CAN DIGITAL TEXTBOOKS BE A FAUSTIAN BARGAIN?

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The first task of thought in our era is to think what technology is.
George Grant (1998[1974], p. 1)

Technology has invaded our lives like a tsunami, blurring the binary between public and private. One of the most commonly emphasized aspects of the advancement of technology, thanks to Samsung, Apple and others, is constant connectivity and permanent accessibility. While having tools to look up something at any time, anywhere, is invaluable, such accessibility is not necessarily beneficial: It may take other, equally invaluable, opportunities from us. Reviewing the promotion of digital textbook in South Korea provides us with an opportunity to think critically about what we might be giving up in exchange for technology.

Since 2007, the Ministry of Education in Korea has gradually carried forward a Digital Textbook Project. Digital textbooks for six subjects for Grades 5 and 6 and English for Grade 7 have been developed. They have been tested in research schools to demonstrate their effectiveness, to find any defects of the textbooks, and to identify other related issues. Furthermore, on June 29 in 2011, the Promotion Strategy for Smart Education that was inaugurated by the Committee for National Informatization Strategy and the Ministry of Education included a plan to provide Grades 3 to 12 with digital textbooks. Against the enthusiasm of the former government on digital textbook, since 2013 the process has been hold in the current government.

With regards to the change to digital textbooks, substantial research has been conducted to solve technological and procedural issues in developing digital textbooks (Kang, 2002; Byun & Choi, 2002; Byun, Choi, & Song, 2006; Jung & Kim, 2007; Leem, 2012; Jang & Kim, 2012) and to show the effectiveness of digital textbooks (Byun, et al., 2008; Park, 2010; Byun, Kim, & Song, 2010; Noh, Kim, & Lee, 2010; Byun, Ryu, & Song, 2011). With differences in terms of their purposes and areas of interest, the research is concerned that the movement toward digital textbooks seem to have been accepted as a fait accompli, and the research was conducted from the perspectives of their effective inauguration and use.

The results of the research do not convince us of the effectiveness of digital textbooks. According to the meta analysis by Byun, Ryu, and Song (2011) with 91 analytic categories from 14 studies involving groups of students who studied with digital textbooks and groups that did not, the students who studied with digital textbooks show a slightly higher academic achievement, but the differences between the two groups were not very noticeable. There were meaningful differences between the two groups in Korean, math, and social studies but no meaningful differences in English and science. These results differed from the assumption of the government that digital textbooks would be effective for teaching and learning English and science, the digital textbooks that were developed first. Park (2010) also conducted a meta analysis of 20 studies

on the effectiveness of Elementary English digital textbooks and found that digital textbooks did not make a meaningful difference in terms of academic achievement. What can be summarized from the research is that it is hard to argue that the use of digital textbooks results in a noticeable improvement in academic achievement, contrary to the beliefs of the policy makers. Even when the difference was statistically identifiable, the difference was insignificant and varied in terms of the year of the study, subjects, students' grades, and areas where the research was conducted. Also the satisfaction of the teachers who used digital textbooks was somewhat low, and there were complaints and concerns about the instability of the digital textbook system (Noh, Kim, & Lee, 2011; Song & Byun, 2013; Hong, et al., 2013).

The effectiveness of digital textbooks is affected not only by the characteristics of the contents (structure, complexity, and form of representation), and the capacity of the digital gadgets (connectivity, usability, communicability, and networking), but also by learners' characteristics (interest in studying a certain subject, ability to study certain subjects, and goals for studying), the approaches of teachers using the technologies, and other contextual circumstances. Thus, we should be wary of attributing the positive results found in the research to generalizable results of teaching and learning using digital textbooks. In addition, the research conducted so far is all empirical mostly quantitative research, which ignores long-term effectiveness, qualitative observations, and the influence on individuals. Even if there is reasonable empirical data that support the use of digital textbooks, we would like to question the movement. Despite the weakness of the research results, the policy has proceeded as if it were a necessary change. Looking at the research on digital textbooks, we argue that what has been missing in this discourse is theoretical and conceptual studies about the use of digital textbooks, a conversation in which we would like to participate.

Appeal of digital textbooks: "Faustian bargain"

The medium is the message.
Marshall McLuhan (1964, p. 1)

All technological change is a Faustian bargain.
Neil Postman (1995, p. 192)

As the epigraph from McLuhan warns us, the technologies we employ in education bring much more than the contents they contain. The railroad brought not only wheels, roads, and trains into human lives but also affected how people live. McLuhan was not interested in technology itself, but rather how people use it and the consequences of using it. From the perspective of media ecology, we need to understand how introducing a certain technology might affect people's values, perceptions, attitudes, ways and quality of conversations, and so on. Arguing that "the medium is the metaphor", Postman (1985, p. 15) emphasizes that the medium we use constitutes how we perceive the world and gradually creates a new culture around us.

The characteristics of digital textbooks that are seemingly attractive include immediate communication, instant responses, the ability to carry much information

through hyperlinks that are non-linear and interactive, and the capacity to collaborate in various dimensions. However, we have not asked what risks we are taking in employing the technology. In *The End of Education: Redefining the Value of School*, Postman (1995, p. 192) lists the following characteristics of technology:

> 1) All technological change is a Faustian bargain.

> 2) The advantages and disadvantages of new technologies are never distributed evenly among the population.

> 3) A new technology usually makes war against an old technology. It competes with it for time, attention, money, prestige, and a "worldview."

> 4) Technological change is not additive; it is ecological. A new technology does not merely add something; it changes everything.

What might using digital textbooks take from us? In addition to the tremendous costs (for developing content, buying gadgets, and maintenance costs) and the psychological and technical burdens on teachers, possible negative consequences of using digital textbooks should be thoroughly investigated, contemplated, and discussed.

Ironically, while hyperlinks can be conduits for enormous amounts of data and content, excessive connectivity could result in a decline in the ability of students to concentrate; the switching cost of multitasking may cause cognitive overload (Carr, 2010, p. 202); and constant skimming between webpages may impede immersed reading and result in superficial reading with the endless operation of a mouse or touch pad. The time that eyes stay on a normal webpage is less than ten seconds, and eyes stay on the page longer than two minutes in less than ten percent of webpages (Carr, 2010, p. 202). The answer that Nicholas Carr gives to the question of how people read webpages is "They don't read" (Carr, 2010, p. 202). Actually stated as part of Google's company philosophy of Google is "our goal is to have people leave our websites as quickly as possible." The faster users move another websites; the more profit Google makes. What the company does not want is to promote engaged reading and contemplating while reading. Google literally, as Carr (2010, p. 231) argues, promotes distraction for its living. Carr (2010) also questions "popular passages," and "word clouds" that Google provides in that while they are useful, they may hinder engaged and contemplative reading.

Empirical studies show that the effectiveness of study through hypertexts needs to be carefully interpreted. Providing evidence that studying with linear text is useful for understanding core concepts and remembering important facts, McNight, Dillon, and Richardson (1993) argue that hypertexts are not always useful. Focusing

on the observation that learners do not always make appropriate decisions in the hypertext environment, Jacobs (1992) also argues that it is not likely that hypertext technology leads toward renovating teaching and learning. Higher order thinking in particular, such as reflection, erudition, creativity, and innovation cannot be promoted in the hypertext environment (Jonassen & Mandl, 1989). Focusing resources and energy heavily on using educational technology to teach may be eroding valuable opportunities to develop higher thinking skills.

According to attention restoration theory (Kaplan, and Kaplan, 1989), our brains become sensitive in silence because they should not be overloaded by distraction and external stimulations (Carr, 2010, p. 316). Not only does deep thinking require silence and concentration, so do compassion and empathy. When everything happens quickly, one cannot feel how others might feel. Many valuable things cannot be immediately processed. It is important to know that sensitivity is not merely knowing facts through *surfing* abundant resources.

It is more timely than ever to critically think about technology in education, as George Grant knew decades ago. It is naïve, and even dangerous, to believe that technology is only a tool and is simply additive. By adopting digital textbooks, what might Korean education achieve? What is it trading for technology? Certainly digital textbooks can be a Faustian bargain.

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