

Chapter 21

Using Technology–Enhanced Activities to Transform K–5 Mathematics Planning, Teaching, and Learning

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ABSTRACT

In this chapter, the authors describe the technology-enhanced activities intended to transform the ways elementary mathematics teachers provide instruction to their students during a time of distance learning and potentially beyond. Recognizing instruction would take place in a variety of formats, The Math Learning Center supported teachers by providing resources that allow them to continue to engage students in the 4Cs—critical thinking, creative thinking, communicating, and collaborating—even in distance-learning environments. More specifically, the authors describe the alignment between the design of the technology-enhanced activities (TEAs) and the 4Cs as well as how the flexibility built into the TEAs provides opportunities for teachers to employ their technological pedagogical content knowledge as they make decisions for implementation in their specific contexts. Results from surveys and teacher interviews influenced the organization’s plans for future research and development opportunities.

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INTRODUCTION

In spring 2020, as schools closed and teachers shifted their instruction to distance formats, educators did not have time to thoughtfully consider instructional formats, design, delivery, and student access. Instead, they were quickly responding to the situation without time to consider best practices for mathematics instruction. As spring moved into summer, it became clear that more and more schools would not reopen in fall 2020, and if they did, their instructional strategies would need to change so teachers and their students could remain physically distanced.

As a publisher of hands-on, paper-based elementary mathematics curriculum materials, The Math Learning Center (MLC) responded by launching a project to create technology-enhanced activities (TEAs), part of a broader effort to provide digital instructional materials to districts using their *Bridges in Mathematics* (2015) curriculum. Although developed primarily to support remote learning, TEAs can also be used by teachers interested in integrating technology into their face-to-face instruction. TEAs provide a structure for mathematics teaching and learning and flexibility to ensure *Bridges* teachers can maintain the hands-on, discourse-rich mathematics instruction inherent in the curriculum and used prior to the need for remote and socially distant instruction.

Recognizing the importance of 21st century skills, this chapter provides information intended to transform the ways in which elementary teachers engage students in mathematics learning at a distance. The information pertains to remote-learning resources developed by MLC. The authors demonstrate the alignment among the four C's—critical thinking, creative thinking, communicating, and collaborating (Thoughtful Learning Organization, 2016)—and the design of both the *Bridges* materials and the TEAs. The authors also analyze TEA implementation, connecting teacher decision-making to their technological pedagogical content knowledge in their specific contexts. Finally, the authors provide results from surveys and teacher interviews that influenced the organization's development decisions and plans for next steps. The chapter ends with recommendations for future research and development opportunities.

BACKGROUND

This section describes the framework informing the design for this work—specifically the design of both the *Bridges in Mathematics* (2015) curriculum materials and the technology-enhanced activities (TEAs).

The Bridges® in Mathematics, Second Edition Curriculum

Following the release of the Common Core State Standards for Mathematics in 2010, and building on the work of previous publications, MLC updated its curriculum. The goal was to ensure alignment to the new standards while still adhering to the main tenets of the organization's philosophy: a focus on using faithful visual models, developing a classroom community in which all learners have a voice, and providing significant experience with hands-on materials. The result was *Bridges in Mathematics, Second Edition* (subsequently referred to as *Bridges*), initially released in 2013. To date, *Bridges Second Edition* has been adopted by more than 70,000 classrooms nationwide as well as hundreds of classrooms internationally.

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