

# The Effect of Peer Tutoring in Terms of Epistemological Beliefs and Self-Regulated Learning

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**Abstract:** Peer tutoring is a learner-centered approach to teaching and learning that is intended to provide significant benefits in learner knowledge, skill and metacognition. This study investigated the change in epistemological beliefs and self-regulated learning under peer tutoring conditions. A total of 117 college students participated in this study. They had to fill out a questionnaire regarding epistemological beliefs and self-regulated learning at the beginning and end of the research. The control group was given reading materials and studied under self-study conditions without small group collaboration. The experiment group had small group collaborative learning opportunities. After every learning task, students from both groups wrote in their reflection journals. There was a significant change in epistemological beliefs between pre and post small group collaborative learning tasks. The experimental group receiving the instructional intervention showed a greater change in sophisticated levels of epistemological beliefs than the control group. There were no significant differences in self-regulated learning for both groups. Peer tutoring facilitated sophisticated levels of epistemological beliefs. Various collaborative strategies should be applied in pre-service teacher education and college tutoring program.

**Keywords:** *small group collaborative learning, epistemological beliefs, self-regulated learning, peer tutoring*

## **1. Introduction**

Peer tutoring is a pedagogical practice to facilitate achievement, motivation and social skills (Palincsar & Brown, 1984; Rittschof & Griffin, 2001). Peer tutoring enables each student to assume both roles of tutor and tutee, thus allowing each student to derive the benefits from preparing to teach another student (Fantuzzo et al., 1992). Peer tutoring is basically small group cooperative learning, and the benefits of cooperative learning are increased motivation, social cohesiveness and cognitive elaboration (Rittschof & Griffin, 2001; Dangwal. & Kapur, 2009; Badger, 2010, Miller, Topping, & Thurston, 2010).

Epistemological beliefs are fundamental assumptions about the nature of knowledge and learning. Researchers (Hofer, 2001; Southerland, Sintra, & Matthews, 2001) have demonstrated epistemological beliefs can change when students work collaboratively and when they are given opportunities to reflect on their thinking and evaluate their beliefs. Schraw (2001) presented the ideas that schools should strive to change epistemological beliefs through discussion and modeling. These studies showed specific educational environments could encourage the students' epistemological beliefs. We hypothesized that naïve-level epistemological beliefs would decrease after peer tutoring learning opportunities. In addition, we hypothesized that sophisticated-level beliefs such as tentative knowledge, multiple perspectives on learning and progressive learning processes would increase for peer groups.

Self-regulated learning is the ability and willingness to effectively use and monitor cognitive strategies (Azevedo, 2005). Self-regulated learners are active and efficiently manage their own learning in many different ways. Self-regulated learning is a constructive process in which learners set goals for their learning and then attempt to plan, monitor, regulate, and control their cognition, motivation, behavior and context (Zimmerman, 2001). We hypothesized that peer tutoring would encourage self-regulated learning strategies more than self-studying.

During peer tutoring, students have to read their material by themselves, find out what they know and what they should know, and they have to explain the contents to their peers. Peer tutoring makes students take responsibility for their own study through the active and reflective thinking process and collaborative group discussion. Students construct their own knowledge understanding through interaction with other students. Peer tutoring as a constructivist learning environment will affect student's epistemological beliefs and self-regulated learning. This research therefore focuses on examining the effectiveness of peer tutoring on epistemological beliefs and self-regulated learning. The results of our research are used to inform the design of various small group collaborative learning environments.

## **2. Method**

### *2.1. Subject and groups*

One hundred and seventeen undergraduates from one university in Korea participated in this study. Consent was

obtained from all participants. The control group was given reading materials with questions and keywords. The control group students totaled 62 with 56 being female (90.3%). The experiment group was also given the same material and students had to attend small group collaborative learning opportunities to teach the material to each other. The opportunities were designed as two one-hour practice sessions and a one-hour peer tutoring session per week, with a total of ten peer tutoring sessions implemented. The peer tutoring groups were composed of 5-7 students, totaling 10 groups, with 55 students of which 45 were female (81.8%). There was no significant difference between epistemological beliefs ( $t = 0.689$ ,  $p > .05$ ) and self-regulated learning ( $t = 0.689$ ,  $p > .05$ ) for pre-experimental questions. These results demonstrated equivalence of the groups.

## 2.2. Instruments

This study used two instruments which are Epistemological Beliefs Questionnaire (EBQ) and Motivated Strategy Learning Questionnaires (MSLQ). The students' epistemological beliefs were assessed using the Korean version of Epistemological Beliefs Questionnaire (Park & Jung, 2012). Park & Jung (2012) adapted and validated the EBQ using Schommer's (1990) and Hofer's (2004) scales. The EBQ is comprised of 46 items rated on a five-point Likert scale (5 = strongly agree, 1 = strongly disagree) to reflect 12 belief systems. Table 1 is an epistemological belief 2 x 6 factorial structure. The reliability of the sophisticated EB was  $\alpha = 0.78$ , the reliability of naïve EB's one was  $\alpha = 0.76$ .

Self-regulated learning was assessed using the Korean version of Motivated Strategy Learning Questionnaires (Pintrich & De Groot, 1990). The MSLQ was composed of 80 items rated on a five-point Likert scale (5 = strongly agree, 1 = strongly disagree) to reflect 3 dimensions: cognition, motivation and resource management. The reliability of the cognition domain was  $\alpha = 0.90$ , motivation was  $\alpha = 0.85$ , and resource management was  $\alpha = 0.91$ .

Table 1

*Epistemological Beliefs of 2 x 6 factorial structure*

EB structures	Epistemological beliefs levels	
	Naïve-level EB	Sophisticated-level EB
Certainty of knowledge	Certain knowledge	Tentative knowledge
Structure of knowledge	Simple Knowledge	Integrated knowledge
Source of knowledge	External Authorities	Individual meaning construction
Justification of knowing	Reception of the authority	Personal critical judgment
Ability to learn	Fixed ability	Gradually improved ability
Learning process	Quick learning	Progressive learning

## 2.3. Procedures

This study was implemented for 12 weeks at the first semester of 2013. Before and after the experiment, all students had to fill out the epistemological beliefs and self-regulated learning questionnaires. The experiments group was given same reading material as the control group and the students had to attend peer tutoring. Peer tutoring students had to play a teaching-role and a student-role in turn every week. The control group and the experiment group were given the prior knowledge test before receiving the reading material, when materials were changed, they took a post-achievement test. Two themes, ethical problems in modern society and information society and information ethics, were used for the reading materials. The two one-hour practice sessions and the one-hour peer tutoring session occurred once a week with a total of 10 peer tutoring session implemented. Students had to present their reflection journals every week. The process was the same for both groups except the peer tutoring or self-study.

### **3. Results**

#### *3.1. Change in epistemological beliefs for both groups*

Figure 1 shows the epistemological beliefs between experimental and control group. There was a significant difference in naïve-level ( $t = 3.901, p < .001$ ) and sophisticated-level ( $t = -3.327, p < .01$ ) epistemological beliefs between both groups (Table 2). The control group had higher naïve-level epistemological beliefs than the peer tutoring group. Except for quick learning, certain knowledge ( $t = 3.241, p < .01$ ), simple knowledge ( $t = 2.333, p < .05$ ), external authorities ( $t = 2.667, p < .01$ ), reception of the authorities ( $t = 3.508, p < .01$ ), and fixed ability ( $t = 2.048, p < .05$ ) showed higher scores for the self-learning group than the peer tutoring group. The experiment group outperformed the control group on sophisticated-level epistemological beliefs. Except for progressive learning, uncertain knowledge ( $t = -1.961, p < .05$ ), integrated knowledge ( $t = -3.160, p < .05$ ), individual meaning construction ( $t = -3.160, p < .01$ ), personally critical judgment ( $t = -2.775, p < .01$ ), and slow learning ( $t = -2.674, p < .01$ ) had higher achievement scores for the experiment group than the control group.

#### *3.2. Change in epistemological beliefs for the peer tutoring group*

Figure 2 shows the change of epistemological beliefs in the experimental group. The mean of naïve-EB sub-factors of post-peer tutoring was lower than pre-peer tutoring. There was a significant difference in naïve-level epistemological beliefs between pre and post-peer tutoring ( $t = 3.901, p < .001$ ). Excluding uncertain knowledge and individual meaning construction, the mean of sophisticated-EB sub-factors post- peer tutoring was higher than pre-peer tutoring. There was no significant difference in the sophisticated-level epistemological beliefs between pre and post-peer tutoring ( $t = -.837, p > .05$ ).

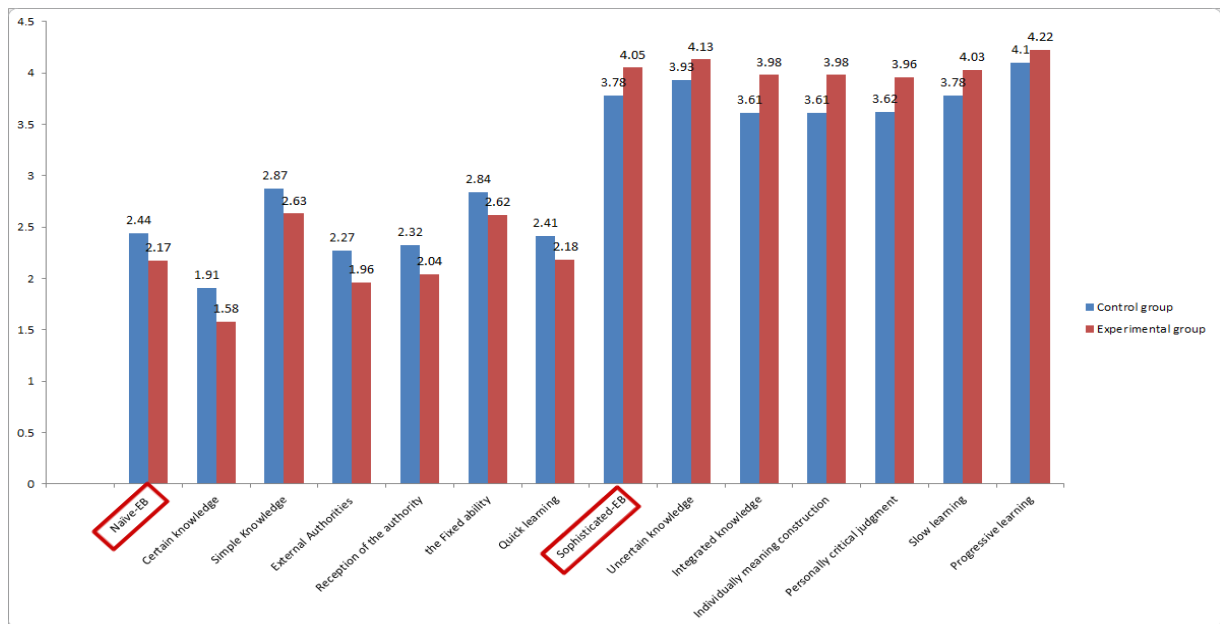


Figure 1. Change of EB for both groups

### 3.3. Change in epistemological beliefs for the self-study group

The change of epistemological beliefs in the control group showed significant differences in sophisticated-level epistemological beliefs ( $t = 3.736$ ,  $p < .01$ ). These result showed students decreased sophisticated-level epistemological beliefs through a learning process of studying materials individually. There was no statistically significant difference in naive-level epistemological beliefs ( $t = .463$ ,  $p > .05$ ).

### 3.3. Change in self-regulated learning for both groups

The mean of self-regulated learning achievement for the experimental group was higher than that of the control group. There was no significant difference for both groups. The cognitive domain ( $t = -1.163$ ,  $p > .05$ ), motivation domain ( $t = -1.586$ ,  $p > .05$ ) and resource management domain ( $t = .857$ ,  $p > .05$ ), none of them was significance difference both groups.

### 3.4. Change in self-regulated learning for the tutoring group

Figure 3 shows the changes of self-regulated learning in the tutoring group. For the experimental group, except motivation domains, there were statistically significant differences in cognitive ( $t = -6.449$ ,  $p < .001$ ) and resource management domains ( $t = -4.053$ ,  $p < .001$ ). After the educational interventions, students who participated in peer tutoring had positive effects on cognitive domains such as rehearsal ( $t = -1.900$ ,  $p < .05$ ), elaboration ( $t = -2.852$ ,  $p < .01$ ), organization ( $t = -8.884$ ,  $p < .001$ ) and critical thinking ( $t = -2.518$ ,  $p < .01$ ). Also for the resource

management domain, peer learning achievement ( $t = -3.740, p < .001$ ) gained significantly from pre-test to post-test.

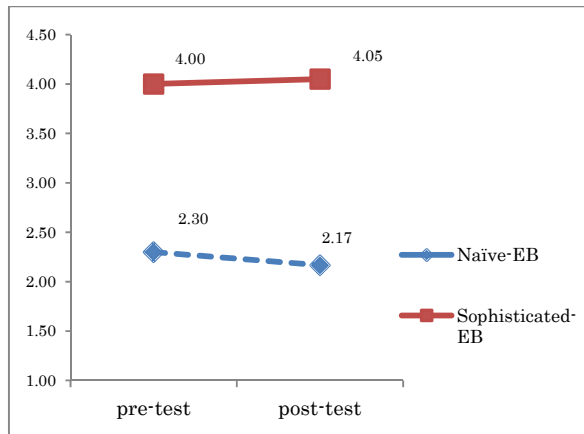


Figure 2. Change of EB between pre and post scores

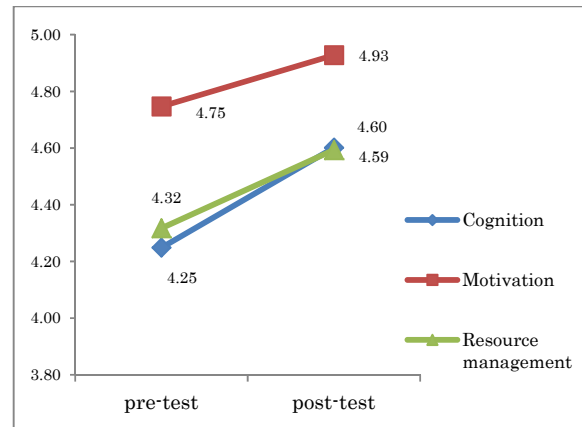


Figure 3. Change of SRL between pre and post scores

### 3.5. Change in self-regulated learning for the control group

Changes in self-regulated learning for the control group showed significant changes in cognitive ( $t = -5.020, p < .001$ ) and resource management domains ( $t = -5.982, p < .001$ ), such as organization ( $t = -12.127, p < .001$ ) and critical thinking ( $t = -2.433, p < .05$ ). Students who participated read the material and studied independently and had higher achievement in resource management domain ( $t = -3.740, p < .001$ ), such as time/study environment regulating ( $t = -2.503, p < .05$ ) and peer learning ( $t = -3.622, p < .001$ ).

## 4. Discussion

These results seemed to suggest that peer tutoring intervention affects students' epistemological beliefs. The peer tutoring group outperformed the control group on sophisticated-level epistemological beliefs. On the other hand, the controlled group had higher naïve-level epistemological beliefs than peer tutoring group. Peer tutoring group students worked collaboratively and they had opportunities to reflect on their thinking and evaluate their beliefs through the learning by teaching process. Therefore, these results confirmed our hypothesis. Peer tutoring could encourage sophisticated-level epistemological beliefs more than the control group.

The mean of self-regulated learning achievement for the experimental group was higher than the control group. However, there wasn't any significant difference in self-regulated learning achievements for both groups. To examine the change in self-regulated learning during the learning process, we analyzed the change in pre and post self-regulated learning achievement in both groups. The same results showed that both groups increased in cognitive and resource management strategies. There wasn't any positive change in the motivation domain both groups. The post-experiment mean scores were higher than pre-experiment scores; however, the learning period could affect

motivation domains. This study period was just one semester, about 12 weeks. These study data did not include achievement about learning task, reflection journal and the dialogue analysis. Therefore, the interpretation of the results cannot be easily interpreted without reference to the context and the limitation of the present study.

Peer tutoring had an advantage on student achievement, metacognitive skills, and social communication skills, but it also consumed time and resources. Tutor's content knowledge, teaching skills and readiness is very important to the peer tutoring success. The various peer tutoring strategies should be applied in pre-service teacher education and college tutoring program.

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