Chang, M. et al. (Eds.) (2019). Proceedings of the 27th International Conference on Computers in Education. Taiwan: Asia-Pacific Society for Computers in Education

Effects of Different Media Formats of Student-provided Explanations to Online Student-generated Questions on English Language Learning

Fu-Yun YU [a*] & Pei-Chi Wu [b]
[a] *Institute of Education, National Cheng Kung University, Taiwan*
[b] *Tainan Municipal Minde Junior High School, Taiwan*
* fuyun.ncku@gmail.com

Abstract: The main purpose of this study is to investigate the comparative effects of text-only and media-afforded student-provided explanations to online student-generated questions on English language learning. Four eighth-grade classes (n=118) participated in this study. An online learning system was adopted to support the activity. A non-equivalent pretest-posttest quasi-experimental design was used. The results of the analysis of covariance found that students in the text-only student-provided explanations group scored significantly higher than their counterparts in the media-afforded student-provided explanations group in terms of the use of learning strategies and social presence while no statistical differences were found in English language academic achievement.

Keywords: Media effects, learning effects, online learning activity, self-explanation, student-generated content, student-generated questions

1. Introduction

Under the contemporary educational paradigm, innovative approaches to teaching, learning, and assessment to cultivate deep learning have been valued by academicians and practitioners. In the same vein, student question-generation (SGQ) has been hailed as a cognitive-enhancing strategy. By requiring students to generate questions corresponding to the study material, empirical evidence on SGQ accumulated over the past decades has generally confirmed its learning effects (Yu, 2012). With the advantages of computer and networked technology, online SGQ has attracted the attention of an increasing number of scholars in this field (Yu, 2012).

Since then, different structures and types of SGQ have been proposed to increase its versatility and scalability. For instance, Stoyanova and Ellerton (1996) proposed three SGQ types: free, semi-structured and structured. Ways to scaffolding online SGQ have been suggested, and their effects on promoting learning have been substantiated (e.g., Yu & Pan, 2014; Yu, Tsai, & Wu, 2013). Recently, the ideas of students constructing tests based on SGQ (Yu & Wu, 2016) and generating explanations in correspondence to answers given to SGQ (Yu, Wu, & Huang, 2018) have been envisioned with their respective learning effects validated.

In light of the fact that nowadays learners are accustomed to media-rich learning environments (Prensky, 2001), allowing students to generate content not limited to text-based would appear desirable. The issue regarding whether such an arrangement renders additional learning gains for the learner serves as the focus of this study. On the grounds of relevant theories, including dual-coding theory (Paivio, 1990), cognitive theory of multimedia learning (Mayer, 2001), and social presence, this study aims to investigate the effects of different media formats of student-generated explanations to online SGQ on learning. Specifically, the research question under examination is: if the multimedia-afforded arrangement compared to the text-only arrangement renders additional benefits in terms of academic performance, use of learning strategies, and social presence when students engaged in explanation-generation for online SGQ.

2. Methods

A non-equivalent pretest-posttest quasi-experimental design was adopted. An online learning system supporting student-generated explanations in text-only (Figure 1) or multimedia-afforded forms (Figure 2) to be used as feedback to student answers to multiple-choice questions was adopted (Yu, 2018). The multimedia files to be included can be in any media form (e.g., texts, pictures, charts, diagrams, tables, animations, audio, video, and so on).

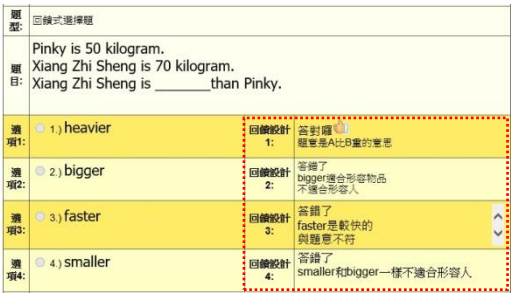

Figure 1. Text-only Student-provided Explanations to Online Student-generated Questions

Figure 2. Media-afforded Student-provided Explanations to Online Student-generated Questions

Four eighth-grade participating classes (n=118) of one junior high school in Tainan, Taiwan were randomly assigned to the two devised treatment groups — text-only student-provided explanations to online student-generated questions (i.e., Group A, the text-only student-provided explanations group) and media-afforded student-provided explanations to online student-generated questions (i.e., Group B, the media-afforded student-provided explanations group). The study took place in the context of an English course. During the study, as a routine, each week after attending five 45-minute instructional sessions on English, the participants headed to the school's computer lab for a 45-minute online activity to support English learning.

Mainly, the study consisted of two stages: the 1st training and baseline establishment stage (3 weeks) and 2nd intervention stage (8 weeks). During the 1st stage, the participants of both groups were exposed to the text-based explanations form where they were directed to generate a set of multiple-choice questions with explanations to each of the options on the English content covered in the current week (Figure 1). To equip the participants with essential knowledge and skills on question- and explanation-generation, a 45-minute training session was held at the beginning of the 1st stage for the participating students of both groups. Then, at the end of the 1st stage, students were asked to fill out a questionnaire on their use of learning strategies (40 item, 6-point Likert scale, Crobach α = .97) and social presence (14 item, 5-point Likert scale, Crobach α = .93). Student academic performance at the school-wide exam on English administered prior to this study was also collected. The collected data were used as covariates for later data analysis.

During the 2nd stage, the participants of both groups continued to engage in the online question- and explanation-generation activities as they did the previous weeks; however, the participants of Group B were introduced to the multimedia feature of the system. With all elements kept the same, the only difference between the two treatment groups was: for Group B, multimedia files are permissible (Figure 2) whereas for Group A they are not. To equip the participants of Group B with the skills of locating and uploading multimedia files as part of the explanations, at the beginning of the 2nd stage,

they were briefed on the operational procedures of accessing and including multimedia files in the adopted system, and were told that they could include any multimedia files stored in the system, or create multimedia of any type of their own. At the conclusion of the study, the participants were directed to fill out the same set of questionnaire, and their academic achievement on English content covered during the study were collected.

3. Results and Discussion

Contrary to the authors' expectations, the results of the analysis of covariance revealed that students participating in the text-only student-provided explanations group scored significantly higher than those in the media-afforded student-provided explanations group in the use of learning strategies, F (1, 115) = 4.64, p < .05 and social presence performance, F (1, 115) = 4.07, p <.05. Moreover, no statistically significant differences were found between the two groups in academic achievement, F (1, 115) = .00, p > .05.

The findings of this study did not confirm any additional benefits of having students generate explanations in media-form. Instead, students generated explanations in text-only form was found to lead to better social presence and more frequent use of learning strategies during the learning process as compared to the media-form. Even though the role and pedagogical value of multimedia in instruction is broadly known, it should be noted that existing studies were predominately conducted under the premise of 'learners as the consumer' rather than 'learners as the producer.' In the rise of the maker movement in the maker era on the basis of the findings of this study, instructors are advised to carefully assess the learning task and situation in focus so as to maximize intended learning.

Acknowledgement

This study was supported by the Ministry of Science and Technology, Taiwan. Project number: MOST 105-2511-S-006-005-MY3.

References

Mayer, R. E. (2001). *Multimedia Learning*. New York: Cambridge University Press.

Paivio, A. (1990). *Mental representations: A dual coding approach*. New York: Oxford University Press.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Stoyanova, E. & Ellerton, N. F. (1996). A framework for research into students' problem posing in school mathematics. *Proceedings of the 19th annual conference of the Mathematics Education Research Group of Australasia*. June 30-July 3, the University of Melbourne.

Yu, F. Y. (2018). The learning potential of student-generated feedback with multimedia shareability for online student-generated multiple-choice questions. In Wu, Y-T., Srisawasdi, N., Banawan, M., Yang, J. C., Chang, M., Wong, L-H, & Rodrigo, Ma. M. T. (Eds.). *Workshop Proceedings of the 26th International Conference on Computers in Education* (pp. 249-251). November 26~November 30. Manila, Philippines: Asia-Pacific Society for Computers in Education

Yu, F. Y. (2012). Learner-centered pedagogy + adaptable and scaffolded learning space design—online student question-generation. Keynote speech at the *International Conference on Computers in Education*, November 26-30, Singapore.

Yu, F. Y., & Pan, K-J (2014). Effects of student question-generation with online prompts on learning. *Educational Technology and Society*, *17*(3), 267-279.

Yu, F. Y., Tsai, H. C., & Wu, H-L (2013). Effects of online procedural scaffolds and the timing of scaffolding provision on elementary Taiwanese students' question-generation in a science class. *Australasian Journal of Educational Technology, 29*(3), 416-433.

Yu, F. Y., & Wu, C. P. (2016). The effects of an online student-constructed test strategy on knowledge construction. *Computers & Education, 94*, 89-101.

Yu, F. Y., Wu. W. S., & Huang, H. C. (2018). Promoting middle school students' learning motivation and academic emotions via online student-created feedback for student-created multiple-choice questions. *Asia-Pacific Education Researcher, 27*(5), 395-408.