

Chapter 25

Educational Technology in a Novice Science Teacher's Classroom

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EXECUTIVE SUMMARY

Why do some science teachers successfully integrate technology into their teaching while others fail? To address this question, educational researchers have conducted a growing body of research focused on technology integration into classrooms. Researchers are studying everything from teachers' philosophical approaches to teaching that influence efforts at technology integration to classroom-level barriers that impact technology integration. Findings indicate that while some teachers fail in utilizing technology due to the personal and classroom barriers they experience, others eagerly work to overcome the barriers and achieve technology integration. In this case, Mr. Bransford, a novice science teacher who has incorporated technology into his classroom practices within his first five years of teaching, is discussed. Mr. Bransford teaches 8th grade Earth Science using a range of educational technology tools. The barriers he has faced, his strategies to overcome those barriers, and his technology enriched classroom practices are presented.

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BACKGROUND INFORMATION

Teaching science with technology has been widely addressed in many recent educational reforms (e.g., NRC, 1996). It has been documented that when used appropriately educational technology tools improve students' content knowledge (Lei & Zhao, 2007) and scientific inquiry skills as they collect and analyze data to answer scientifically oriented questions and share their findings with others (Hug, Krajcik, & Marx, 2005). Furthermore, the use of learning technologies in science classrooms also enhances students' attention, engagement, and interest in science (Van Lehn, Graesser, Jackson, Jordan, Olney, & Rose, 2007). In spite of the substantive body of research demonstrating the efficacy of technology to enhance science learning and attitudes toward science, the vast majority of science teachers either do not use technology tools in their teaching or only employ technology in ways that replicate traditional instructional strategies (U.S. Dept. of Education, 2003).

In order to successfully use technology as an instructional tool, science teachers need to know about educational technology tools and make informed decisions about what technology to use, where (in the curriculum) to use it and how to use it. Thus, teacher education programs are very influential in teachers' use of technology in classroom instruction. Today, more than 90% of teacher education programs provide coursework where pre-service teachers learn about various content specific educational technology tools and ways to integrate them into the curriculum (Kleiner, Thomas, and Lewis, 2007). Kleiner, Thomas, and Lewi's (2007) study also shows that a smaller percentage of institutions teach techniques to use technology in assessing student learning. However, some institutions offer technology courses integrated into content methods courses.

Having knowledge of and prior experience with educational technology tools can help novice teachers smoothly integrate technology into their teaching (Niess, 2005). Thus, including educational technology training in teacher education programs is critical and should be considered essential in teacher preparation. However, having well-developed knowledge on technology tools is necessary but not sufficient to integrate technology into teaching. Teaching with technology is demanding particularly for novice science teachers as they are also faced with other unique challenges during their first years of teaching (e.g., classroom management). Also, as integrating technology into the curriculum requires extra time and effort, for most novice teachers, designing and implementing technology-rich lessons is not a priority.

Various studies report on the obstacles that impede successful technology integration (e.g., Clausen, 2007; Mumtaz, 2000). These barriers include lack of financial support, time, technical support, access, experience with technology, and supportive administration and colleagues. In addition, students' comfort and prior experience with technology strongly influence teachers' technology integration efforts (Kozmo,

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