Chapter 3
The Learning Sciences, Technology and Designs for Educational Systems\textsuperscript{1}: Some Thoughts About Change

John Bransford, Mary Slowinski, Nancy Vye, and Susan Mosborg\textsuperscript{2}

Abstract The idea that technology can be instrumental in connecting experts and novices who are separated by time or space inspired distance education pioneers over a century ago to take advantage of the innovations of their day—the printing press and postal system—to deliver the first correspondence courses. The technologies to facilitate learning at a distance have vastly evolved in the intervening years, becoming far more sophisticated and showing potential to break us free from old models of instruction. Yet instead of acting as transformative agents, the new technologies have often been assimilated to existing models, and it is not unusual to find ourselves strongly influenced by the methods found in the face-to-face classroom as we design instruction, monitor participant interaction, organize curricula, and conduct assessments in these new arenas. Still, the combination of a fast-changing, technologically-connected world and the expanding knowledge brought to our disciplines by advances in the learning sciences present an extraordinary opportunity for all of us to take part in the evolution and expansion of what we think of as ‘teaching and learning.’ Can technology help us reinvent how we prepare people for healthy and productive lives? This chapter asks that question and hopes to add at least a bit to the rich discussions in this book and sparked by it.

\textsuperscript{1} This chapter, and a number of studies reported in it, were supported by a grant from the National Science Foundation (NSF\# 035445) to the LIFE Center (Learning in Informal and Formal Environments). We thank our LIFE Center colleagues and the NSF. However, the views expressed in this paper should be attributed to the authors and not to other LIFE members or to the NSF.

\textsuperscript{2} Mary Slowinski’s experience in developing and teaching with online learning environments that connect formal and informal learning, and her knowledge of work in this area, played an especially important role in this chapter. Nancy Vye, Susan Mosborg and John Bransford brought knowledge of the learning sciences to this chapter, including studies that we use to support our arguments. Overall, the paper represented a strong collaborative effort where everyone made unique contributions that enriched the chapter as a whole.
3.1 Introduction

Anyone who has been highly motivated to learn something new—especially something difficult—understands the advantages of finding experts who can help them. This is often not easy. Gaining access to instructional expertise has been a challenge throughout much of human history. Many secrets of success (e.g., how to make glass vessels, axe heads, or scalpels; how to read, write, or hula) were available only to a select few. In today’s world, vast inequities still frustrate people’s desires and opportunities to gain access to expert instruction (e.g., Banks et al., 2007; Darling-Hammond & Bransford, 2005; Ladson-Billings & King, 1990; National Research Council, 2000). Nevertheless, people throughout the world are beginning to act on the premise that increased access to learning opportunities is a moral imperative that can make far-reaching differences in peoples’ lives.

A pioneering effort to increase access to learning opportunities is illustrated by the use of the correspondence course in the late 1800s (see Bergmann, 2001; Harris, 1967; Moran, 1993). The goal was to find ways to help learners who, for one reason or another, were unable to attend school in person. Technologies of the day, especially the printing press and the postal system, made the courses possible. Subsequent innovations added filmstrips and sometimes lantern slides—eventually progressing to radio broadcasts and audiocassettes, and to television and videotapes.

These, of course, were primarily one-way technologies. Initial presentations of information were followed by a lag while the student prepared a response. Opportunities for feedback and teacher-student dialogue were pretty much limited to asynchronous exchanges made in writing which, in turn, were further limited by the vagaries of the postal system.

Today’s distance educators, by contrast, have a rapidly expanding array of Web-enabled technologies at their disposal, and more seamless opportunities for synchronous exchange. Even the venerable Open University, a forerunner in distance education, stopped televising lectures in late 2006, as its iconic late-night broadcasts ‘succumbed’ to the efficiencies of the Web (Jowit, 2006).

Digitally-based courses and their online delivery provide powerful examples of ways that new technologies can expand access to learning opportunities (Duffy & Kirkley, 2004; National Research Council, 2000). Internet technologies not only support a more rapid exchange between teacher and student—asynchronous as well as synchronous—they also provide new opportunities for interactivity among learners. While a great need to develop technology infrastructures still exists around the world, considerable strides are being made towards this end (e.g., Friedman, 2005; Smith & Casserly, 2006). Today, access to online learning is becoming much more common, and for people of means, rapidly expanding. Still, it is important to ask: Accessibility to what?

Some years ago, Weigel (2000) argued that most current attempts to create online learning environments suffered from a ‘port the classroom to the Web’ model. Based on our experiences, his point still rings true seven years later.