



An investigation of the effects of reciprocal peer tutoring

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ARTICLE INFO

Article history:

Available online 18 July 2008

Keywords:

Cooperative learning
Motivation
Reciprocal peer tutoring
Peer-assisted learning
Educational technology
Mixed method study

ABSTRACT

This study investigated the effects of reciprocal peer tutoring (RPT) on student achievement, motivation, and attitudes. Four sections of an educational technology course were randomly assigned to one RPT and one non-RPT group. Participants in the RPT group were then randomly assigned to groups to tutor and support each other while participants in the non-RPT group worked individually. The results suggested that the RPT and non-RPT groups did not differ on student achievement and motivation. Findings concerning student attitudes revealed that what students liked about RPT were helpful group members, opportunities to work in groups, feedback from groups, the comfort that RPT provided, and knowledge sharing. What students disliked about RPT were the unnecessary work and lack of interaction.

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1. Introduction

Research studies on cooperative learning have demonstrated that it can be an effective strategy to use in elementary and middle grades. It may bring important educational gains for high school and college students as well (Emerson & Mosteller, 2004a). The benefits of cooperative learning include a deeper understanding of knowledge, enhanced student achievement, improved inter-group relations, greater opportunities to work together, and increased acceptance of academically handicapped peers (Sanders, 2001; Slavin, 1995). Joyce, Weil, and Calhoun (2004) contended that the synergy in cooperative learning generates more motivation than individual, competitive settings. Cooperative learning also contributes to a higher level of reasoning and more frequent generation of ideas and solutions (Choudhury, 2002). It works well with homogeneous classes and is especially needed for classes with a wide range of student skills, for it can make diversity a resource rather than a problem (Slavin, 1995).

The concept of cooperative learning is based on a social learning theory that students are more likely to possess high self-efficacy to complete a task when they know they will have assistance from their peers (Ormrod, 1999). When working cooperatively with others, people acquire more effective learning strategies and solve problems more successfully (Gillies & Ashman, 2003; Ormrod, 1999). Other theories related to cooperative learning include Vygotsky's (1978) concept of the zone of proximal development

(ZPD) and social constructivism. The ZPD refers to "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In essence, people are able to accomplish more difficult tasks when they have assistance from other individuals.

Peer tutoring is a type of cooperative learning in which students coach one another as they develop specific skills (Choudhury, 2002; Sanders, 2001). Forman and Cazden (1985) argued that peer tutoring requires a difference in knowledge between the tutor and tutee so the more knowledgeable individual can tutor the less knowledgeable. Falchikov (2001a) also described peer tutoring that can occur between students in the same class group with similar expertise and development levels. Peer tutoring provides an alternative teaching and learning approach where students take proactive roles in thinking, questioning, and sharing knowledge (Luca & Clarkson, 2002).

Whereas tutors and tutees increase achievement by participating in peer tutoring, students acting as tutors benefit most from the process (Benware & Deci, 1984). In light of the circumstance that student tutors make greater content-specific gains than student tutees, Pigott, Fantuzzo, and Clement (1986) developed an instructional strategy called reciprocal peer tutoring (RPT) to promote mutual tutoring. RPT is a type of cooperative learning that requires students to fulfill both tutor and tutee roles (Al-Hassan, 2003; Griffin & Griffin, 1995; Riggio, Fantuzzo, Connelly, & Dimeff, 1991). Students thus benefit through the rehearsal in which tutors engage as well as from the assistance tutees receive.

The effects of RPT have been researched in math, reading, and vocabulary at elementary as well as middle school levels. Studies on regular education students, underachieving students, students with learning disabilities and mild mental retardation, and aca-

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demically at-risk students generated positive results (e.g., Fantuzzo, Davis, & Ginsburg, 1995; Fantuzzo, King, & Heller, 1992; Ginsburg-Block & Fantuzzo, 1997; Heller & Fantuzzo, 1993; Malone & McLaughlin, 1997; Mastropieri et al., 2001; Pigott et al., 1986). Students in the RPT group outperformed those who received more traditional instructional intervention.

Researchers have also examined academic achievement, self-efficacy, test anxiety, levels of distress, and student satisfaction regarding the effects of RPT on the college level (Choudhury, 2002; Griffin & Griffin, 1995, 1998; Mickelson, Yetter, Lemberger, Hovater, & Ayers, 2003; Riggio, Whately, & Neale, 1994; Riggio et al., 1991; Rittschof & Griffin, 2001; Robinson, 1995). Although mixed results have been reported, the influence of RPT has only been studied in a limited number of disciplines, such as in abnormal psychology, industrial/organizational psychology, social psychology, human growth and development, educational psychology, human development, and introductory statistics. Additionally, the method used in RPT was to have students construct test items, take turns administering these items to their partners, and provide one another with explanations for questions answered incorrectly. This method may not be applicable to all disciplines. Researchers have suggested that cooperative learning methods could be effective in technological areas (Emerson & Mosteller, 2004b; Lou, Abrami, & d'Apollonia, 2001; Springer, Stanne, & Donovan, 1999). Nevertheless, the impact of RPT has not been explored in subject matter of this kind. The interdependence between educational technology and cooperative learning has been relatively unexplored (Johnson & Johnson, 2004).

The requirement for people to work cooperatively in using the tools of technology calls for children, adolescents, and young adults to develop and increase technological and teamwork literacy. However, teachers and schools have been slow in adopting innovative technologies, and the uses of such technologies in classrooms have been infrequent (Cuban, 2001). One of the barriers to adopting new technologies may be the failure of utilizing cooperative learning as an inherent part of educational technologies. Cooperation can promote a thorough mastery of the procedures in technology-supported lessons. Students learn how to use software programs more effectively when they engage in cooperative groups (Johnson & Johnson, 2004). In this study, the researchers investigated how reciprocal peer tutoring affected student achievement in the subject area of educational technology.

While student satisfaction is the only affective trait that has been investigated in previous RPT studies with college students (Riggio et al., 1991, 1994; Robinson, 1995), student total motivation as well as four motivational factors: attention, relevance, confidence, and satisfaction (ARCS) were relatively unexplored. The motivational benefits of cooperative learning have been justified in previous literature (Johnson & Johnson, 1989, 2003; Joyce et al., 2004). From a motivational perspective, cooperative learning creates a situation in which group success determines whether group members can attain their personal goals. Consequently, group members must help their group to be successful as well as encourage their peers to exert maximum effort in order to meet personal goals. In other words, when students work cooperatively, their efforts help their group members succeed. Students, therefore, encourage each other to learn and reinforce one another's academic efforts (Slavin, 1995). In this study, the researchers also investigated how reciprocal peer tutoring affected student motivation and attitudes in the subject area of educational technology.

Cooperative learning is an indispensable element in schools that mirrors the authentic working environments where graduates will most likely work and communicate in teams. While it is common for university courses to teach isolated skills in the application of software (Oberlander & Talbert-Johnson, 2004), cooperative learning prepares students for the increasingly technological world by

providing a context that helps to reinforce students' technological skills through sharing and combining expertise. Therefore, it is crucial to investigate the importance of cooperative learning in combination with technology to prepare students to become lifelong learners of technology.

The purpose of this study was to determine whether reciprocal peer tutoring (RPT) improved student achievement and motivation as well as assess student attitudes toward RPT in four sections of an undergraduate educational technology course. The researchers utilized a mixed methods study in which both quantitative and qualitative research methods were employed. The following research questions were investigated in the study:

1. Does RPT have an effect on student achievement in an undergraduate educational technology course?
2. Is there a differential effect on the achievement of RPT and non-RPT students on different software programs in an undergraduate educational technology course?
3. Does RPT have an effect on undergraduate students' total motivation toward the educational technology course?
4. Does RPT have an effect on the motivational factors (attention, relevance, confidence, and satisfaction) among undergraduate students in an educational technology course?
5. What are students' attitudes toward reciprocal peer tutoring?

This study has educational implications for reciprocal peer tutoring practices. The results of this study will provide guidance for educators, instructional designers, and course developers to improve course delivery methods. Educators delivering multimedia courses will benefit from this study in that it could help them decide whether to adopt reciprocal peer tutoring during the whole class period or in teaching specific software. In addition, this study could provide guidelines for instructional designers and course developers in terms of designing and developing courses that effectively integrate reciprocal peer tutoring.

2. Methods

2.1. Participants

The participants were 105 undergraduate students who took a Technology in Education course at a university in the western United States. The participants were from a western city with a population of approximately 84,000 people. This course is a one-credit hour course taken by pre-service teachers typically after their sophomore year. Among the 105 participants, 61 were female and 44 were male, 86% of them were Caucasian, 8% were Hispanic, and 6% were others. Participants' mean age was 22.23 and mean GPA was 3.36. The participants came from 14 different emphasis areas with 19% majoring in history secondary education, 17% majoring in math secondary education, 16% majoring in English secondary education, 12% majoring in social science secondary education, 11% majoring in biology secondary education, 10% majoring in theatre secondary education, and 15% majoring in other emphasis areas.

2.2. Instructional units and course settings

The Technology in Education course is a one-credit hour course that was designed mainly to educate pre-service teachers in a variety of technology tools, such as Microsoft Excel, Inspiration, Adobe Photoshop, Microsoft PowerPoint, advanced Microsoft Word, and Macromedia Dreamweaver. Issues related to the instructional applications of the tools, such as visual literacy and design principles are also explored.

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