

Teaching Scientific Principles using a Testing-Based Training Paradigm

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This research was supported by NSF Grant DRL1246588.

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### **Abstract**

Cognitive psychology often produces findings that are relevant to educational instruction. However, many of these studies rely on artificial conditions, which often fail to transfer to more realistic settings, resulting in a disconnection between cognitive psychology and education. This paper begins to address this issue by taking established principles from cognitive psychology and applying them to teach subjects real academic concepts. We report a training paradigm that applies 4 established principles from cognitive psychology: testing effect, self-paced studying, form of responding, and feedback in which subjects were shown the correct response. This paradigm was used to teach subjects basic concepts of research design that are typically taught in university science courses. Subjects studied PowerPoint-style slides that were divided into three sections. At the end of each section, subjects were presented quiz questions meant to simulate in-class “clicker” questions. After each quiz response, the subject was shown the correct answer. The training paradigm also tested different forms of responding to quiz questions: (1) fill-in-the-blank, (2) multiple-choice, and (3) fill-in-the-blank followed by a multiple-choice version of the same question. Subjects completed two posttests, one immediately after training and another 1 week later. Both posttests consisted of items that tested retention and conceptual understanding. A control condition was used to assess the effectiveness of the training paradigm. No differences were found among the different forms of responding, but subjects who trained using the training paradigm outperformed subjects in the control condition on both posttests, demonstrating the effectiveness of this training paradigm.

*Keywords:* Clicker Technique, Complex Concept Acquisition, Technology-Based Learning and Instruction, Translational Research