Chapter 6
Identifying Effective Uses of Mobiles for Encouraging 21st Century Skills

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ABSTRACT
This chapter outlines characteristics of inquiry-oriented projects that blend theories of constructivism with mobile technology. These characteristics capitalize upon 21st Century Skills (P21, 2009) that align with learner-centered instructional practices. We share insights from a multiple case study of four secondary teachers’ integration of mobiles to encourage student engagement in 21st century skills and inquiry. These teachers integrated mobiles into inquiry-based lessons to promote student ownership of their learning. Data collection from this study included reflective writings, teacher products and an open-ended question from the Technological and Pedagogical Content Knowledge (TPACK) survey (Mishra & Koehler, 2006). Findings indicated that participants consistently encourage their students to engage in 21st Century Skills. Communication, Collaboration, Creativity most common 21st Skills encouraged by the participant as they used mobiles.

INTRODUCTION
The introduction of mobiles for teaching and learning has become commonplace (Kukulska-Hulme, 2010) in today’s schools. This introduction, however, is not implemented in a manner that is independent of other teaching practices. As teachers are being exposed to mobile learning initiatives, they are also being encouraged to devote themselves to other initiatives, such as 21st century skills and inquiry-
based learning (e.g., problem-based learning and project-based learning) to focus on career readiness. Considering current initiatives drive teachers’ pedagogical practices, mobile learning integration should be purposeful in attending to these pedagogical concerns (Ozdamil, 2012). Fortunately, theories of mobile learning support connectivity, authenticity, and context (Crompton, 2013; Kearney et al, 2012), which can bolster students’ use of 21st Century Skills (P21, 2009) and inquiry practices. Inquiry encourages students to engage in collaborative and goal-focused discourse; critical thinking, reasoning, and the development of strategic competence; and opportunities for reflection and making real-world and discipline-based connections (National Research Council, 2000). National teaching standards, such as Next Generation Science Standards (NGSS Lead States, 2013) or the Common Core State Standards (CCSS, 2010), continuously encourage student-centered and meaningful learning rooted in tenets of inquiry and 21st Century Skills.

BACKGROUND

Theoretical Perspectives

Using inquiry instruction as a lens enables teachers across disciplines to engage students in tasks that promote 21st Century Skills such as problem solving, communication, and collaboration (Saavedra & Opfer, 2012; Trilling & Fadel, 2009). Inquiry instruction is grounded in constructivist theory, in that lessons are predominately learner-centered and developed around students’ experiences (Bevevino, Engel, & Adams, 1999; Perkins, 1999; Savery & Duffy, 1995). By situating instruction around experiences that are relevant to students’ lives, inquiry instruction seeks to make learning meaningful, thereby increasing student motivation and value of content. Inquiry instruction can also encourage active engagement and collaborative learning opportunities where students come together to work towards a central goal.

Mobile technology can act as a catalyst in inquiry instruction, enabling students to find creative and innovative ways to meet lesson goals. Regardless of content area, mobiles can support students as they explore content, reason through and make a plan to solve problems, and work together to communicate and represent ideas (Cheng, Yang, Chang, & Kuo, 2016; Edelson, 2001; Jones, Scanlon, & Clough, 2013; Shih, Chuang, & Hwang, 2010). Mobiles can also be used to develop innovative and creative products, while acting as a mechanism for exponentially increasing the substance and depth of information that students can interact with during a lesson. While mobiles can be used to support managerial aspects of instruction (e.g., grading and record keeping), they can also support formative assessment by allowing teachers to easily check student understanding through applications that provide students with instant feedback and creative ways to showcase their understanding of content. Being that the integration of mobiles can structure content in meaningful and creative contexts, teachers believe they afford students with opportunities to connect with the content (Deaton, Linder, & Deaton, in press). If effectively combined with inquiry instruction, which also gives students’ ownership of their learning, teachers can use mobiles to create learner-centered environments that promote 21st Century Skills and active learning.

Our study emerged from a three-year examination of a constructivist-based professional development model, using situated learning as a framework for integrating mobiles across grade levels and across disciplines. The major tenet of situated learning is connecting what is learned to the context in which it is learned (Anderson, Reder, & Simon, 1996; Brown, Collins, & Duguid, 1989). The professional development model purposefully utilized district space, resources, and initiatives in the development
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