Effects of Print-Storybooks and E-Storybooks with Reading Comprehension Strategies on Fifth Graders' Reading Comprehension Ability

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Abstract. The goal of the study was to develop the instruction module of the e-storybooks reading comprehension in the elementary school and test the effect of the instruction module of the e-storybooks reading comprehension. This study was to compare the influences of print-storybooks and the instruction module of the e-storybooks reading comprehension among the fifth graders' reading comprehension ability. The results of the study indicated that there was significant difference between the experimental group and the controlled group. The controlled group had better performances of reading comprehension than experimental group. To put it more specifically, students and teachers were busy learning how to operate the module and platform, and that resulted in greatly reduced learning effect. However, with the mastery of e-storybooks instruction module, experimental group class expressed higher motivation than controlled group class in learning activities. These data indicated that the study had the positive contribution.

Keywords: digital reading, e-storybooks, reading comprehension, reading strategies.

1 Introduction

Because the rapid improvement of technology in this e-age, the types of reading change a lot. Traditionally, people read printed books. Nowadays, people try e-books

and e-reading besides reading books. E-book reading seems to become a new trend in the future. Learners have become more actively involved in searching for information and reading on the web because internet learning had been transformed from one-way communication into interactive communication.

According to the report of PISA 2006, the Taiwan students' math mean score was the highest, science mean score was the fourth, but the mean score of reading was the sixteenth among the 57 countries that participated in the PISA. It showed that the Taiwan students were weak in reading literacy and lacked abilities of reflection and evaluation. The results made us reconsider our education and pay more attention to the reading instruction. Reading was the core of learning and should be emphasized[1][7].

However, it was a pity that e-book and Chinese reading machine were still in the initial stage in Taiwan, and the environment of digital reading was not matured enough. What students read on line is "shallow reading' which was short and can be read fast, such as e-newspapers[2]. Nevertheless, developing reading comprehension strategies of reading e-books in order to deepen students' meta-cognition is very important.

Therefore, the researchers hoped to base on the electronic storybooks and develop suitable e-storybooks integrating with reading comprehension strategies. And then, the researchers attempted to compare the efficiency of different groups with reading print-storybooks and e-storybooks . The purposes of this study were as follows:

1. To develop instruction modules of e-book reading comprehension in order to enhance the readers' reading strategies and reading comprehension ability.
2. To explore the changes of the fifth graders' reading comprehension in the instruction module of print-storybooks and the instruction module of the e-storybooks.

2 Literature Review

2.1 Digital Reading

Digital reading included reading digital materials on-line or off-line. Digital reading could not only help people read a lot of data but also transfer people's reading habits. The characteristics of digital reading included: (1) being able to present context with multimedia. (2) providing information quickly. (3) helping leaping reading. When doing traditional paper reading, readers often followed the authors editing formats. However, with the functions of hyperlink of digital reading, readers could choose any contents to read instead of reading from the start to the end. Reading could be done more flexibly. Readers could get the important point of the content in a short time. (4) being helpful to reading and writing, because it could offer opportunities of the interactions between writers and readers. (5) reading whenever and wherever, as long as the readers have computers.

In short, the media of paper reading or digital reading varied the reading context. Print-books had clear boarders and fixed contexts. However, the borders of the digital reading were blurred with multiple contexts. Although digital books were opener than print-books, readers could take the same reading strategies to enhance the reading comprehension.

2.2   E-Storybooks

E-storybook, which combined with picture books, fairy tales and multimedia, is one kind of e-books. There are four characteristics about e-book. Firstly, e-books could be downloaded so that it could help readers get instant and flexible information. Secondly, e-books could provide supportive information through the computer systems to overcome the problems of learners' shortage of background knowledge. Thirdly, the limits of space and time would not affect the feedback system of e-books. Fourthly, e-learning needed to combine related techniques with computer systems[2]. Leu did a study of e-books experimental teaching on the students. The results showed that the students in the experimental group could have more detailed descriptions than the students in the controlled group because of the vivid images of e-books[3].

2.3   Reading Comprehension in Digital Reading

On-line reading comprehension allowed readers to make use of internet and other communication skills to find out important questions, search for information, analyze useful data, and communicate [4].

Coiro and Dobler did a study on the expert readers of the sixth graders and limited them to find and evaluate information. The results showed that there were similarities between print reading and on-line reading but the on-line reading was more complicated[5]. However, there is no research being done in e-storybooks, which were important and useful to learning and teaching. Therefore, the focus of this study was to compare the influences of print-storybooks and e-storybooks with reading comprehension strategies on the fifth graders' reading comprehension ability.

Thus the researchers followed Elizabeth's viewpoints to integrate four reading strategies into the instruction module of the e-storybooks reading comprehension, which included "prediction", "inference", "query" and "summary". The main reading strategies of the instruction module illustrated in Table 1.

Table 1. Reading strategies of the instruction module

Reading strategies	Content
prediction	Readers could predict the content of e-books according to their titles, clues, outlines and pictures.
query	Readers could identify the main messages in e-books and ask related questions. In other words, readers could monitor the reading comprehension process by asking themselves questions.
inference	Readers could integrate their prior knowledge with textual clues to comprehend the core context.
summary	Readers could retell core elements in the stories with their own words.

As mentioned above, the instruction module of the e-storybooks reading comprehension needed digital interactive scripts to arrange presentation of media, interactive links and feedback. In order to constructive reading recycle made the reader through decoding, meaning comprehension, inferential comprehension and monitoring comprehension, the instruction module adapted the design of scaffolding. In the instruction module of the e-storybooks reading comprehension, reader could

read the multimedia e-storybooks with four reading strategies, every strategy was displayed in four steps: "test and feedback", "inform strategy", "practice to use" and "online discussion and clarification". Through the gradual reduction of the assistance, repetitive practice and immediate assessment, the readers gradually developed the capacity of self-learning and independence. The structure of the instruction module showed in Fig. 1.
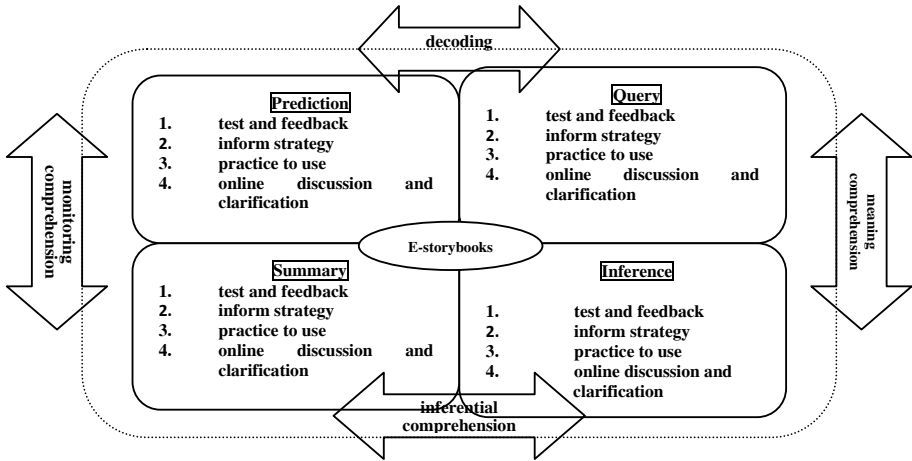

Fig. 1. The structure of the instruction module

3 Method

3.1 Subjects

Two classes of fifth graders were participated in a pretest and posttest quasi-experimental design. There were 31 students in the experimental group class, which had an average age of 11.5, with 17 girls and 14 boys. The other 32 students were in the controlled group class, which had an average age of 11.3, with 17 girls and 15 boys.

3.2 Process

Before the intervention started, the researchers analyzed different Chinese storybooks and discussed with some experienced elementary school teachers to make good choices. Then, the researchers created the e-storybooks instruction module and E-Book Reading Platform. The instruction module of the e-storybooks reading comprehension had the same contents as the print-storybooks, but they were presented in the interactive educational activities and extended learning field by E-Book Reading Platform. The experimental group class went through e-book reading with instruction module of the e-storybooks reading comprehension for 4weeks, 80minutes/week. The controlled group class went through Print-storybooks reading

Table 2. The design of the study

Group	N	pre-test	experimental intervention	post-test
The experimental group class	31	Y_1	X_1	Y_2
The controlled group class	32	Y_3	X_2	Y_4

Y_1, Y_3 : took pre-test of reading comprehension test.

Y_2, Y_4 : took post-test of reading comprehension test.

X_1 : E-storybooks reading with instruction module of the e-storybooks reading comprehension for 4 weeks, 80minutes/week.

X_2 : Print-storybooks reading with reading comprehension strategies for 4 weeks, 80minutes/week.

with reading comprehension strategies for 4 weeks, 80 minutes/week. All the students took pre-test and post-test of reading comprehension tests before and after the intervention. The design of the study is displayed in Table 2.

3.3   Design of E-Storybooks Reading Platform

The system set up the server environment in Xoops 2.2.4 and adopted APHP, HTML, Flash and other technologies to establish the learning platform. Teachers provided reading materials and issues in the database, so that students could download e-storybooks through internet.

Before using the platform, firstly, each participant should set up a password and a username. In e-storybooks reading sub-system, registers downloaded the instruction module of the e-storybooks reading comprehension and followed the interactive interface to participate reading activity. In discussion and feedback sub-system, teachers and students could enter the web-based forum of platform and exchanged opinions. Additionally, students followed the procedures to answer questions, then e-storybooks reading platform provided the pre-set feedback. In e-storybooks management sub-system, teachers managed e-storybooks and the learning process records. The functions of the e-storybooks reading platform were implemented in Fig. 2.

In Fig. 2, teachers expanded e-storybooks instruction module through e-storybooks management sub-system, and guided the discussion through discussion and feedback sub-system. Besides, students could read e-storybooks on-line or off-line. Teachers and students could enter the web-based forum of platform to clarification important issues. From the above, the interface of e-storybooks reading platform showed in Fig. 3.

In Fig. 3, teacher provided e-dictionaries, search engines and relevant websites on the web, students could search information to clarify the confusion and supply the lack of prior knowledge. Additionally, students could overview the relevant websites in order to reduce the distraction. As the result, the platform could make up for the lack of interactions between learners and teachers in e-storybooks learning environment.
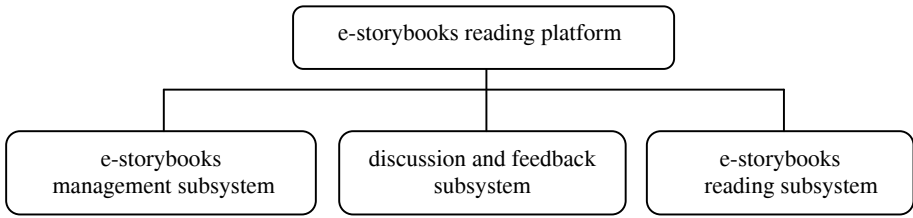
Fig. 2. The functions of e-storybooks reading platform

Fig. 3. The interface of e-storybooks reading platform

3.4 Instruction Module of the E-Storybooks Reading Comprehension

In this study, the instruction module focused on how to enhance reading comprehension ability through interactive e-storybooks. The interactive e-storybooks played a virtual teacher to guide reader and avoid students from losing in multimedia hyperlinks. The interactive e-storybooks were divided into four parts to foster reading comprehension strategies. Every strategy was displayed in four steps: "test and feedback", "inform strategy", "practice to use" and "online discussion and clarification". The design of the instruction module showed in Table 3.

3.5 Design of the E-Storybooks

According to the theory of reading comprehensive strategies, researchers applied ADDIE Model to develop the interactive e-storybooks. The interactive e-storybooks integrated the content of storybooks and educational activities. In order to use the characteristic functions of interactive multimedia, we developed the more interesting and vivid interface to attract attention from users and to promote their reading comprehension ability. The e-storybooks materials were made by Adobe Flash and Action Script2.0 syntax. The design of the interactive e-storybooks materials was showed in Fig. 3, which were divided into five aspects: the context, prediction activity, query activity, inference activity, and summary activity. The interactive type of reading activities included object dragging, interactive buttons, hyperlink pages, animation and painting. The e-storybooks reading followed the text structure to present activities and to provide questions that guided students to discuss the contents.

Table 3. The design of the instruction module

Strategy Sub-module	Instruction Sub-module	Content
Prediction	test and feedback	■ Testing the ability of prediction ■ Creating cognitive conflicts ■ Formatting learning hypotheses
	inform strategy: title page practice to use : picture clue	■ Recognizing the principles of prediction ■ Practicing how to predict through pictures and flashes
	online discussion and clarification	■ Presenting the thought of prediction ■ Admiring the classmates and asking questions
Query	test and feedback	■ Testing the ability of asking questions ■ Creating cognitive conflicts ■ Formatting learning hypotheses
	inform strategy : 6W	■ Recognizing the principles of asking questions
	practice to use	■ Practicing how to asking questions in e-book reading
	online discussion and clarification	■ Connecting to web-based forums ■ Designing the questions based on the context
Inference	test and feedback	■ Testing the ability of inference ■ Creating cognitive conflicts ■ Formatting learning hypotheses
	inform strategy : context clue/ prior knowledge	■ Recognizing the principles of inference
	practice to use	■ Combining life experiences with context clue trough multimedia flash games ■ Exploring the opinions of e-storybooks
	online discussion and clarification	■ Connecting to web-based forums ■ Presenting the viewpoints of e-storybooks
Summary	test and feedback	■ Understanding the plot through flash game
	inform strategy : story structure	■ Presenting systematical structures and tips
	practice to use	■ Readers used the flash paint to mark important sentence. ■ Reader could click on the answer and compare with the teacher's thought
	online discussion and clarification	■ Using cognitive map to organize the important sentences. ■ Connecting to web-based forums ■ Presenting summary

Students not only read e-book but also participated the flash games to check how much they had learned from the e-storybooks. At the same time, teachers enhanced the readers' comprehension and motivation through hyperlinks of context and interactive feedback.

3.6 Measurement and Data Analysis

Researchers used "Reading Comprehension Assessments" to understand the differences before and after the intervention. The assessment tested students' changes of reading comprehension ability. In order to set a national norm, the participants were 2462 elementary school students in different areas of Taiwan. The assessment consisted of twelve sub-tests which were designed for the second, third, fourth, fifth, and sixth graders. There were two similar texts for each grade. The coefficients of internal consistency were between .70 and .86. The coefficient of test-retest reliability was between .70 and .94. Comparing to other related assessments, the coefficient of criterion-related validity was between .21 and .78. In short, the reading comprehension assessments had good reliability and validity [6]. The collected data were analyzed by Descriptive statistics and an Independent Sample t-test, which was to compare the mean scores of the progress score differences (post-test score – pre-test score) between the experimental group class and the controlled group class.

4 Result

In order to compare the performances of reading comprehension between the experimental group and controlled group, the researchers collected the pre-test scores and post-test scores in Reading Comprehension Assessments to understand the differences, the result indicated in Table 4.

In Table 4, the post-test average of reading comprehension decreased, and the post-test average of experimental group was lower than the controlled group. Then we compared the progress score differences (post-test score – pre-test score) with an Independent Sample t-test, the result indicated in Table 5.

Table 4. Descriptive analysis of the performance of reading comprehension

Reading Comprehension Assessmer	Group	N	Mean	SD
pre-test	the experimental group	31	16.81	3.28
	the controlled group	32	16.25	4.66
post-test	the experimental group	31	16.35	3.50
	the controlled group	32	16.38	4.52

Table 5. Independent Sample t-test of the performance of reading comprehension

group	Mean	N	SD	df	t	p
the experimental group	-13.16	31	6.59	61	-10.90	.000
the controlled group	.13	32	1.64			

In table 5, there were significant differences between the experimental group and the controlled group in the progress score ($t = $-10.90, $p<.05$). In other words, the controlled group had better performances of reading comprehension than experimental group.

5   Conclusion

The study was designed to test the effect of the instruction module of the e-storybooks reading comprehension. Based on multimedia electronic-storybooks, the instruction module applied reading comprehension strategies into context, students not only read the multimedia context, but learned reading comprehension strategies. Additionally, the instruction module attempted to transfer personal reading type into cooperative reading type through the platform, on which students could search information and exchange viewpoints in web-based forums.

The result showed that there was significant difference between the experimental group and the controlled group in reading comprehension test. The controlled group had better performance than the experimental group. The result was out of our expectations. In order to realize the users' viewpoint of the instruction module of the e-storybooks reading comprehension, the researchers randomly selected four students from good academic performance group and lower academic performance group to interview. Jane, who had the good academic performance and always completed the learning mission in the study, said: *I did not know why to be so complex. Without these strategies, I could comprehended the meaning.*

The same dilemma was displayed by the teacher. Elaine, who was the teacher in experimental group and controlled group reflected: *I was rush to get familiar with the e-book module, l was worried about that my students did not know how to use e-book to learn, so I ignored to lead children to pay attention to the reading comprehension.*

However, Tom had expressed different opinions, who had the lower academic performance and always spent more time on learning mission of e-storybooks instruction module, said: *I not only clicked buttons of the e-storybooks to acknowledge meanings of words, but read with reading comprehension strategies back and forth. Before adapting e-storybooks instruction module, it was strange for me to read with comprehension strategies. How magic these experiences were!*

In short, the e-storybooks instruction module could response to the need of learner. To sum up, the new way of reading and teaching made students and teachers feel confused. The students and teachers were busy learning how to operate the module and platform, and that resulted in greatly reduced learning effect. However, with the mastery of e-storybooks instruction module, experimental group class expressed higher motivation than controlled group class in learning activity. According to the record of classroom video in the sixth class, the controlled group felt impatient at writing summary , they usually complained during the learning activities. On the contrast, the experimental group class enjoyed in writing summary, exchanging information and clarifying the puzzle through web-based forums. These indicated that the e-storybooks instruction module was helpful to promoting engagement.

As for the limitations of this study, firstly, in this study, the experimental group class went through the instruction module of the e-storybooks reading comprehension only for 4weeks, 80minutes/week. The experimental time was too short to verify the effect of the instruction module of the e-storybooks reading comprehension. Secondly, the teachers and students spent a lot of time to get familiar with the application of the instruction modules, and ignored the reading comprehension ability. Therefore, researchers who were interested in this topic could further design the sub-module to explain the instruction module of the e-book reading comprehension or

they could extend experimental time to test effect of the instruction module of the e-storybooks reading comprehension in future studies.

Acknowledgement

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