Chapter 4
Structure of Digital Textbook

ABSTRACT

Many projects around the world aim to use and develop digital textbooks. However, differences between aims, affordances, methodologies and technologies cause many issues, controversies and concerns to arise. This chapter aims to explore the basic structure of digital textbooks. The focus is on the non-linear mechanisms of eTextbooks and Open Source Textbooks. At the beginning is investigated the current state-of-art in order to arrange the distinctive features in a hierarchical manner. Then, it assembled the digital textbook infrastructure. The proposed methodology allows identifying the common elementary components of digital textbooks through meta-analyses of proposed methodologies. To arrive at this framework, it explored the diversity of contexts, educational platforms, PC, digital devices, contents and processes. The chapter concludes with a call for future research of digital textbooks functionalities, analysing them in a diversity of four learning environments.

INTRODUCTION

Learning today goes beyond four walls of traditional classrooms with classic methods of teaching and printed textbooks. Digital textbooks offer a new way to explore phenomena, learning objects, processes, events, and what is more important the information flows. To date, they aren’t only digital or digitalised imitations of printed textbooks. Digital textbooks provide many interesting features as: immediate feedback, adaptivity, multimodal text etc. Research (Kim & Park, 2014, p. 418) expect that in future, digital textbooks will elevate the learning efficiency, reduce the educational gap between different location and incomes, and the dependency on private education through the normalization of public education. In a fast-paced world it is becoming increasingly likely that a significant portion of what students learn will be out of date by the time they finish their professional working careers. In such a world it is no longer enough for students to reproduce facts or information provided by the teacher or/and textbook. More important is being able to find, manage and evaluate new information. It was argued (Midoro, 2005, p. 52) that students learn complex subject matter best when they are engaged in the process of constructing meaning from information and from their personal experience to meet their own goals. The use of ICT should not only enhance learning, but also transform it.

We live in a knowledge-based information society where new knowledge is produced every minutes. Use and development of digital textbooks

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has become an increasingly concept in textbook theoretical and practical studies. The growing interest in digital textbook has occurred partly in response to the changing nature of content and partially of cognitive processes. It was argued the existence of multiple ways in which cognitive and meta-cognitive processes impact attitude. For example, as was noted by Petty and Briñol (2014), emotions can serve as simple cues when elaboration is low; emotions can serve as arguments when elaboration is high; emotions can bias cognition when elaboration is high or emotions can influence the amount of thinking when elaboration is unconstrained. The impact of emotions on secondary cognition relies on happiness, anger, disgust and arousal. This way arise many legal, philosophical, pedagogic, psychological, economic, managerial, technical, and others issues. Thus, there is a dispute over the key issues in digital textbook structure. In general terms, the digital textbook structure could be developed on the base on postmodernism or on the base on empiricism. “The emergence of Digital Natives has led to change in communication methods, forms of knowledge and the way in which collective intelligence is cultivated for social education” (Jang, 2014, p. 73). The differences between the postmodernism and empirical/theoretical methods is similar to the difference between a scientific fundament with principles and trial-errors methodology aims to explain evident facts. In this way the learning design of digital textbooks should take into consideration the integration of new technologies across the curriculum and methodology of learning.

Last decade several studies have documented aspects of digital textbooks’ structure, content, frameworks, text structure and learning environments (Hyman, Moser & Segala, 2014; Lawrence, 2014; Hannafin, Hill, Land & Lee, 2014; Harvey, 2011; Eppelin & Böttcher, 2011). Our research question is: What are the key elements of the digital textbook structure? Usually, studies aim to describe the content or/and frameworks. However, in a knowledge based society it is no longer enough to learn “fact” and “information”. Being competent, have knowledge, skills, energy and attitudes to find, manage and evaluate information, time, resources, and risks. It has become evident that investigation the structure elements of digital textbooks is unprecedented. These possibilities can be attributed to easy on-line access to e-resources; registration to educational platforms and open source textbooks as well as databases with scientific articles related to use and development of digital textbooks in learning.

As many scholars have pointed out, the scientific investigation trend to SMART education, that is “a creativity focused and customised system for developing new ways to learn by using up-to-date technology like cloud computing, and enables students to study with various materials based on their aptitudes and intellectual levels using mobile Digital Textbook at anytime, anywhere and on any devices” (Jang, 2014, p. 73). Such new methodologies allow identifying, also, the common elements of textbook structures. This chapter “looks” into digital textbook structures. It analyses the last decade challenges related to real context of the learner in concordance to digital content provided by textbooks (schoolbooks) and requirements of different learning environments.

The chapter is interested in exploring interdependencies between learner’s psycho-pedagogical characteristics and the real learning environment, were was radically changed. What is the learning environment with digital textbooks? What is better for a digital textbook environment: individualized (personalized); collaborative (cooperative); mastery-based or performance-based learning methods? What frames should be designed: homogeneous or heterogeneous? Homogeneous frames include text, graphic, exercises and the linear structure of text. Instead, heterogeneous frames have text, graphic, animation, spoken word and a non-linear structure that can be tailored by teacher(s) or/and students.

Our essential research question concerns the key elements of digital textbooks’ structure,