Online Student-Constructed Tests with Citing Capability: Perceived Uses, Usage, and Considerations

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Abstract: Students' perceived uses, usage, and considerations with regard to citing versus no citing peers' work during online student-constructed tests (SCT) activities were examined. A total of 84 fifth-grade students from three classes (N=84) were invited to participate in an online SCT activity during their regular science class. One online system was adopted to support the associated learning activities, where students experienced SCT with both citing (i.e., SCT based on both self- and peer-generated questions) and no citing conditions (i.e., SCT based on entirely self-generated questions). Three major findings were obtained. First, predominate percentage of the participants rooted for 'citing' for promoting learning over 'no citing' during online SCT. Second, data from perceived uses and revealed citing usage both supported the potential of citing for providing an observational learning space for imitation, comparison-making, and learning from peers, despite that a handful of the participants casted doubts upon the worth of the effort and work involved in locating and editing items. Third, the quality and the author of the item are the two determining factors affecting citing decisions. Suggestions for system developers and instructors were provided.

Keywords: online learning activities, perceived uses, revealed usage, selection considerations, student-constructed tests

1. Introduction

Engaging students in reflecting back on what they view as relevant and important in the study material and generating question items around the identified areas has attracted an increasing number of researchers' and practitioners' attention since the turn of the century (Yu, 2012). This approach, known widely as student-generated questions (hereafter called SGQ), has been applied in different domains at various educational levels as alternative learning and assessment approach (Yu, Wu and Hung, 2014).

With SGQ's prevalent learning effects for facilitating cognitive and affective development, recently, efforts to further promote the fluidity, flexibility, and effects of SGQ via different arrangements and designs have been the focus of a network of researchers. Some features examined include: the provision of online procedural prompts during SGQ by Yu, Tsai and Wu (2013) and Yu and Pan (2014), different identity during SGQ (Yu and Liu, 2009; Yu and Wu, 2011), online access to peer-generated questions during SGQ by Yu and Yang (2014), and student-constructed tests (SCT) based on SGQ activities by Yu and Su (in press). Along this line of work, this study explored the potential of citing peers' work during online SCT process. Specifically, students' perceived uses, revealed usage, and considerations with regard to citing versus no citing peers' work during online SCT were examined.

2. Methods

Three fifth-grade classes (N=84) participated in this study during their regular science class in the participating school's science lab. Two units were covered during the study—Unit 3: properties of an aqueous solution (e.g., PH, conductivity), and Unit 4: forces and motion. Three 40-minute

instructional sessions were allocated for science each week. The online learning activities (both SGQ and SCT) were introduced to support students' science learning. As yes/no and multiple-choice question types are most frequently used by primary school science teachers, they were chosen as the question types to be generated for SGQ and included in SCT.

Prior to the actual study, a training session was reserved to equip the participants with the needed knowledge and skills to prepare them for the following online SGQ and SCT activities. Four instructional sessions, each with a different focus, were arranged in two weeks. They are: locating the main ideas of the study material and generating questions around the identified target in conformance with a set of criteria; generating yes/no questions in the adopted system with reference to the set criteria; generating multiple-choice questions in the adopted system with reference to the set criteria; constructing a test based on generated questions in the adopted system with reference to the set criteria.

Afterwards, for the following nine weeks, as a routine, students were directed to use I-pad mini to individually generate five yes/no and multiple-choice question items according to the learned science material covered in the current week and keyed in the adopted SGQ online system at the last 20 minutes of the instructional time on a weekly basis. Then, after the last instructional session on each unit (i.e., Units 3 and 4), students were requested to construct a test for each respective unit with reference to already generated questions stored in the system in 40 minutes. Students could also generate new question items at this stage if deemed beneficial. In order for the participants to experience and compare SCT with and without the capability of citing peers' work, students were set to work on SCT based entirely on their own generated questions for Unit 3, following by constructing a test based on one's own and peers' generated questions for Unit 4.

An online system to support the associated activities (SGQ and SCT) was adopted. Simply explained, to access peers' work during SCT, students click on / icon, which are only accessible when the citing function is activated by the instructor to switch between self-generated and peer-generated questions spaces. Students must edit peer's work before it can be included in one's test. To include any work in a test, students simply drag the targeted item from the SGQ space to the SCT space. For a complete description on the design of SGQ and SCT, please refer to Yu (2009) and Yu and Su (in press).

At the conclusion of this study, each student was asked to complete a questionnaire. Three questions were designed to solicit students' views regarding their perceived uses, revealed usage, and considerations with regard to citing versus no citing peers' work during SCT. They are:

(1) Which of the two approaches for SCT do you think better promote your learning (no citing, citing, no difference)?
(2) Under citing condition, your frequency of citing peers' work was (very high, high, slightly high, slightly low, low, very low). Please justify your answer.
(3) What are the determining factors when deciding whether and which peer's work to cite?

3. Results

3.1 Uses

Results from Q1 found that nearly two-thirds of the participants (n=54, 65.85%) expressed their support for 'citing' function for promoting learning over 'no citing.' The rest of the participants split between 'no citing' and 'no difference' options (17.07%, n=14). A X^2 test indicated that the proportion among the three options was statistically significant (X^2=39.02, $p < .001$).

Three salient themes emerged from the constant comparative data analysis method (Lincoln & Guba, 1985) done on students' written responses supporting citing. First, among those, 50% (n=27) highlighted citing's enabling effects for observing and learning various ways of creating questions around the study content. Second, more than 20% of those (n=11, 20.37%) mentioned directly that via viewing peers' generated questions, it served well for reviewing purpose. Finally, five students appreciated that 'citing' allowed them to recognize areas deemed important by their peers but missed by them.

On the other hand, more than half of those supporting 'no citing' (57.14%, eight out of the fourteen) referred explicitly to the importance of relying on oneself to reflect and figure out what's important, what's not yet understood, the answer to the posed question, and so on, which resulted in better comprehension, learning, and sense of accomplishment. Three respondents directly downplayed the effects 'citing' may have due to its merely requiring preliminary editing work from the part of the user, and was less challenging, less effort-demanding, and thus not beneficial for learning.

Finally, for those feeling no difference between 'citing' and 'no citing' (n=14), most noticed the benefits that respective approaches offered, that is, 'citing' for allowing one to observe and learn from peers' versatile ways of generating questions and reviewing, and 'not citing' for directing students to review and think hard about test-worthy content by themselves.

3.2 Usage

As for Q2, as shown in Table 1, substantially more participants (32.10%) selected the 'slightly high' option than the rest of the options, which ranges between 9.88% (very low) and 16.05% (high). Clustering the participants into the high citing (i.e., those selecting 1+2+3) and low citing frequency use groups (i.e., those selecting 4+5+6) revealed that more participants fell on the high citing group (61.73%) than the low citing group (38.27%).

One main theme emerged from the constant comparative method done on reasons for frequently citing peers' work—to increase the quality of SCT (32 out of the 50, 64%). Among those, eight respondents pointed out specifically that they tended to cite items that appear interesting or creative (i.e., style-wise), five mentioned that they chose to cite items at different difficulty levels or covering different areas of the study material to increase versatility (i.e., content-wise).

On the other hand, data analysis conducted for not frequently citing peers' work (n=31) revealed two major reasons—no need, and the editing work imposed by citing peers' work. For the former, fourteen respondents explained that it is because they felt that the quantity and quality of their own work is good enough, and it is hard to locate questions of a better quality than theirs. Eight respondents simply stated that the hassle involved in editing peers' work surpassed what was needed for generating one's own questions.

Table 1. Descriptive statistics on students' responses regarding their frequency of citing peers' work (N=81)

	1* *f* (%)	2* *f* (%)	3* *f* (%)	4* *f* (%)	5* *f* (%)	6 *f* (%)	1+2+3 *f* (%)	4+5+6 *f* (%)
Q2. Reported frequency of citing peers' work	11 (13.58)	13 (16.05)	26 (32.10)	12 (14.81)	11 (13.58)	8 (9.88)	50 (61.73)	31 (38.27)

*1: very high; 2: high; 3: slightly high; 4: slightly low; 5: low; 6: very low

3.3 Selection consideration

Constant comparative method done on students' responses as to the determining factors for their deciding whether and which peer's work to cite (n=80) fell into two main categories—the quality of the item itself (n=68, 85%) and who the author is (n=13).

While some respondents simply stated that "items of good quality" without providing further explanation about what qualities those are (n=11), most respondents did. Three main features were identified. First, the interestingness, creativity and funniness of the item were mentioned by most respondents (n=44). Relating to main ideas of the study material was also pinpointed by many (n=35) as their main consideration during the citing process, followed up by item difficulty (n=12).

Another group of respondents clearly stated that items generated by their good friends (n=11), or by those generally performing well in class (n=4) were their main targets for citing.

4. Discussion and Conclusion

Several important findings were obtained. First, significantly predominate percentage of the participants rooted for 'citing' for promoting learning over 'no citing' during SCT.

Second, data from the perceived uses and revealed citing frequency both supported the potential of citing for providing an observational learning space for the participants to imitate, compare, and learn from each other regarding question-generation and main ideas identification. This provided space, as suggested by Bandura's social learning theory (1977, 1986), would be beneficial for personal cognitive growth and task development in the focal domain.

Third, the quality and the author of the item are the two determining factors affecting students' citing decision. About the quality of the item, the interestingness/creativity/funniness of the item, relating to main ideas of the study material, and item difficulty were the three considerations offered by most respondents. This obtained results resembled what was found in Yu and Sung's study (in press) where the features/content of the work was the determining factor when it came to deciding the target for online peer assessment. However, unlike Yu and Sung's findings, in this study the author of an item did have an effect on citing for a handful of students.

In view of the positive responses obtained from the participants about SCT with citing, system developers are advised to include this design in SCT to allow students to benefit from the process. By including citing feature in online SCT, the power of the web 2.0 technology is better tapped on for the realization of collective wisdom (Abramovich and Brouwer, 2008; O'Reilly, 2005) and peer-assisted learning in a fluid way (Topping and Ehly, 1998). Likewise, it is suggested that instructors consider adopting systems equipped with this affordance for added learning support.

Finally, as reflected in respondents' comments, requirements for citing peers' work (i.e., editing) affected usage. System developers as well as instructors can incorporate this requirement/design to help mitigate unethical copying behavior, which negatively affect deep cognitive processing on the part of the user.

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