ABSTRACT: Comparison is a powerful learning process that improves learning in many domains. For over 10 years, my colleagues and I have researched how we can use comparison to support better learning of school mathematics within classroom settings. In 5 short-term experimental, classroom-based studies, we evaluated comparison of solution methods for supporting mathematics knowledge and tested whether prior knowledge impacted effectiveness. We next developed supplemental Algebra I curriculum and professional development for teachers to integrate Comparison and Explanation of Multiple Strategies (CEMS) in their classrooms and tested the promise of the approach when implemented by teachers in two studies. Benefits and challenges emerged in these studies. I will conclude with evidence-based guidelines for effectively supporting comparison and explanation in the classroom. Overall, this program of research illustrates how cognitive science research can guide the design of effective educational materials as well as challenges that occur when bridging from cognitive science research to classroom instruction.