Instructing a Teachable Agent with Low or High Self-Efficacy – Does Similarity Attract?

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## Sample

"A total of 166 fourth graders (83 girls and 83 boys) took part, recruited from nine classes in four schools in Southern Sweden in areas with median to low socio-economic status." (Authors, 99)

## Implications For Educators About

# Abstract

This study examines the effects of teachable agents’ expressed self-efficacy on students. A total of 166 students, 10- to 11-years-old, used a teachable agent-based math game focusing on the base-ten number system. By means of data logging and questionnaires, the study compared the effects of high vs. low agent self-efficacy on the students’ in-game performance, their own math self-efficacy, and their attitude towards their agent. The study further explored the effects of matching vs. mismatching between student and agent with respect to self-efficacy. Overall, students who interacted with an agent with low self-efficacy performed better than students interacting with an agent with high self-efficacy. This was especially apparent for students who had reported low self-efficacy themselves, who performed on par with students with high self-efficacy when interacting with a digital tutee with low self-efficacy. Furthermore, students with low self-efficacy significantly increased their self-efficacy in the matched condition, i.e. when instructing a teachable agent with low self-efficacy. They also increased their self-efficacy when instructing a teachable agent with high self-efficacy, but to a smaller extent and not significantly. For students with high self-efficacy, a potential corresponding effect on a self-efficacy change due to matching may be hidden behind a ceiling effect. As a preliminary conclusion, on the basis of the results of this study, we propose that teachable agents should preferably be designed to have low self-efficacy.

# Outcome

"What we found was that the tutee’s SE had no effect on students’ attitude toward the agent; neither did it have any statistically significant effect on students’ own SE. It did, however, have a significant impact on in-game performance – at least with respect to the sub-group of low-SE students.... Separating the low- from the high-SE students, we found some tantalizing effects of tutee SE on student SE. Low-SE students increased their SE consider- ably regardless of condition – but with a trend towards a stronger effect when they taught a low-SE agent. The high-SE students – perhaps not surprisingly – did not change their SE much and may well have encountered a ceiling effect." (Authors, 115)