Authors: Abbey M. Loehr, Bethany Rittle-Johnson, Kelley Durkin, & Jon R. Star

Title: *Does Calling it 'Morgan's Way' Reduce Adoption and Generalization of the Strategy?*

When describing how to solve a problem, it is common to give an example of how someone else solved it. For example, middle-school mathematics textbooks often use hypothetical students to present problem-solving strategies (e.g. Morgan solved the problem using distribution; Riggs, Alibali, & Kalish, 2015). Presenting strategies as being implemented by a specific individual (i.e., *person-presentation*) is meant to make educational materials more interesting and engaging. However, person-presentation reduced strategy generalization in a controlled, short-term setting (Riggs et al., 2015, 2017). In the current study, we tested whether person-presentation harms strategy generalization when strategies were compared and integrated into classroom instruction. Specifically, ninth graders learned through comparison and explanation of multiple strategies. Comparison and explanation both support learning by focusing attention to the underlying structure of problems and away from less relevant surface features (Gentner & Medina, 1998; McEldoon, Durkin, & Rittle-Johnson, 2011; Siegler & Chen, 2008). Therefore, comparison and explanation of multiple strategies could protect against the negative effects of person-presentation on strategy generalization.

During a unit on solving linear equations, five Algebra I teachers and their 174 students used 9 worked example pairs (WEPs) in which strategies were either presented with pictures and names of hypothetical students (e.g., "Morgan's way"; *person-presentation condition*) or with a strategy label (e.g., "add up way"; *strategy-label condition),* with teachers randomly assigned to condition. After comparing and explaining the two strategies in each WEP, students answered generalization questions by rating how likely another student, teacher, or themselves would be to use each strategy in the future on a 5-point scale. Students completed a pretest and posttest at the beginning and end of the unit assessing their conceptual and procedural knowledge of the strategies as well as their procedural flexibility.

Students' scores on the assessment improved from pretest to posttest (*M*'s = .34 to .53). Students in the person-presentation condition performed similarly on the posttest compared to students in the strategy-label condition, controlling for pretest scores (*M* = .53 vs .52). Their generalization ratings were also similar (*M* = 3.73 vs 3.70). Thus, in a long-term classroom context we found no negative (or positive) effects of comparing and explaining strategies presented with pictures and names of hypothetical students.

Learning different ways to solve problems and comparing strategies helps children become flexible problem-solvers (Rittle-Johnson & Star, 2007). Our findings suggest no negative effects of teachers using students' names to label strategies, a method recognized by The National Council of Teacher of Mathematics (NCTM, 2000). In prior research, person-presentation has only been used with single strategies presented one at a time. Comparison and explanation of the strategies in the current study may have supported learning and generalization because students were focused less on surface-features of the strategies such as the characters and their names. The negative effects of person-presentation on strategy generalization can be counteracted by supporting deep learning processes such as focusing on problem structure.