

E-Textbooks as a Classroom Tool

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INTRODUCTION

Digital technology has greatly influenced every aspect of the digital generation's lives: how they play, how they socialize, how they communicate, and how they learn. As technology is integrated seamlessly into the personal and social aspects of students' lives, technology further changes their academic environment. This technology force often influences educators to deliver content and assess students' performance. This article will address a recent, innovative force, e-Textbooks, which should hold a prominent place in the field of education because this technology initiative can change the classroom landscape of how we teach and learn. Although the importance of e-Textbooks in the classroom has increased, limited literature on this technology tool calls for the more discussion—especially in relation to its pedagogical meanings. Hence, the main purpose of this article is to define e-Textbooks, to provide pedagogical meanings of e-Textbooks in the classroom, and to discuss how e-Textbooks address many of the contemporary issues in education, such as differentiated instruction, self-directed learning, and evidence-based (data-driven) teaching. In addition, because the impact of e-Textbooks is varied, this article will discuss the antecedents where e-Textbooks influenced students' learning outcome significantly in educational contexts. In other words, this article will discuss whether the research found significant learning outcomes in using e-Textbooks.

The Definition of E-Textbook

The key definition of e-Book varies due to its nature and extent. The Oxford Advanced Learner's Dictionary (2010) defines an e-Book as "a book that is displayed on a computer screen or on an electronic device that is held in the hand, instead of being printed on paper. It is in multiple electronic formats." Vassiliou and Rowley

(2008) claims most early definitions of e-Books are obsolete due to too much reliance on specific readers or their access to rapidly developing cutting-edge technologies. She defines e-Books in two parts. The first part of her definition summarizes the essential and stable nature of e-Books referring to digital object with textual and/or other contents. It is the result of integrating the common concept of a book with features that can be provided in an electronic environment. The second part refers to in-use features such as search, cross-reference functions, reference materials, monographs, hypertext links, bookmarks, interactive dictionaries, highlights, multimedia objects and note taking. These features will become less significant due to the vast advancement in technology. Thus, an ongoing revision of the e-Book definition is required. The definition of e-Textbook adds the educational intention into the definition of e-Book. Accordingly, e-Textbook is defined as an educational or instructional book in digital form. As more students use their laptops and smart phones on a daily basis, e-Textbooks are increasingly taking the place of printed books (PCMac, 2013).

BACKGROUND: PEDAGOGICAL MEANINGS OF E-TEXTBOOKS IN THE CLASSROOM

It is critical to discuss how educational theories support the use of e-Textbooks because the review of these theories will provide the particular answers to how, what, and under what conditions learning can be maximized in the use of e-Textbooks. While the topic is too large and complex to be thoroughly examined in this article, we can highlight those theories that are particularly relevant to specific features of digital textbooks such as hypertext, multimedia, interactivity, learning analytics because these features unswervingly give e-Textbooks pedagogical meanings in the classroom. It is important

to notice that the pedagogical meaning of e-Textbook will evolve as newly developed technology tools are embedded in e-Textbooks.

Multimedia Presentations and Long-Term Memory

E-Textbooks' capability to incorporate multimedia makes presentation of information not only more appealing and engaging but also more understandable and more effective in increasing long-term memory by using multiple sensory channels to put forward information. As incoming information is presented through multiple sensory channels, the learner's ability to generate mental representation of external information is enhanced (Mayer, 2001). This assumption aligns well with Paivio's (1986) dual coding theory. Dual coding theorists (Large, Beheshti, Breuleux, & Renaud, 1994) argued that pictures are more likely than words to be dual-coded (verbal and visual) in the human cognitive system; thus, when one memory is lost, the other remains available. In addition, two separate codes of pictures have additive effects so that the likelihood of information being remembered is increased. As a result, multimedia use in e-Textbooks can foster cognitive change (Mariano, Doolittle, & Hicks, 2009; Mautone & Mayer, 2001) and facilitate information processing in learning (Mayer & Moreno, 2003; Rieber & Kini, 1991).

Interest in E-Textbook

Multimedia presentations are highly vibrant to catch students' attention, which, in turn, increases a student's situational interest. The key function in e-Textbooks that will increase the situational interest is e-Textbooks' capability to allow students to have a choice on what to read and what to perform by providing different options of learning using Web-resources and technology applications. Choice increases interest and task engagement (Parker & Lepper, 1992; Zuckerman et al., 1978). Choice appears to increase interest for several reasons. One is that students tend to pick what they like or what they are curious about (Shirey, 1992). Satisfying one's curiosity increases intrinsic motivation and engagement (Kohn, 1993; Lowenstein, 1994). Second, choice allows students to select learning materials with which they are familiar. A number of studies indicate that prior

knowledge increases engagement and understanding (Alexander & Jetton, 1996; Schraw & Lehman, 2001). Third, having control of what and how one studies increases intrinsic motivation and interest (Deci et al., 1991). Choices that E-Textbooks offer expand their potential to be an interest generator.

Motivation in E-Textbook

Motivation increases learning (Debnath, 2005; Palmer, 2007; D'Souza & Maheshwari, 2010). Multimedia elements of E-Textbooks can also trigger the motivation to learn, which is another topic of hot cognition. Park and Lim's study (2007) demonstrated that the illustration effects of multimedia materials generated a significant effect on learners' motivation and found that learners pay more attention to learning materials when emotional interest illustrations are presented than when text-only information is presented. Additionally, their study also showed that the emotional interest group had a significantly higher relevance score than did the text-only group. Um and others (2011) indicated that applying emotional design principles to learning materials can induce positive emotions and that positive emotions in multimedia-based learning can facilitate cognitive processes and learning—thus suggesting that emotions should be considered as an important factor in the design of multimedia learning materials.

Interactive Interface, Problem-Solving, and Self-Efficacy

One of the significant features that E-Textbooks offers education is its ability to create interactive educational materials. Multimedia with carefully designed interactive components offer visibility in learning so (a) users are able to see the actions that are open to them at every choice point, (b) they are able to receive immediate feedback about the actions they have just taken—since few things upset computer users more than not knowing what a computer is doing when it seems to be churning endlessly, and (c) they are able to get timely and insightful information about the consequences of their actions (Norman, 1988; Hutchins, Hollan, & Norman, 1986). It is believed that providing interactive, manipulative functionality in multimedia can improve learners' problem-solving skills by (a) promoting their self-efficacy and (b) reducing the cognitive load

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