

Analysis of Teacher Perceptions of Digital Textbook Use in Korea Pilot Schools

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The purpose of this analysis is to identify teacher perceptions of Digital Textbooks and their use in schools. For this objective, 119 representative teachers of Digital Textbook Pilot Schools in Korea participated in an online questionnaire containing open-ended questions regarding classes using Digital Textbooks and their responses were analyzed. Results of the content analysis of the responses were categorized into four topics (Student Development, Digital Textbook Contents, Digital Textbook Functions, and Instructional Change) and each included responses involving advantages and improvements. Though there were responses regarding the adverse effects of Digital Textbooks, such as student distraction and eyestrain, positive feedback regarding the implementation of student concentration, interest, and self-directed learning attitudes outweighed the negative responses. Also, there were affirmative responses regarding the variety and volume of Digital Textbook contents and voices demanding more rich and high quality contents.

Keywords: Contents Analysis, Digital Textbook, Open-ended Questionnaire, Pilot Schools,

Introduction

Digitization of textbooks is being promoted worldwide. The US government set the goal of introducing Digital Textbooks for all schools in 2012 (The White House 2012) and the French Ministry of Education has released a report (Eduscol, 2012) for the duration of five years (2009-2014) regarding experimental schools utilizing Digital Textbooks. Additionally, the Chinese Ministry of Education set up a professional organization regarding Digital Textbooks in 2010 to research and establish standards for Digital Textbooks and to promote the introduction and dissemination of Digital Textbooks through pilot schools, especially in Beijing and Shanghai (KEDI, 2014). In keeping up with such international innovation, Korea's Ministry of Education and its Japanese counterpart announced the implementation of Digital Textbooks for 2018 and 2020 at the start of 2016(MEXT, 2017).

Ahead of implementing Digital Textbooks in schools, there is a plethora of research on the effects of learning and usability of Digital Textbooks in countries such as France, Republic of Korea and Japan. However, there is little research to analyze teachers' opinions on the use of Digital Textbooks. Even in Republic of Korea, which has been promoting a Digital Textbook Pilot School for more than 10 years(see Table 1)., there have been few research studies on the teacher perception of Digital Textbooks. With regard to the studies on Digital Textbook Pilot Schools in Korea, Seung, Kim, and Lee (2014) pointed out that such research mainly focused on the technical functionality of Digital Textbooks and student perceptions of Digital Textbook usage effects. And Seung et al. (2014) pointed out the lack of teacher opinion input is problematic.

Table 1.
Outline of Digital Textbook Pilot Schools in Korea

Items	Status
School Infrastructure	6.2 students per student PC (teaching & educational purposes)
Related to Digital Textbook*	11.2%: Ratio of classrooms with Wireless LAN accessibility
Legal Position	Equal to paper-based textbooks
Definition of Digital Textbook	A Textbook adding an abundance of supplementary learning materials, learning support and management functions to existing curriculum contents (book-type). Also, able to link with external materials such as Educational Contents Open Market (MOE, 2012)
To Combine or Replace	Combine
Authorization	Required

Leading Agency	Government Level - Ministry of Education & KERIS
Subject Development	Social Studies, Science, English
Target Grades	Elementary & Middle Schools
School Usage	Pilot Schools(EST 130) & Not Pilot Schools(EST 3,000)
Price	Free
Commercialization	2018 ~
DT Related Platform	EDUNET
DT Pilot Schools	2008 ~ 2017 (continuing)

Note: Korea: KERIS (2015)

In addition, Jeong, Lee, and Shin (2017), through the questionnaire of 1,452 teachers of Digital Textbook Pilot Schools, showed an improvement of teacher perception in regard to learning effects, usability, and satisfaction. Also, Jeong et al. (2017) showed teacher perceptions on the main advantages of Digital Textbooks that consist of various multimedia functions, interaction, and motivation. Additionally, the main drawbacks are device error, students' low concentration, and dependence on digital devices. However, there is a limit to interpret or draw specific implications for school education from the above advantages and drawbacks, because these findings are contradictory to each other and it is difficult to analogize the reason or background from the results based on five-point multiple choice or optional items. Various multimedia functions are likely to cause technical problems (device errors), and increased interactions can affect the loss of concentration and digital device dependence. In addition, high teacher perceptions that were reflected in the survey in regard to satisfaction and usability of Digital Textbook (score 4.19 and 3.83 of 5) are not entirely flawless because there were also a number of teacher responses about device errors(31.4%), students' low concentration(27.4%), and dependence on digital devices(14.6%) that highlighted the disadvantages of Digital Textbooks. In addition, the results about teacher perception are not divided into digital textbook itself (functions, contents, etc.) and instead are focused on the use of Digital Textbooks.

Also, Seung et. al. (2014) analyzed the opinions of about four teachers who used Digital Textbooks in class through interview surveys, and identified four positive facets (convenience usage, content wealth, interaction promotion, and self-directed learning strengthening) and four negative facets (teacher class burdens, device errors, in-class student distractions, and the regression of positive learning effects). Based on the above research, I constructed the following three questions:

- (1) How can the negative and positive opinions co-exist, given that they are contradictory?
- (2) Approximately what percentage of teachers gives positive or negative opinions in regard to certain functions or content?
- (3) How do teacher opinions differ on Digital Textbooks and classroom instruction incorporating them?

The purpose of this analysis aims to identify the advantages and issues for improving the use of Digital Textbook in classrooms that is not merely limited to teacher perceptions of the functions of Digital Textbook..

Research Design and Method

For this objective, an online questionnaire was analyzed. This questionnaire was distributed to 134 representative teachers (directors or head teachers) of Digital Textbook Pilot Schools (71 Elementary and 63 Middle Schools) from the Republic of Korea in October 2015. The questionnaire contained the five following open-ended questions about the advantages and issues for improving Digital Textbooks with classes using Digital Textbooks along with management of Digital Textbook Pilot Schools.

- (1) The advantages of Digital Textbooks
- (2) Issues for improving Digital Textbooks
- (3) The advantages of classes using Digital Textbooks
- (4) Issues for improving classes using Digital Textbooks
- (5) Opinions about supporting Digital Textbooks Pilot Schools

Results and Discussion

Among the 134 representative teachers (Director or Head teacher) of Digital Textbook Pilot Schools, 119 teachers (Elementary School 64, Middle School 55) responded. The open-ended responses of the online questionnaire were analyzed accordingly.

Through three coding processes (open, axial, and selective coding) of the qualitative research method proposed by Strauss and Corbin (1990), and the hermeneutic classificatory content analysis (Oevermann, Konau, and Krambeck, 1979), the topics and categories were extracted and responses were then counted. After reading all of the responses three times or more, I attempted to extrapolate keywords and criteria for categorizing these keywords. During this process, new keywords were discovered and integrated. The results of the content analysis of the responses were categorized into four topics (Student Development, Digital Textbook contents, Digital Textbook functions, and Instructional change). Each of the topic responses involved three to ten keywords about advantages and improvements. I counted one from one keyword in each sentence of the teacher responses, and I counted two or more if teachers referred to more than two keywords in the same sentence. Also, I counted one if teachers referred to the same keyword in different sentences. For example, if a teacher's response is thought of as "student improvement in interest", I count one 'interest' using the keyword under the 'Student Development' category (see Table 2).

I realized that the theme of responses was mixed between items (1) and (3), also, between items (2) and (4). Some teachers referred to their classes using Digital Textbooks in item (1) or (2) which is not related to the items about Digital Textbooks directly, but the actual class using Digital Textbooks. In addition, some of the responses were not focused on Digital Textbooks, but instead focused on items such as LMS (Learning Management System) or cloud platform. The main analysis results are as follows.

Four Topics Derived from Teachers' Responses

Results of the content analysis of the responses were categorized into four topics (Development of Students, Digital Textbook contents, Digital Textbook functions, and Instructional change). Each of the responses, given the four topics, included three to ten keywords regarding advantages and improvements. For example, if the teacher response to the advantages of Digital Textbooks was "Students can access a variety of data through Digital textbook (Diversity of Digital Textbook contents), Digital Textbooks have search functions (Search in Digital Textbook Functions), and students became more interested (Interest in Student Development)". For each of the above responses, keywords and topics were extracted and decided as follows; Diversity (keyword) of Digital Textbook contents (topic), Search (keyword) of digital textbook functions (topic), and interest (keyword) in student development (topic).

Teacher Perceptions of 'Student Development'

The 'Development of Students' topic involved 'interest', 'self-directed learning', 'concentration' as positive effects, 'eyestrain', and 'distractibility' were seen as negative side effects. The responses about positive effects outweighed the negative side effects. Also, the side effects were not mentioned in Elementary Schools, but were mentioned in Middle Schools (see Table 2).

Table 2.
Teacher Perceptions of 'Student Development' in Classes using Digital Textbooks

	Advantages			Total	Issues Requiring Improvement		
	Interest	Concentration	Self-directed		Distractibility	Eyestrain	Total
Elementary School	30	8	26	64	0	0	0
Middle School	21	4	19	44	7	4	11
Total	51	12	45	108	7	4	11

Note: A total of 119 teachers responded from 64 Elementary and 55 Middle Schools

Teachers Perceptions of ‘Digital Textbook Contents’

There were 84 affirmative responses about the variety and volume of Digital Textbook contents and 27 voices demanding more abundant and high quality contents. Some teachers showed positive cognition of the Digital Textbook contents, yet other teachers demanded higher quality and more contents (see Table 3).

Table 3.
Teacher Perceptions of ‘Digital Textbook Contents’

	Advantages				Issues Requiring Improvement			
	Multi Contents	Abundant Contents	Textbook Contents	Total	Shortage of Contents	Excessive Contents	Low Quality Contents	Total
Elementary School	31	15	2	48	15	5	5	25
Middle School	20	22	6	48	12	2	5	19
Total	51	37	8	96	27	7	10	44

Note: A total of 119 teachers responded from 64 Elementary and 55 Middle Schools

Teacher Perceptions of ‘Digital Textbook Functions’

There were double positive responses compared to negative responses of teachers regarding Digital Textbook functions (see Table 4). However, some negative opinions are not focused on keywords such as LMS (Learning Management System), functions of controlling student PCs, and the cloud platform. Also, teachers responded about advantages and issues for improvements such as search, exam, note, etc.. From these results, we can see the teacher satisfaction and demands for improvement of those functions.

Table 4.
Teacher Perceptions of Digital Textbook Functions

	Advantages						Issues Requiring Improvement								
	Wedurang (SNS)	Contents Restriction	Note	Exam	Search	Total	Wedurang (SNS)	App Connections	Search	Exam	Note	Access	LMS	Control Student PCs	Total
Elementary School	32	4	5	6	13	60	7	3	4	6	3	9	2	2	36
Middle School	27	2	8	6	11	54	9	3	2	4	5	2	4	5	34
Total	59	6	13	12	24	114	16	6	6	10	8	11	6	7	70

Note: A total of 119 teachers responded from 64 Elementary and 55 Middle Schools

Teacher Perceptions of ‘Instructional Change’

Pilot School teachers commented about diversification of in-class Digital Textbook usage (Flipped learning, Collaborative learning, personalized learning, etc.) and preparation (class design, lesson study, etc.). From these results, teachers could diversify classes based on purpose and student conditions via Digital Textbooks, but needed more time to for preparation. Also, many teachers advised classes to not depend too much on technology (ICT, Devices, Digital Textbooks, etc.) and made further time for lesson study. In addition, they referred to information regarding ethics education for students and school information infrastructure before using Digital Textbooks (see Table 5).

Table 5.
Teacher Perceptions of 'Instructional Change'

	Advantages				Issues Requiring Improvement									
	Flipped Learning	Collaborative learning	Diversity Activity	Etc.	Total	Class Model	Not Technology Centered	Lesson Study	Shortage of time in class	Information Education	ICT Infrastructure	People's Cognition	Etc.	Total
Elementary School	9	6	6	4	25	3	13	5	3	1	4	3	4	36
Middle School	1	10	4	0	15	0	1	11	2	5	14	0	0	33
Total	10	16	10	4	40	3	14	16	5	6	18	3	4	69

n = number of keywords

Note: A total of 119 teachers responded from 64 Elementary and 55 Middle Schools

Based on the results above, I have come to non-exhaustive conclusions to the questions aforementioned. In response to question number (1), the contrary opinions between teachers could serve as guidelines on advantages and issues for improvement. For example, certain keywords regarding Digital Textbook contents or functions were derived from advantages and issues for improvement (Table 3, & Table 4). Alternatively, due to the various aspects of Digital Textbooks and instruction with them, teachers established conflicting opinions. Furthermore, some of these negative opinions could be understood as a reflection of teacher interests and demands. In response to question number (2), teachers in this study have more positive opinions than negative ones about digital textbooks. Their responses about digital textbook contents involved 68.6% advantages and 31.4% issues for improvements. Their responses about digital textbook functions involved 61.4% advantages and 38.6% issues for improvements. Also, though there were responses about Digital Textbook side effects such as student distractibility and eyestrain, positive feedback regarding the implementation of student concentration, interest, and self-directed learning attitudes outweighed the negative responses.

Lastly, in response to question number 3, differing teacher opinions could highlight their enthusiasm for Digital Textbook functions and contents highlight how teachers innovate instruction using Digital Textbooks. Individual teacher opinions about Digital Textbooks and instruction using them, corroborate, in my opinion, Vygotsky's Activity Theory (Vygotsky 1978) wherein human activity is culturally and technically mediated by artifacts. As such, it is important to examine each opinion of media (Digital Textbook) and activity (using Digital Textbook in class), and not merely to consider the differences between their opinions. In particular, teacher perceptions of 'instructional change' is significant due to Digital Textbooks helping with changes in teaching and learning (Flipped Learning, Collaboration Learning, Diversity Activity, etc.) and class and study ideas (Class models that are not technology centered, Lesson studies, and Lack of class time), hence the importance of opinion examination. Thus, class models and guidelines should be provided, and further research and policies are required to establish the best possible environment for smooth and efficient learning with the use of digital textbooks.

As Sherin and Russ (2014, p3) stated, "teacher noticing is contextual and interdependent", teacher perceptions about their classes using Digital Textbooks could also be pointed same way. Teacher perceptions regarding Digital Textbooks is difficult to grasp and requires careful attention to use them as a basis for policy implementation. The experience of each teacher, the existing thought process, and the diversity of the functions and contents of Digital Textbooks are reflected in a complex way. We need to explore the context and background (why, what and how) of the teachers' perception especially about Digital Textbook and therefore researchers and policy makers reconsider the results of previous research about teacher perception (about effectiveness, usability, pros & cons, etc.) of Digital Textbook based on selective questionnaire survey.

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