Chapter 6

A Framework for Defining and Evaluating Technology Integration in the Instruction of Real–World Skills

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ABSTRACT

The Technology Integration Matrix (TIM) was created to provide a resource for evaluating technology integration in K-12 instructional settings, and as a tool for helping to target teacher-related professional development. The TIM is comprised of 5 characteristics of meaningful learning (Active, Constructive, Authentic, Collaborative, and Goal-Directed) and 5 levels (Entry, Adoption, Adaptation, Infusion, and Transformation), resulting in 25 cells. Within each cell, descriptions are provided, along with video sample lessons from actual math, science, social studies, and language arts classrooms that illustrate a characteristic at the indicated level. Throughout development, focus groups and interviews were conducted with in-service teachers and technology specialists to validate the progression of characteristics and descriptive components.

INTRODUCTION

As schools continue to invest in technology tools and resources for instruction, it is increasingly important that teachers and school leaders are equipped to leverage this technology to support students in learning real-world skills. A variety of organizations, agencies, practitioners and scholars have agreed on the importance of preparing students for the 21st century, and have articulated definitions and frameworks for the requisite skills and their instruction (see, for example,

International Society for Technology in Education [ISTE], 2007; Partnership for 21st Century Skills, 2011; Saavedra & Opfer, 2012; and United States Department of Education [USDOE], 2014). Common among these are: critical thinking and problem solving, communication, collaboration, and creativity and innovation (National Education Association [NEA], n.d.). These skills can be most effectively taught and learned through the use of more constructivist pedagogies in environments that effectively integrate technology (Brantley-Dias & Ertmer, 2013; Saavedra & Opfer, 2012).

Teachers and principals have likely received training on specific software or devices, however, there is often a need for additional training in and modeling of the most effective uses of technology for higher-order thinking skills in everyday instruction (NEA, 2008). While technology tools can provide powerful support for instruction, technology is not in and of itself an academic intervention. The model presented here provides a conceptual framework, grounded in sound pedagogy, by which specific uses of technology can be evaluated.

This chapter describes the Technology Integration Matrix (TIM; http://mytechmatrix.org) and illustrates how schools can use this framework to plan and evaluate technology-rich instruction and target teacher professional development. The TIM was created to help K-12 schools support their students in learning skills necessary for their success in the 21st century by providing a common, pedagogically-centered language to describe effective technology integration. The TIM was first developed at the Florida Center for Instructional Technology (FCIT) from 2003 to 2005, and updated in 2011 (Welsh, Harmes, & Winkelman, 2011). Fostering learning environments with increasingly authentic instruction is necessary to prepare students for authentic assessments of real-world skills. The TIM provides a framework for situating technology in instructional settings while maintaining a central focus on students. It is organized according to five characteristics of

meaningful learning and five levels that describe a progression of pedagogical approaches, thus creating a five-by-five matrix. In addition to the matrix itself as a model, an interactive website, referenced above, includes supportive materials such as detailed descriptors for students, teachers, and learning environments across levels and characteristics, and 100 videos of actual classroom lessons that have been aligned to the TIM. The matrix and accompanying resources have been successfully applied to professional development and planning (e.g., Fodchuk, Schwartz, & Hill, 2014), program evaluation (e.g., Pringle, Dawson, & Ritzhaupt, 2015), and academic research (e.g., Digiovanni, 2015; Kieran & Anderson, 2014; Marcovitz & Janiszewski, 2015; Olson et al., 2015; and Sherman & Cornick, 2015) in a variety of educational contexts in the United States and several other countries. Included within this chapter are a background on technology integration and related models, a complete description of the TIM framework and its components, and an overview of tools and processes for implementing the TIM for professional development, planning, and evaluation.

BACKGROUND ON TECHNOLOGY INTEGRATION

Historically, teachers have used a variety of different tools to do their jobs, all of which constitute "technology." As antiquated as they now may seem, chalkboards were at one time a great innovation in classroom technology. The same is true for calculators, film projectors, televisions, tape recorders, dry erase markers, and even ballpoint pens (Purdue, 2015). The innovative technological tools of one generation become the conventional tools, and eventually the obsoletisms, of succeeding generations. Although technology has been a facet of every historical instantiation of the classroom (e.g. a hornbook is mid-16th century educational technology), in

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