Chapter 5
Technological Pedagogical Content Knowledge (TPACK) and Neuroscience for Pedagogical Content Knowledge (PCK)

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ABSTRACT

Teaching is a complicated task that requires an interweaving of many kinds of specialized knowledge. It is ill structured that needs teachers to apply complex knowledge. Effective teaching requires teachers to have integrated knowledge from different domains including technology and the brain. This chapter examines why it is important to integrate the concepts of Technological Pedagogical Content Knowledge (TPACK) and neuroscience in Pedagogical Content Knowledge (PCK) to enable teachers to design courses that facilities effective learning to students. This chapter begins with a brief review of PCK, it uses, benefits and limitations. The rapid advance of technology leads to the use of online learning that extend PCK technological pedagogical content knowledge (originally TPCK, now known as TPACK, or technology, pedagogy, and content knowledge). TPACK framework

DOI: 10.4018/979-8-3373-2267-4.ch005

builds pedagogical content knowledge (PCK) to include technology knowledge. This chapter describes how principles from TPACK, and educational neuroscience can be integrated in PCK for effective learning and teaching.

INTRODUCTION

Teaching is a complicated task that requires an interweaving of many kinds of specialized knowledge. It is ill structured that needs teachers to apply complex knowledge. Effective teaching requires teachers to have integrated knowledge from different domains including technology and the brain. This chapter examines why it is important to integrate the concepts of Technologcal Pedagogical Content Knowledge (TPACK) and neuroscience in Pedagogical Content Knowledge (PCK) to enable teachers to design courses that facilities effective learning to students. This chapter begins with a brief review of PCK, it uses, benefits and limitations.

The rapid advance of technology leads to the use of online learning that extend PCK technological pedagogical content knowledge (originally TPCK, now known as TPACK, or technology, pedagogy, and content knowledge). TPACK framework builds pedagogical content knowledge (PCK) to include technology knowledge. On the other side, educators and schools around the world are increasingly using the knowledge, techniques, and programs developed from a new understanding of how our brains learn; that is neuroscience in their classrooms. Educational neurosciences empower teachers with a new understanding about how students learn. Principles from educational neuroscience have important implications to understanding learning and should be incorporated into PCK to promote effective teaching to students. This chapter describes how principles from TPACK, and educational neuroscience can be integrated in PCK for effective learning and teaching.

Pedagogical Content Knowledge (PCK)

Lee Shulman developed the concept of Pedagogical Content Knowledge (PCK) in the mid-1980s (Shulman's, 1986,1987) He argued that, on top of subject knowledge and general pedagogical skills, teachers must know how to teach topics in ways that learners can understand. PCK was initially a science education-based concept to support science teachers in teaching the ill-structured parts of the syllabus. It has now become a useful tool to enables teachers to think about what they want to teach and how they want to teach it. According to Shulman (1986), Pedagogical content knowledge (PCK) is a type of knowledge that is unique to teachers and is based on how teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). The

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