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The Learning Potential of Student-Generated Feedback with Multimedia Shareability for Online Student-Generated Multiple-Choice Questions

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Abstract: An online system supporting student-generated feedback for student-generated questions was extended by including the feature of multimedia shareability. A study examining students' perceived learning usefulness and task difficulties toward the extended multimedia capability for feedback-generation was conducted with sixty eight-grade students. Several significant findings were obtained. First, the X^2 tests on perceived learning usefulness and task difficulties were both statistically significant. Second, the majority of the participants felt that multimedia-equipped feedback-generation better help their learning, and perceived text-based feedback-generation as intrinsically more difficult. Finally, the constant comparative method conducted on the explanatory reasons revealed that while added cognitive and affective gains were appreciated as the affordances of multimedia-equipped feedback-generation, emotional tensions were well noted due to the time-constrain issue. Suggested topics for future studies are provided.

Keywords: Multimedia, online learning system, perceived learning potential, perceived task difficulties, student-generated feedback, student-generated questions

1. Introduction

Feedback to performance is known to affect student cognitive engagement with tasks (Butler & Winne, 1995), and has been shown to play a pivotal role in improving knowledge and skill acquisition (Shute, 2008). Despite the widely acclaimed effectiveness of feedback, it is usually the teachers who are responsible for providing elaborated feedback to student answers to questions. Under the premise of student-generated content, a learning system enabling students to provide feedback to each of the options of multiple-choice questions (i.e., named student-generated feedback) has been developed (Yu & Liu, 2016). Recent studies found that student-generated feedback for online student-generated multiple-choice questions promoted better learning (Yu & Wu, 2017; Yu, Liu, Wu, & Huang, 2018).

With the considerably supporting evidence of feedback on learning, factors moderating its outcomes have been the focus of numerous empirical studies (Narciss & Huth, 2004; Shute, 2008). Among these, forms of feedback, specifically the multimedia feature, in the context of student-generated feedback for online student-generated multiple-choice questions warrant investigation, in light of the fact that learners today are used to a media-rich learning environment (Prensky, 2001) and the communicative power of multimedia presentation (Clark & Mayer, 2011).

Several experimental studies have confirmed that multimedia presentation (e.g., combinations of text and illustrations) enhances communication and learning than single medium presentation (e.g., text only) (Clark & Mayer, 2011; Mayer & Moreno, 2002) because each medium is equipped with distinct features and affordances. Although the role multimedia serves in instruction to support diverse learners (Clark & Mayer, 2011) is commonly appreciated, its learning potential in the context of student-generated feedback for student-generated questions is yet to be understood. In other words, despite that the value of multimedia for 'learners as the consumer' is broadly known, its value for 'learners as the producer' is less known. To this aim, an existing online learning system targeting student-generated

feedback for student-generated multiple-choice questions is extended, and students' perceived learning usefulness and task difficulties toward multimedia-equipped feedback-generation is examined.

2. Methods

An existing online learning system (QuARKS) (Yu & Liu, 2016) was extended by allowing multimedia files to be included as part of the generated feedback. The multimedia files uploaded can be shared and reused by peers to embrace and actualize the ideas of Web 2.0 (e.g., openness of data, collaborating, the power of the crowd, and so on) (Anderson, 2007).

Two eighth-grade classes of students (n = 60) from one junior high school participated. Each week after attending five 45-minute instructional sessions on English, the participants headed to the school's computer lab for a 45-minute supplementary online activity. Essentially, on a weekly basis for a duration of ten weeks, the participants were directed to generate three multiple-choice questions with elaborate feedback in connection with each of the four options (i.e., justifications for the correct answer and explanations for the other three incorrect options) on English content covered in the current week in QuARKS. To equip the participants with the fundamental knowledge and skills on question- and feedback-generation, a 45-minute training session was arranged at the first week. Afterwards, the participants were exposed to text-based feedback-generation at the first stage and then multimedia-equipped feedback-generation at the second stage (Figure 1). At their first encountering with multimedia-equipped feedback-generation, the participants were briefed on the operational procedures of accessing and including multimedia files in QuARKS. Students were free to create their own multimedia, or use any multimedia files already stored and shared by the instructor or their peers in QuARKS as part of feedback. At the end of the last session, two selection questions with explanations were distributed to the participants to solicit their views on the relative learning usefulness and task difficulties of text-based and multimedia-equipped feedback-generation.

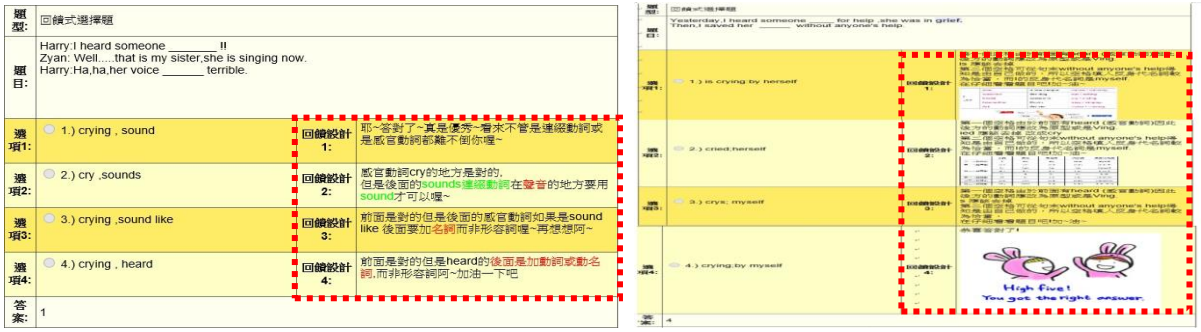

Figure 1. Online student-generated questions with text-based feedback-generation (left) and multimedia-equipped feedback-generation (right)

3. Results and Discussion

Data analysis done on the perceived learning usefulness found that the majority of the participants (80%, n = 48) regarded 'multimedia-equipped feedback-generation' as better promoting their learning. Only one participant voted for text-based feedback-generation, and nearly one-fifth of the participants (18.33%, n = 11) felt the two approaches with similar learning usefulness. A X^2 test on the observed frequency distribution among the three options was statistically significant, $X^2 = 61.30$, $p < .05$. Two salient themes emerged as a result of the constant comparative method done on the descriptive reasons provided by the participants who rooted for multimedia-equipped feedback-generation. First, half of this group of participants (n=24) pointed out that multimedia-equipped feedback-generation enhanced the clarity of the message intended to be conveyed and their comprehension of the learned material. Second, 21 participants highlighted the positive emotional tone multimedia-equipped feedback-generation helped to create (e.g., amusing, fun, relaxing, motivating). In sum, added cognitive and affective gains were recognized as affordances of multimedia-equipped feedback-generation. The results reflected what Narciss and Huth (2004) accentuated regarding the multiple-function nature of feedback — cognitive and motivational.

Data on the perceived task difficulties showed that the majority of the participants (53.33%, n =32) regarded 'text-based feedback-generation' as more difficult, while one-fifth (20%, n = 12) regarded 'multimedia-based feedback-generation,' and about one-fourth (26.67%, n = 16) felt no differences. The results of the X^2 test showed a statistical significance of the frequency distribution observed among the three options, $X^2 = 9.1$, $p < .05$. Constant comparative analysis of the participants' rationales revealed four important themes. First, as meaningful feedback entails providing explanations and justifications, resorting to text solely for feedback-generation was viewed by twelve participants as more draining and demanding, both cognitively and emotionally. Second, with its high reliance on descriptive explanations, personal inadequacy in English, typing skills, and overall communicative ability was noted by nine participants as drawbacks of text-based feedback-generation. Third, the time factor was highlighted by a high percentage of those who felt multimedia-equipped feedback-generation as more difficult (i.e., eight; two-thirds), as a result of the extra time needed for locating relevant multimedia. Fourth, because graphics or tables combined with text can convey message in a clearer way, text-based feedback-generation was considered by seven participants as more difficult, compared to multimedia-equipped feedback-generation. As a whole, the results corroborated what more multimedia researchers accentuated — multimedia is equipped to convey intended message with clarity.

To conclude, the pedagogical value of multimedia is well established. Nevertheless, its roles and effects for the maker themselves in the maker era are in need of further investigation. In particular, the comparative effects of text-based and multimedia-equipped feedback-generation for student-generated multiple-choice questions on learning (e.g., the quality of student-generated questions and feedback) are an important direction for future research. In addition, as the participants perceived the task difficulties of multimedia-equipped feedback-generation differently, 'if there are any moderating effects perceived task difficulties have on learning' would be another topic worth to be pursued to yield explicit suggestions for differentiated instruction.

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