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Is Learning by Teaching Interesting? : A Comparison of Teachable Agent with Peer Tutoring

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Introduction

The researchers in the field of cognitive science and learning science suggest that the teaching activity induces the elaborative and meaningful learning (Chi, et al, 2001). Teachable agent (TA) is a modified version of traditional intelligent tutoring system that assigns a role tutor to teach the agent. To validate the effectiveness of the specific TA, KORI (KORea university Intelligent agent), in terms of cognition and motivation, the effect of learning by teaching the KORI was compared with peer tutoring and traditional method of learning by reading.

Experiment

Method

Thirty-four fifth graders participated in the experiment. All participants took 30 minutes lesson on 'rock cycle' together to acquire the base knowledge in the domain. After the lesson, participants were randomly assigned to one of the three experimental conditions. Participants in the reading condition studied 'rock cycle' with long text for 30 minutes by themselves. In peer tutoring condition, both tutor and tutee were asked to read the text during 10 minutes. After finishing reading, tutors taught tutees during 20 minutes. In teachable agent condition, each participant was asked to teach KORI individually for 30 minutes.

The basic learning material was the eight-page long text on 'rock cycle' extracted from textbook. The post experimental questionnaire to measure interestingness included 9 items and reliability coefficient of interest questionnaire was .746. The comprehension test score composed of 20 true-false questions on 'rock cycle'.

Results

An ANOVA was conducted on the interestingness ratings and the comprehension test scores. First, in the interestingness ratings, the three experimental conditions differed significantly on the interestingness, $F(2, 31) = 7.61$,

$p < .05$. Results of LSD analysis indicated that both conditions of the peer tutoring ($M = 4.38$) and teachable agent ($M = 4.09$) showed more interests in the learning than reading condition ($M = 3.72$). In addition, both of peer tutoring condition and teachable agent condition were divided into two subgroups: that is tutor versus tutee subgroup within peer tutoring condition and positive versus negative feedback subgroups within teachable agent condition. As a result of additional multiple comparison among four subgroups, it revealed the significant difference in participants' interestingness ratings, $F(3, 20) = 5.02$, $p < .05$, indicating that tutor subgroup ($M = 4.32$), tutee subgroup ($M = 4.44$) and positive feedback subgroup ($M = 4.35$) were more interested in the learning than negative feedback subgroup ($M = 3.83$). An ANOVA was conducted to investigate the difference in comprehension test among the four subgroups. The results indicated no significant difference.

Conclusion

We found that both the peer tutoring and the teachable agent conditions were more interesting than the reading condition, despite of no difference in the comprehension test score. It is suggested that teachable agent has more advantages in overcoming the several practical limitations of peer tutoring such as restrictions in time and place, tutor's cognitive burden, tutor's learning skill, unnecessary interaction during peer tutoring.

Acknowledgments

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