

# **Single Template vs. Multiple Templates: Examining the Effects of Problem Format on Performance**

**Yang Jiang**

Educational Testing Service, Princeton, New Jersey, United States

**Ma. Victoria Almeda**

TERC, Cambridge, Massachusetts, United States

**Shimin Kai**

Teachers College Columbia University, New York, New York, United States

**Ryan Baker**

University of Pennsylvania, Philadelphia, Pennsylvania, United States

**Korinn Ostrow**

Worcester Polytechnic Institute, Worcester, Massachusetts, United States

**Paul Salvador Inventado**

California State University Fullerton, Fullerton, California, United States

**Peter Scupelli**

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

## **Abstract**

Classroom and lab-based research have shown the advantages of exposing students to a variety of problems with format differences between them, compared to giving students problem sets with a single problem format. The rapid development of technologies such as intelligent tutoring systems (ITS) in education affords the opportunity to automatically generate and adapt problem content for practice and assessment purposes. In this paper, we investigate whether this approach can be effectively deployed to an ITS, conducting a randomized controlled trial to compare students who practiced problems based on a single template and those who were exposed to problems based on multiple templates, both in the same ITS. Results show no statistically significant difference in the two conditions on students post-test performance and hint request behavior. However, students who saw multiple templates spent more time to answer the practice items compared to students who solved problems of a single structure.