

Chapter 12

Emerging Technologies: Perspectives From Metacognitive Teachers

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ABSTRACT

Emerging technologies enhance student learning through the explicit intentional educational design such as Active Learning Classrooms, Flipped Classrooms, Problem Based Learning, and Project Based Learning to empower students. Throughout this article, we will describe several emerging technologies that support learning for the 21st century using student-centered learning models. By means of vignettes, we model how a Metacognitive Technological Pedagogical Content Knowledge Framework (M-TPACK) supports the use of emerging technologies for active learning (Wilson, Zygouris-Coe, Cardullo, & Fong, 2013). Throughout all of the vignettes, we draw connections to the various emerging technologies and the level of integration using both Blooms Taxonomy (Bloom et al., 1956) and the SAMR Model: Substitution, Augmentation, Modification, and Redefinition (Puentedura, 2006).

INTRODUCTION

Teaching and preparing students for learning in the 21st century is becoming increasingly more complicated. Active Learning defined as any instructional method that engages students in the learning process. Active learning requires students to think about what they are doing. The general concept of active learning is to enhance self-learning through problem solving. It often requires the development of new methods of teaching and learning thus enhancing the role of the student. It is the essential elements that focus on students' engagement and interact with the learning process (Prince, 2004). Today's students differ from the students our educational system was designed to teach.

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The Assessment and Teaching of 21st Century Skills committee (ATC21S)¹ postulate that 21st century skills are categorized into four domains: (1) ways of thinking—creativity, critical thinking, problem-solving, and decision-making and learning; (2) ways of working—communication and collaboration; (3) tools for working—information and communication technology (ICT), and information literacy; and, (4) skills for living in the world—citizenship, life and career, and personal and social responsibility.

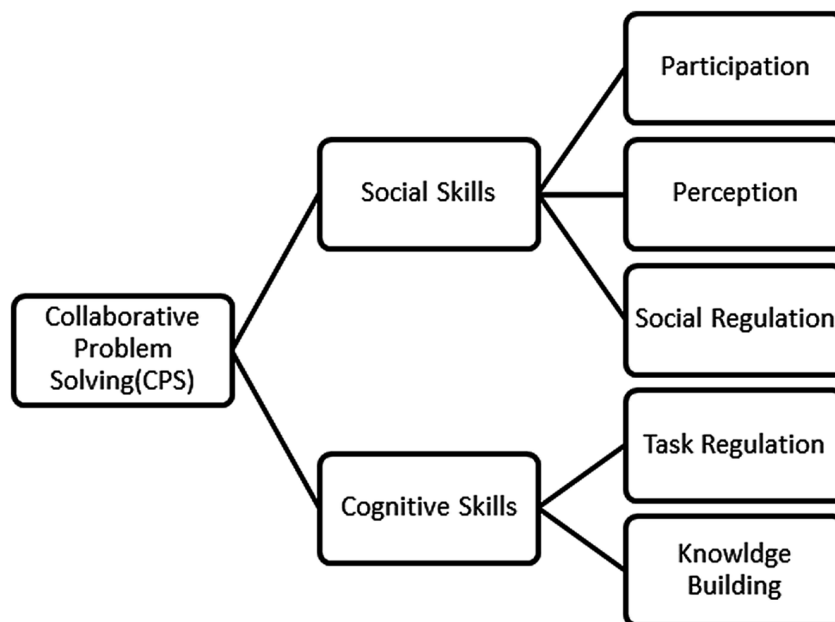
In addition, the ATC21S has also identified two skills that span across all of the aforementioned categories: (1) collaborative problem solving and (2) Information Communication Technologies (ICT). Collaborative Problem Solving (CPS) combines cognitive skills and social skills to create a framework for skills needed for the 21st century (see Figure 1).

In today's digital age students must adapt to the emerging technologies and emerge social environments that are changing the way we collaborate and communicate. Employers are looking for more than entry level skills. They are searching for students who can work collaboratively through the problem-solving process effectively and systematically throughout collaborative problem solving (see Table 1).

An additional skill that span across all of the aforementioned categories is Information Communication Technologies (ICT) learning in digital networks. ICT requires the students to actively engage with technology to research, organize, evaluate, and communicate information. It also requires the use of digit technologies to access, manage, integrate, evaluate and create information all while applying the fundamental understanding of ethical and legal issues surrounding the use of information technologies.

As a nation, we must develop students' 21st-century skills to ensure students have a place in a globally competitive economy. Today's curriculum is not fully preparing students to live and work in an information age society. Reading, writing, math, and science are the cornerstones of today's curriculum; educational institutions must go further. They must include skills needed for 21st-century global competitiveness. These skills include Collaborative Problem Solving and Information Communication Technologies (Binkley al., 2012)

Figure 1. Hierarchical design for collaborative problem solving



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