Factors Influencing Peer Online Citing Behavior

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Abstract: Peer influences, including academic prestige, friendship, and gender, on affecting online citing behavior under a student test-construction learning task are investigated. Seventy-five fifth-grade students from three classes participated in the devised online educational activities for twelve weeks. Quadratic Assignment Procedure multiple regression and simple regression were adopted. Significant differences were found between friendship and the number of peer citations. However, non-significant effects were found between academic prestige and gender and the number of peer citations. Significance of this study as well as suggestions for future research are provided.

Keywords: online citing behavior, online learning activity, peer influence, student-generated questions, test-construction

1. Introduction

The learning effects of online student test-construction on knowledge integration, elaboration, and construction have been substantial (Yu & Wu, 2016). In further consideration that enabling the learners to cite their peers' work as part of the constructed tests is in alignment with contemporary educational paradigms and Web 2.0 ideology (e.g., participatory inquiry, innovation in assembly) (O'Reilly, 2005), an online system supporting the learners' power to mix and remix via citing during student test-construction has been designed and developed (Yu, in press). Recent studies have confirmed the superiority of citing peer-generated questions over non-citing (i.e., constructing tests based entirely on self-generated questions) for promoting academic and question-generation performance without elevating significant cognitive loads and learning anxiety (Yu & Wei, 2016; Yu & Wei, 2017).

As more studies on how the learners behave and interact with each other in school-based online educational activities are needed, factors influencing the learners' online citing behavior serve as the focus of this study. According to social impact theory (Latané, 1981), interpersonal power structure influences interacting behavior and decision-making process. Explicitly, people who are presumably intellectually superior, wealthier, and/or of higher status within the social network are believed to exercise more impact over others — the strength factor (Latané, 1996). Also, friends with better established relationship are considered to exert more social impact on individuals in the network — the immediacy factor (Latané, 1996; OC & Bashshur, 2013). Furthermore, collaborative learning studies have suggested that individual attributes, such as levels of achievement, friendship, and gender influence interaction patterns (Chan, 2010; De Laat, Lally, Lipponen, & Simons, 2007; Johnston & Miles, 2004; Palonen & Hakkarainen, 2000). In light of these, the following research question is examined in this study — 'what are the effects of academic prestige, friendship, and gender on student-generated questions being cited by peers?' Along this line of thought, two hypotheses are proposed:

H1: The effects of peer influences, including perceived academic prestige, friendship, and gender, can positively predict student-generated questions being cited.

H2: The higher one's actual academic prestige is, as denoted by student science performance at the posttest, the higher his/her influence is in the citation network.

2. Methods

Seventy-five fifth-graders from three intact classes participated in this study for a duration of twelve weeks using their regular computer class (one 40-minute instructional session per week). The online learning activities incorporated (i.e., student question-generation and test-construction) were introduced to support science teaching and learning (three 40-minute instructional session per week).

Two online learning systems were adopted — Question Authoring and Reasoning Knowledge System (QuARKS) for student question-generation (Yu, 2009) and Test Authoring and Reasoning Online Learning (TAROL) for student test-construction (Yu & Su, 2015). For QuARKS, regardless of question types, three fields need to be completed for the successful submission of each question item: questions, answer keys, and annotation fields. It's just that for multiple-choice questions, the question part consists of the question-stem and four options. For test-construction, students first decide the number and scoring scheme for each of the question types to be included in a test (i.e., the test-planning phase). They, then, select question(s) to be included in a test by referring to both self- and peer-generated questions during the test item-inclusion stage. Before submitting the test, students can re-arrange the relative sequence of questions within and between question types before test submission (i.e., the test item-sequencing phase).

For the purpose of this study, two stages were devised. During the 1st training/induction stage (6 weeks), it dealt with three essential topics — question-generation, test-construction, and the operation procedurals of the adopted learning systems. On a weekly basis, the participants were directed to individually generate three true/false and multiple-choice question items on QuARKS on the science material covered in the current week, after a brief whole-class feedback session on the participants' previous online question-generation performance. Then, after the last instructional session on the current unit, the participants were directed to construct a 10-item test on the entire unit, with reference to both self- and peer-generated questions already submitted to and saved on QuARKS.

During the 2nd stage (6 weeks), it basically followed the same implementation procedures as those of the 1st induction stage. It's only that the name of the question-author was shown now when the participants viewed and decided which question item(s) to be included in one's tests during test-construction (i.e., citing peer-generated questions under the name-shown condition). In total, three online test-construction activities were undertaken during the 2nd stage and used in the data analysis of this study.

A number of instruments and data sources were used. First, the participants were asked to name the top five students in their class they perceived as with superior academic performance, and with whom they befriend. Second, all questions included in their final submitted tests at the 2nd stage (three in total) were analyzed in terms of the number of citations from peers and from whom. Third, the participants' science performance at the posttest were collected.

To test H1, Quadratic assignment procedure (QAP) multiple regression was adopted using UCINET 6, where the dependent variable is the citation matrix (i.e., network, consisting of the size of each participant), and the independent variable is the peer influence similarity matrices, including perceived academic prestige, friendship ties, and gender. For H2 testing, simple regression was adopted using SPSS 20 with actual academic prestige (i.e., science academic performance at the posttest) as the independent variable and the actor's eigenvector centrality as the dependent variable.

3. Results and Conclusions

The results from QAP multiple regression found neither perceived academic prestige nor gender similarity was a good predictor of citation patterns. Friendship ties, conversely, was found to be significantly different for the two participating classes while one class was at the borderline, $p = .071$. Finally, the results of the simple regression for H2 testing for all three classes were non-significant.

Contrary to what would be expected from social impact theory (Latané, 1981; Latané, 1996; OC & Bashshur, 2013) and studies on collaborative learning (e.g., Chan, 2010; De Laat, Lally, Lipponen, & Simons, 2007; Johnston & Miles, 2004; Palonen & Hakkarainen, 2000), students' science achievement and gender did not significantly predict how impactful they would be in the

citation network, meaning that students with higher academic prestige (perceived and actual) and with the same gender did not receive more citing from their peers. Nevertheless, questions generated by one's close friends were cited more. Among the factors suggested by social impact theory, 'immediacy' not 'strength' of the source of influence was shown to affect upper-level primary schoolers' online citing behavior, as evidenced by this study.

3.1 Significance of this study and suggestions for future studies

Both a test of a theoretical model and a description of student behavior in an online learning environment, the results obtained in this study shed important light on the interaction of students with each other in online educational activities.

While the results from this study provided initial empirical base and a first glimpse of students' online citing decisions during student-constructed tests, age groups is a crucial variable to note. Since existing network studies on homophily and peer influence either mostly dealt with secondary to higher education student populations, or were conducted in organizational settings, and rarely are works involving elementary students, future research on the applications of these theoretical models to school-based online learning should be encouraged.

Acknowledgements

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