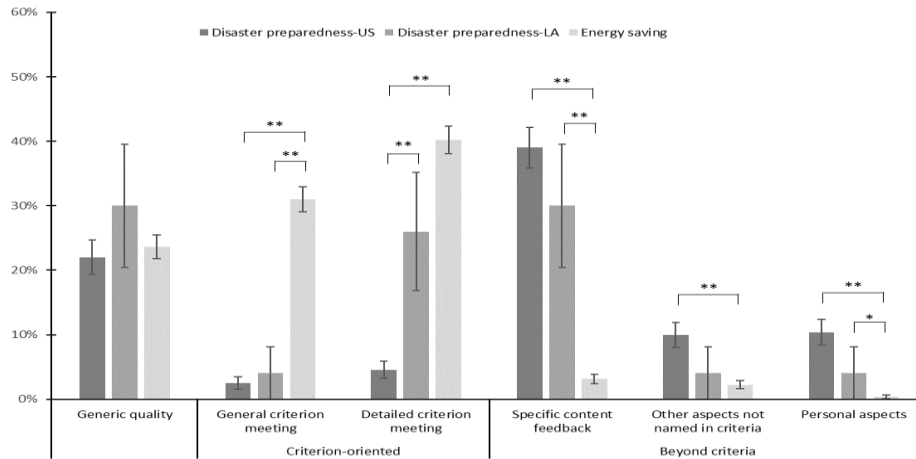
Figure 3
Percentages of comments (with SE bars) with each content focus.**p<0.01. *p<0.05.

Both groups of Disaster Preparedness MOOC participants were more likely to make Specific Content comments than were the Energy Saving MOOC participants, again suggest a difference based in design features rather than in culture. A similar but weaker pattern was found for Other aspects not named in criteria and the Personal aspects comments. The growth in Personal aspects may also be connected to the non-anonymous aspect of the Disaster Preparedness MOOC peer assessment activities. Participants who had information from other participants, such as their name, nationality and previous performance, appeared more willing to produce comments that allude to personal aspects.

We identified three main commenting differences that can be explained by the instructional design features in peer feedback activities. Overall, the Energy Saving MOOC comments tended to be more focused on the criteria and the Disaster Preparedness comments tended to look beyond the criteria. This tendency may be mainly explained by the structure of the peer feedback guides.

DISCUSSION

In terms of research question 1, findings showed that guide structure and peer interaction are two main features that distinguish how peer feedback activities are carried out. MOOC instructional designers decide the structure of the peer feedback guide according to their beliefs about the abilities of participants to evaluate and produce feedback. Also, they decide between anonymous or non-anonymous interaction towards promoting peer learning or avoiding complaints due to low ratings and negative comments. Moreover, instructional designers noted that they do not have the capacity to completely determine some features, like the opportunity to reply, which are predetermined platform features that cannot be easily changed.

In terms of research question 2, differences in the types of comments were divided into those that appeared to due to the nationality of participants and those which appeared to due to MOOC instructional design features. Most importantly, Disaster Preparedness MOOC participants produced more Solutions and less Problems than Energy Saving MOOC participants. These findings suggest that non-anonymous interaction and opportunity to interchange comments about the received feedback make participants produce more Solutions rather than Problems in feedback to their counterparts. Moreover, Disaster Preparedness MOOC participants produced less comments that focused on overall criterion and more comments that focused on content than Energy saving MOOC participants. These findings suggest that a structured peer feedback guide that uses a clear rubric for guiding the feedback leads participants producing more comments that focus on criterion meeting.

These results were consistent with the general premise that instructional design directs and guides the types of peer feedback comments, which is important because the types of peer feedback comments influences learners' performance and skill development (Van der Berg, Admiraal & Pilot, 2006; Noroozi, Biemans & Mulder, 2016). Furthermore, the results agree with Gielen and De Weber (2015) claims that the structure of peer feedback guides promotes certain types of peer feedback comments. They suggested that providing a higher degree of structure in a peer feedback template does not necessarily results in a higher proportion of elaborations, and the current results found a similar result.

In sum, instructional designers and other decisions makers in MOOC pedagogical design should decide whether they want participants to focus either on content or assignment criteria, and the current findings suggest how they can achieve those goals. However, it is also important to note that the interviewees noted that instructional designers do not always have full control of the instructional design features. Instead, the existing MOOC platforms like Coursera and EdX have some characteristics that instructional designers cannot avoid, but instead address through additional features to improve the communication and feedback aspects of the participants' experience.

REFERENCES

Admiraal, W., Huisman, B. and Pilli, O. (2015). Assessment in massive open online courses. *The Electronic Journal of e-Learning (EJEL), 13*(4), pp.207-216.

Cho, K., & MacArthur, C. (2010). Student revision with peer and expert reviewing. *Learning and Instruction, 20*(4), 328-338.

Cho, K., Schunn, C. D., & Charney, D. (2006). Commenting on writing: Typology and perceived helpfulness of comments from novice peer reviewers and subject matter experts. *Written Communication, 23*(3), 260-294.

Clarà, M., & Barberà, E. (2013). Learning online: massive open online courses (MOOCs), connectivism, and cultural psychology. *Distance Education, 34*(1), 129-136.

Coll, C., Rochera, M. J., & de Gispert, I. (2014). Supporting online collaborative learning in small groups: Teacher feedback on learning content, academic task and social participation. *Computers & Education, 75*, 53-64.

Comer, D. K., Clark, C. R. and Canelas, D. A. (2014). Writing to learn and learning to write across the disciplines: Peer-to-peer writing in introductory-level MOOCs. *The International Review of Research in Open and Distributed Learning, 15*(5).

Comer, D. K., & White, E. M. (2016). Adventuring into MOOC writing assessment: Challenges, results, and possibilities. *College Composition and Communication, 67*(3), 318.

Dawson, P. (2017). Assessment rubrics: towards clearer and more replicable design, research and practice. *Assessment & Evaluation in Higher Education, 42*(3), 347-360.

Falakmasir, M. H., Ashley, K. D., & Schunn, C. D. (2013). Using argument diagramming to improve peer grading of writing assignments. In AIED 2013 Workshops Proceedings Volume, p. 41.

Gielen, M., & De Wever, B. (2015). Structuring peer assessment: Comparing the impact of the degree of structure on peer feedback content. *Computers in Human Behavior, 52*, 315-325.

Gao, X., Samuel, M., & Asmawi, A. (2016). Online features of qzone weblog for critical peer feedback to facilitate business english writing. *Journal of Educational Technology Systems, 45*(2), 285-301.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112.

Hew, K. F. (2018). Unpacking the Strategies of Ten Highly Rated MOOCs: Implications for Engaging Students in Large Online Courses. *Teachers College Record, 120*(1), n1.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, *33*(7), 14-26.

Kollar, I., & Fischer, F. (2010). Peer assessment as collaborative learning: A cognitive perspective. *Learning and Instruction, 20*(4), 344-348.

Kulkarni, C., Wei, K. P., Le, H., Chia, D., Papadopoulos, K., Cheng, J., Koller, D. & Klemmer, S. R. (2013). Peer and self assessment in massive online classes. *ACM Transactions on Computer-Human Interaction (TOCHI), 20*(6), 1–31.

Lin, W. C., & Yang, S. C. (2011). Exploring students' perceptions of integrating Wiki technology and peer feedback into English writing courses. *English Teaching: Practice and Critique, 10*(2), 88-103.

Lynda, H., Farida, B. D., Tassadit, B., & Samia, L. (2017). Peer assessment in MOOCs based on learners' profiles clustering. In Information Technology (ICIT), 2017 8th International Conference, 532-536. IEEE.

Nelson & Schunn (2009). The nature of feedback: How different types of peer feedback affect writing performance. *Instructional Science, 37(*4), 375-401.

Neubaum, G., Wichmann, A., Eimler, S. C. and Kramer, N. C. (2014). Investigating incentives for students to provide peer feedback in a semi-open online course: An experimental study. *Memorias de The International Symposium on Open Collaboration,* pp. 19. ACM.

Noroozi, O., Biemans, H., & Mulder, M. (2016). Relations between scripted online peer feedback processes and quality of written argumentative essay. *The Internet and Higher Education, 31*, 20-31.

Onah, D. F., Sinclair, J., & Boyatt, R. (2014). Dropout rates of massive open online courses: behavioural patterns. *EDULEARN14 proceedings*, 5825-5834.

Ortoleva, G., & Bétrancourt, M. (2016). Supporting productive collaboration in a computer-supported instructional activity: peer-feedback on critical incidents in health care education. *Journal of Vocational Education & Training, 68*(2), 178-197.

Patchan, M. M., & Schunn, C. D. (2015). Understanding the benefits of providing peer feedback: how students respond to peers' texts of varying quality. *Instructional Science, 43*(5), 591-614.

Patchan, M. M., Schunn, C. D., & Correnti, R. J. (2016). The nature of feedback: How peer feedback features affect students' implementation rate and quality of revisions. *Journal of Educational Psychology, 108*(8), 1098.

Sadler, P. M., & Good, E. (2006). The impact of self-and peer-grading on student learning. *Educational Assessment, 11*(1), 1-31.

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research, 78*, 153–189.

Topping, K. J. (2010). Methodological quandaries in studying process and outcomes in peer assessment. *Learning and Instruction, 20*, 339–343.

Topping, K. J. (2009). Peer assessment. *Theory into practice, 48*(1), 20-27.

Usher, M., & Barak, M. (2017). Peer assessment in a project-based engineering course: comparing between on-campus and online learning environments. *Assessment & Evaluation in Higher Education, 43*(5), 745-759.

Van den Berg, I., Admiraal, W., & Pilot, A. (2006). Design principles and outcomes of peer assessment in higher education. *Studies in Higher Education, 31*(03), 341-356.

Wasson, B., & Vold, V. (2012). Leveraging new media skills in a peer feedback tool. *The Internet and Higher Education, 15*(4), 255-264.

Weinberger, A., Ertl, B., Fischer, F., & Mandl, H. (2005). Epistemic and social scripts in computer–supported collaborative learning. *Instructional Science, 33*(1), 1-30.

Yousef, A. M. F., Chatti, M. A., Wosnitza, M., & Schroeder, U. (2015). A Cluster Analysis of MOOC Stakeholder Perspectives. *RUSC. Universities and Knowledge Society Journal, 12*(1), 74-90.

Yurdabakan, Í. (2016). The investigation of the prospective teachers' opinions related to peer assessment: A qualitative study. *International Journal on New Trends in Education & their Implications (IJONTE),* 7(4).

ACKNOWLEDGEMENTS

APPENDICES

Appendix 1. Disaster preparedness MOOC peer assessment rubric

	Grading Criteria and Levels of Performance				Peer Score (0, 1, 3, 5)
Section of Plan	Missing Response (0 points) Provides no response for this section of the plan.	Needs Improvement (1 point) Lacks significant amount of information stated in the instructions; offers an incomplete and unorganized response.	Sufficient (3 points) Follows instructions but lacks some specific and comprehensive information; Lacks a topic sentence or clearly organized information.	Exemplary (5 points) Follows instructions with specific and comprehensive details; Includes a topic sentence and organized information.	
Personal Background information					
Types of Disasters					
Home Preparedness and Jump Kit Checklists					
Contingency Plans					
Escape Routes or Transportation Plan					
Emergency Communication Plan					

Maintenance Approach					
References					
Student Total (Maximum of 40 points)					

Comments

Appendix 2. Energy saving MOOC peer assessment rubric

Assessment Criteria	It complies		Comment
	Yes	No	
1. The report of energy consumption presents at least five actions that will be part of the saving strategy.			
2. The report contains a list of the specific actions that detail the potential savings of the selected elements (minimum five).			
3. It exposes the current amounts of energy consumption of the selected elements and the quantities that are expected to be obtained once the strategy is applied.			
4. It shows the savings amounts in economic terms through calculations and/or rates.			
5. It performs an analysis of at least half a page explaining the viability of the proposal and the impact of it.			

Overall comment