

Facilitating Higher Levels of Thinking and Deeper Cognitive Processing of Course Text Using Reciprocal Teaching Strategies in Asynchronous Discussion Forums

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Abstract

Twenty-five students enrolled in the asynchronous, online community college course Introduction to Education participated in this study. The course was taught at a community college in the Southeastern region of the United States. Students were placed in either a traditional discussion group or a reciprocal discussion group using a convenience sample based on enrollment in a section of the 16-week course. The reciprocal group served as the treatment group and received embedded reciprocal teaching training and used the four reciprocal teaching strategies and peer teaching in asynchronous discussion forums. The traditional group served as the control group and followed typical discussion forum protocol by posting in a teacher-led discussion forum and responding to two other students. Results showed the reciprocal discussion group had significantly higher-level thinking and deeper processing of course texts during discussions. The study found that reciprocal teaching could be successfully implemented in an online, asynchronous course.

Keywords: reciprocal teaching, interaction, cognitive strategies, metacognitive strategies, peer teaching, asynchronous online course, and discussion forum.

Introduction

Reciprocal teaching is an interactive instructional procedure that improves students' text comprehension skills through scaffolded instruction of four comprehension-fostering and comprehension-monitoring strategies (Palincsar & Brown, 1984; Rosenshine & Meister, 1994). The four reciprocal teaching strategies are predicting, questioning, clarifying, and summarizing (Palincsar & Brown, 1984, 1986; Palincsar, Brown, & Martin, 1987). Reciprocal teaching involves student-led instruction, modeling, practice, and feedback in metacognitive, self-monitoring, and evaluating strategies (Brown, Campione, & Day, 1981). According to the literature, reciprocal teaching leads to improved reading comprehension. It has been studied in many contexts with multiple subjects.

In this study, reciprocal teaching was translated into an online, asynchronous course. Purposeful, strategy-rich discussion forums resulted and enabled students to negotiate meaning and deeply understand course texts. Reciprocal teaching supported the negotiation of meaning in a social learning atmosphere. Peer teaching resulted in generative processing through the reworking of a topic from the textbook into a lesson and questions for peers (Collins et al., 1989; King, 1991; Pressley et al., 1992; Rosenshine et al., 1996; Wood et al., 1990). The strategies and peer teaching engaged students in high-level, content-based discussions leading to deeper understanding course texts in the online, asynchronous context.

Following are the research questions that guided this study:

1. To what extent did the type of discussion forum strategies, traditional or reciprocal, effect levels of thinking during posts in asynchronous discussion forums?
2. To what extent did the type of discussion forum strategies, traditional or reciprocal, facilitate deeper understanding of the course textbook?
3. To what extent were reciprocal teaching strategies and peer teaching implemented in online, asynchronous discussion forums?
4. What impact did traditional discussion forums have on student reflections of the relationship between discussion forums and learning?
5. What impact did reciprocal teaching have on student reflections of the relationship between strategies, peer teaching and learning?

Methods and Data Sources

Quasi-experimental, multiple methods were employed to compare the effects of traditional discussions and reciprocal teaching discussions. Outcome variables were level of thinking, understanding of course texts, online reciprocal teaching implementation, and students' reflections on the relationship between discussions, strategies, and learning. The instruments used to measure the dependent variables included: the SOLO Taxonomy, Midterm and Final Exam, Reciprocal Teaching Rubric, and the Learning Reflection Tool.

The SOLO taxonomy was first developed in 1989 to measure the quality of learning outcomes (Biggs, 1989). The SOLO taxonomy was used to measure level of thinking in this study. Table 1 shows the levels of thinking and numeric score associated with each level of the SOLO taxonomy.

Table 1. Modes and Levels of the SOLO Taxonomy

Mode	Structural level	SOLO
Next	Level 5: Extended abstract	The learner now generalizes the structure to take in new and more abstract features, representing a higher mode of operation.
Target	Level 4: Relational	The learner now integrates the parts with each other, so that the whole has a coherent structure and meaning.
Target	Level 3: Multi-structural	The learner picks up more and more relevant or correct features, but does not integrate them.
Target	Level 2: Uni-structural	The learner focuses on the relevant domain, and picks up one aspect to work with.
Previous	Level 1: Pre-structural	The task is engaged, but the learner is distracted or misled by an irrelevant aspect belonging to a previous stage or mode.

Results

Results showed that reciprocal teaching strategies promoted significantly higher levels of thinking and deeper processing of course texts compared to traditional methods. Level of thinking SOLO scores for all discussion posts were higher in the reciprocal group ($M = 4.1$, $SD = 0.4$) than in the traditional discussion group ($M = 2.8$, $SD = 0.3$), and the difference between these discussion groups was statistically significant, $F(1,23) = 94.699$, $p < .001$. There was a large effect size, $\eta^2 = .81$. Deeper understanding of course texts was measured by comparing scores of each group on a midterm and final exam. Total midterm scores were higher for the reciprocal group ($M = 112.4$, $SD = 4.7$) than for the traditional group ($M = 103.3$, $SD = 8.4$). The differences between the groups was statistically significant $F(1,22) = 9.619$, $p = .005$. There was a large effect size, $\eta^2 = .30$. Total final exam scores were higher for the reciprocal group ($M = 111.9$, $SD = 4.5$) than for the traditional group ($M = 98.7$, $SD = 12.9$). The differences between groups on the total final exam was statistically significant, Welch's $F(1, 19) = 18.576$, $p < .01$.

Results also showed that the reciprocal teaching strategies and peer teaching could be implemented in discussion forums. To determine the effectiveness of strategy use in the reciprocal environment, students were rated on each strategy forum post using the reciprocal teaching rubric. Rubric grades were awarded 25 points for an exemplary post, 20 points for a proficient post, 15 points for a developing post and 10 points for a beginning post. A frequency distribution of all strategy posts combined showed that the mean of the 381 posts over the 11 weeks was 24, ($N = 381$, $M = 24$, $SD = 1.9$). Only one student scored at the beginning level, four students scored at the developing level, 65 students scored at the proficient level, and 311 students scored an exemplary on the rubric in the overall strategy forum analysis. The peer-teaching forum was found to be a very effective way for students to lead class discussions. The peer teaching forum was conducive to carefully planned lesson content and discussion questions posted by students and provided time for students to formulate a well-developed lesson and questions.

The qualitative analysis of the study was conducted through surveys where students reflected on the relationship between discussion forums, strategies and learning. The survey for the reciprocal group was divided by strategy to help gain insight into student perspectives on each strategy. Students felt predicting helped prepare them for reading. Students found questioning helpful, especially when the instructor or other students answered the questions they posted. Similarly, the responses in the survey related to clarifying showed that students found value in having a space to post items for which they needed clarification where they could receive answers from the instructor. Summarizing helped them understand, remember and organize thoughts. Students felt peer teaching was innovative, unique and fun. The enjoyed the challenge and looked forward to being the peer teacher. Overall both groups of students highly rated their discussion forum types.

Discussion

Adding to findings reported in previous literature, reciprocal teaching supports text comprehension. Reciprocal teaching in the context of an online, asynchronous community college course supported interactions that led to higher levels of thinking and deeper understanding of course texts. All three types of interaction were present in the reciprocal teaching implementation. Student-content, student-teacher, and student-student interaction occurred as students used cognitive and metacognitive strategies to process the content in the course textbook during discussions. Student-content interaction was present in all of the forums as student posts were based on the content in the course textbook. The high prevalence of student-content interaction ensured there was not a lack of initial understanding of content prior to engaging in online discussions. The peer teaching forum facilitated student-student interaction as students asked and answered questions and responded to each other.

Relating back to the literature review, the results from this study showed that the full reciprocal teaching method could be effectively implemented in an online course leading to significantly higher levels of thinking and deeper processing of course texts.

Limitations

The first limitation was the small sample size ($n = 25$). There was a small number of students enrolled in the two sections of the course resulting in a small sample size. Research conducted with a larger sample size would increase the validity of the results and generalizability to all learners. A second limitation was the quasi-experimental design and sampling procedure. The study was conducted over two different semesters to obtain enough participants for a control and treatment group. Since the study was conducted over two semesters, there may have been a threat to external validity. A third limitation was the difficulty level of the course and textbook used in the study. Community colleges are two-year institutions and courses are not reflective of the difficulty level of bachelors or masters level courses. The course, *Foundations of Education* is a survey course and is not as difficult as more advanced upper-division courses. The introductory nature of the course may not have necessitated higher-level thinking. Another limitation was that there was not a pre-test or assessment of prior content knowledge given to participants. There was no way to determine whether the significant results of the reciprocal group were due to prior knowledge or higher aptitude than the traditional group. Another limitation came with the technology used by some of the peer teachers. Peer teachers were not trained to use the technology in Moodle and there was occasionally a struggle to get the lesson posted and viewed. Some of the students had difficulty accessing the lessons without intervention from the teacher. Finally, even though every effort was made for the ratings of discussion posts to be blind, the researcher and instructor could easily distinguish between the groups based on the questions asked in the forums. The familiarity with the course content and the instructor-led questions made it possible for the researcher and instructor to know the group from which the posts were written, possibly leading to experimenter bias.

Conclusions

This study was unique in that the full reciprocal teaching method was implemented in an online, asynchronous course with fidelity including the four strategies and peer teaching. The discussion forums provided a social setting so that students could share the responsibility of making meaning through social negotiation using generative learning strategies (Glaser, 1990; Vygotsky, 1978; Wittrock, 1974, 1990). The reciprocal teaching strategies and peer teaching fostered high levels of student interaction with the content and with the teacher and other students having a significant positive influence on learning. Peer teaching resulted in generative processing through the reworking of a topic from the textbook into a lesson and questions for peers (Collins et al., 1989; King, 1991; Pressley et al., 1992; Rosenshine et al., 1996; Wood et al., 1990).

Based on the promising findings of this study, practitioners may want to adopt reciprocal teaching in their online courses. The first step is to teach students how to participate in reciprocal teaching. Direct instruction on the strategies and peer teaching can be embedded in learning management system during the first weeks of class using videos, presentations, and documents. The instructor may model the strategies and act as the peer teaching the first week to show students what is expected and how to participate. Grading criteria and rubrics should be presented early in the class.

There is a wide-open door for more studies in distance education focused on improving text comprehension through research validated strategies such reciprocal teaching. Researchers, instructional designers and teachers need to ensure that online courses are engaging, interactive and most of all optimally designed for learning. While this study was a step towards understanding how to increase learning through specific interaction strategies in an online, asynchronous course, there is a lot left to discover about learning in the realm of distance education.

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