Summary

Students learn better when studying a picture paired with narration rather than simply on-screen text in a computer-based learning environment. This study was designed to evaluate three effects among students learning about the human cardiovascular system: the modality effect (narration vs. on-screen text), the embodied agent effect (narration + agent vs. on-screen text), and the image effect (narration + agent vs. narration). Fifty-one undergraduate students enrolled in several educational technology courses at a large public university participated in the study. The participants were randomly assigned one of the three computer-based conditions: on-screen text, narration, or narration + agent to learn about the cardiovascular system. Overall, the results showed that incorporating an animated agent could foster learning.

Research Question

How does the use of an animated agent’s image affect learning of science?

Method

Each participant was randomly assigned a method (on-screen text, narration, or narration + agent) for learning the material on the computer. All three versions of the computer-based learning environment contained exactly the same instructional information. After instruction the participants were given a 30-item multiple-choice posttest containing three categories of questions. They also were required to draw a human heart and finally, answer a 14-item attitude survey. The multiple-choice posttest questions consisted of retention, near transfer, and far transfer questions that required students to apply the knowledge attained from the computer-based learning environment. In the student's drawing of the heart they were required to label the parts and use arrows to mark the direction of blood flow in the heart. In the attitude survey, the students' perception of the learning environment was assessed.

Results and Implications

Overall, on the posttest, the narration + agent condition significantly outperformed the on-screen text condition as well as the narration condition. The mean difference between the narration condition and the on-screen text condition was not significant. In an analysis of the different types of questions on the posttest, the narration + agent condition achieved the highest mean score and outperformed the others in each category of question. Although in the near transfer questions, the
narration + agent condition achieved the highest mean score, the differences among the three conditions were rather small.

In the human heart drawing, the narration + agent condition achieved a higher mean score than the narration condition and the on-screen condition.

In the learner attitudes survey it was discovered that overall, there were neither strong preferences nor dislikes whether the instruction was presented by on-screen text, narration, or by narration + agent mode.

Also the students recorded the amount of time required to complete all tasks and overall, students spent approximately equal amounts of time completing all tasks regardless of which presentation mode they were assigned.

The results suggest that using an animated pedagogical agent with the verbal and non-verbal features foster information processing. This is because the computer becomes personified in a sense and the learners perceive the learning process as social and respond more engagingly. Incorporating an animated pedagogical agent in a computer-based science learning environment fosters learning.