

Chapter 7

Balancing Student Needs and Learning Theory in a Social Interactive Postdigital Textbook

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ABSTRACT

Digital technologies are revolutionizing many aspects of contemporary education. Nevertheless, the bulk of formal learning still takes place in classrooms and despite several decades of computers in classrooms, the textbook is often the primary instructional resource. This chapter will explore how user-centered design can define a future for the digital textbook in ways that incorporate emerging learning technologies but preserve the traditional functions of textbooks in classroom communities. The authors describe the methods and results of three separate user-centered design pilots we conducted to understand user needs: a diary study, a creative writing exercise, and a participatory prototyping activity. Results from each exploration are integrated to highlight commonalities and differences. The chapter closes with a reflection on the overall strengths and limitations of this approach.

INTRODUCTION

This chapter explores how user-centered design can define a future for the digital textbook in ways that incorporate emerging learning technologies and preserve the traditional functions of textbooks in classroom communities. We use the term “postdigital textbook” to represent this vision, to signify that we are working towards developing a platform that meets the same goals as today’s textbooks while advancing the technology of current digital books. Digital technologies are revolutionizing many aspects of con-

DOI: 10.4018/978-1-5225-2639-1.ch007

porary education. The Open Educational Resources movement has given students unprecedented access to resources and expertise in a variety of subject areas, and with the combination of Web 2.0 technologies and educational content, students can now make social and intellectual connections with those who share similar interests around the world (Brown & Adler, 2008). The growth of mobile and ubiquitous technologies has made learning content accessible anytime and anywhere (Hwang & Wu, 2014). A multitude of online learning resources has emerged that can be tailored to meet students' unique needs.

Nevertheless, the bulk of formal learning still takes place in classrooms and despite several decades of computers in classrooms, the textbook is often the primary instructional resource. Millions of students continue to use textbooks that quickly become dated, impose rigid knowledge structures on material, and offer limited forms of interactive engagement (Lewin, 2009). Digital textbooks are gradually replacing physical textbooks in the classroom, with decreasing costs and improved portability and accessibility making them increasingly appealing (Heider, Laverick, & Bennett, 2009; Marmarelli & Ringle, 2011; Nelson, 2008; Uzwyszyn, 2012). The infrastructure for developing digital textbooks is growing rapidly: Apple iBooks has established distribution partnerships with major textbook publishers, and AcademicPub and Inkling have developed digital textbook authoring platforms. Digital textbooks incorporate more multimedia and interactivity, cost less, and are more easily searchable than physical textbooks (Lewin, 2009). However, today's digital textbooks rarely leverage advances made in educational technology and learning sciences. They are often analogs to their print counterparts with additional features such as better search, navigation, and annotation (Chong, Lim, & Ling, 2009; Marmarelli & Ringle, 2011; Marshall, 1997), and the facilitation of multimedia and basic interactivity (Kim, Yang, Kang, & Kim, 2010; Kwok, 2012).

There are good reasons that the traditional model of the textbook persists, even as technology and pedagogy advance. Textbooks serve important core functions in formal learning environments. They provide curricular stability through structured knowledge: teachers can depend on a uniform structure for instruction and know that all students are approaching the same material at the same pace (Cunningham, Duffy, & Knuth, 1993; Eilam & Poyas, 2012). They serve as a shared resource in the learning community of the classroom, creating a space for students and teachers to voice their thoughts and engage in collective acts of meaning-making (Finn, 2012; Zhao & Kuh, 2004). Bold thinkers like Neal Stephenson and Alan Kay imagined the future of education as uniquely personalized with content and activities that intelligently adapt to each student's needs and preferences (Kay, 1972; Stephenson, 1995). However, a textbook that is completely adaptive to each individual student is at odds with the current function of a textbook in the classroom, where a learning community works together to acquire the same content in a fixed order.

The Potential of Digital Textbooks

Two threads of work on advanced learning technologies have emerged that better leverage the current role of textbooks in classrooms. First, representational tools help students build on prior knowledge and integrate across different sources of information, often through the use of graphic organizers like tables or concept maps (Davies, 2011; Ponce & Mayer, 2014). Today, students produce a variety of personal digital resources (e.g., notes, flashcards, and reports) and have access to a flood of online educational content (e.g. websites, internet forums, and online learning communities) that can extend and complement their primary learning resource (Greenbow, Robelia, & Hughes, 2009). Students must work to connect information within a text and integrate information with external resources (e.g., class notes and

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