An Investigation of the Impacts of Narrative Structure Based Reading Comprehension Teaching System on the Reading Comprehension Ability of Elementary Students

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ABSTRACT

Many previous studies have indicated that reading comprehension strategies have great benefits to students' understanding towards different reading contents. Teachers, however, in general do not have sufficient time to master various reading strategies so as to instruct their students. Therefore, the work of this study is twofold, First, A design of narrative structure-based reading comprehension teaching system is proposed. Narrative structural texts are adopted as reading materials. The reading teaching system helps users to analyze structural elements of an article including, setting, initiating event, internal response, attempt, and consequence. Then, multiple choice questions are used to examine the learning results as well as to offer immediate feedbacks to students. Second, Empirical data about the system usage is collected to test the effectiveness of the design.

50 participants adopted from the fifth and sixth graders in elementary school are divided evenly into control and experimental groups. The study shows that the reading abilities of the experimental group are significantly better than the control group after eight weeks teaching system experiment. In other words, the teaching system has significant effects on the promotions of higher graders' reading comprehension abilities. Therefore, the system can be adopt to enhance the fifth and sixth graders' reading comprehension, and to assist teachers in instructing reading comprehension to individual students.

keyword：narrative structure analysis、reading comprehension、reading teaching strategies

1.Introduction

Reading plays an important role in school curriculum and it influences the learning of various school subjects, including sociology, science, linguistic, math, and art. Accordingly, sufficient reading experiences and the abilities of applying different reading strategies to solve complex comprehensive questions are the main issues that students need to overcome.

In recent years, teachers have made great efforts in promoting students' reading proficiencies. As a result, schools equip more appliances which help the practice of reading activities. On the other hand, more teachers as well as students are willing to devote their time to reading. However, in a "Self-learning Ability" survey of junior high school teachers and students conducted by "Education Parenting Family Lifestyle" magazine, more than sixty percent of the teachers consider that students may not possess the reading comprehension ability as well as the proficiency of writing summary on what they have read. It even indicates that more than ten percent of teachers are convinced that their students do not fully comprehend their reading materials. Consequently, the instruction of reading comprehension is an essential issue in promoting reading proficiency [12].

Pressley [16] deliberates that most of the fifth and sixth graders are able to decode the reading articles in the textbooks, but many of them do not understand the passage

completely. Chang[2] has the similar finding drawn from her own teaching experiences. She claims that the sixth graders are not capable of pointing out the main idea of the reading passage, although they have acquired many lexemes and even know every word in it. Accordingly, the instructions of efficient reading comprehensive strategies as well as the development of metacognition abilities are important in improving reading comprehension.

In terms of the teaching of reading comprehension strategies, many scholars find the strategy of structural analysis has a great benefit to the understanding of reading content [7、21、22]. Teachers, however, need considerable training time in order to be familiar with the applications of a reading strategy. Besides, the reading material preparation is not only time consuming but laborious for teachers. Also, it is not easy to carry out individualized reading instruction within current school curriculum. Therefore, a designed instantaneous feedback reading comprehension teaching system can help students to acquire the structural analysis strategy which improves students' reading comprehension as well as reduces teachers' burdens in teaching reading.

2.Literature Review

2.1 Narrative structure

There are four main literary forms in writing: narration, description, argumentation, and exposition[3]. Narration is the most popular writing style in the fifth and sixth grader's Chinese language curriculum. Narrative writing has been defined as the sequence of incidents or events of which a story is composed. This genre is fundamental and widely used in composition[19]. Story writing is one kind of narrative writings and the structure of narrative writing usually refers to story grammar.

Stein and Glenn [20] indicate that story grammar consists of two elements, setting and episode. Character and plot are related to the setting of a story, while episode refers to six other messages including initiating event, internal response, internal plan, attempt, consequence, and reaction.

Setting: introduction of characters, place and time.

Episode:

(a)Initiating event: the incident motives protagonist to take actions.

(b)Internal response: the goal, thought and emotion of protagonist.

(c)Internal plan: the action that protagonist is going to take.

(d)Attempt: the real action that protagonist takes to gain his or her target.

(e)Consequence: protagonist's success or failure.

(f)Reaction: protagonist's feeling towards the consequence.

The reading materials used in the study are all narrative writings because narration is the literary form that sixth and fifth graders encounter often in both inside and outside classroom readings. According to Stein and Glenn's story grammar theory, the study further generalizes five story grammar structural elements, setting, initiating event, internal response, attempt, and consequence. These structural elements are adopted as theoretical foundations of the article structure analysis in the reading comprehension teaching system (RCTS).

2.2. Theories of reading comprehension

2.2.1. Definitions of reading comprehension

Reading is a rather complicated mental process. It can be defined as narrow as the recognition of words or as board as a reader's comprehension of the written symbols[9]. Alexander and Heathungton [1] believe that reading is a meaningful process which aims to comprehend the meaning of the writing passage. Goodman [5] deliberates that reading is a guessing game of psychological language. When readers

use the hints written in the article, they will have better understandings toward the world and then enable readers to comprehend the content of the articles. Hence, reading is an ability to transfer visual message into meaning acquisition.

2.2.2. The process of reading comprehension

Reading comprehension is an important component in the process of reading cognition. The process involves with two main steps, decoding and comprehension. Gagné [4] further divides the process of reading comprehension into four stages:

Decoding: It refers to the recognition of words and it is considered as the foundation of reading. The amount of decoding influences the efficiency of reading comprehension directly.

Literal comprehension: It is the process of the understanding of a sentence. During the stage of decoding, reader confirms a word from or a pronunciation and those further stimulate the understanding of the meaning of a sentence. In other words, the acquisition of word meaning enables reader to comprehend the meaning of a sentence.

Inferential comprehension: It provides an inmost analysis to the concept of the article and can be divided into integration, summarization, and elaboration the three courses.

Comprehension monitoring: During the process of reading, in order to aim the target effectively, readers adopt comprehension monitoring to check their understanding of the article. It involves goal setting, strategy selection, goal checking, and remediation.

2.2.3. The strategies of reading comprehension

The applications of reading strategies influence reading comprehension directly. Owing to the different processes involved in reading, readers need to adopt proper strategies to cope with diverse processes as well as assignment activities[18]. Scholars have proposed several reading comprehension strategies.

First of all, according to the information processing theory, Pressley and Gillies [15] elicit the strategies used in different stages. They are presented as the following:

Decoding stage: to consult a dictionary; to guess the word meaning from context.

Literal comprehension stage: to underline; to question and answer; to analyze the article structure.

Inferential comprehension stage: to apply old experience and knowledge; to make new connection and inference.

Comprehension monitoring stage: to evaluate the accuracy rate of one's comprehension and to make self-adjustment.

Heilman, Blair, and Rupley [6] also demonstrate diverse strategies adopted in three different stages:

Before reading: to review the background knowledge related to the article; to make the connection between new and old experiences; to refer personal experience to new material; to read the article outline and be able to develop the overall concept; to predict the article content.

In reading: to make use of guideline learning; to question and answer in every passage; to discover the author's pattern.

After reading: to apply the questions attached to the article to check comprehension; to use gained-information to predict later development; to summarize main points.

Story structural analysis is the major strategy adopted in the study and reading comprehension test is used to investigate student's reading comprehension process, including decoding, literal comprehension, and inferential comprehension. Students need to be familiar with the story structure before reading, to skim the content while reading, and to circle each story structural element at the same time. Additionally, they are required to take after-reading comprehension test to check their understandings concern with the article.

2.3.Related studies

2.3.1.Related researches in article structure analysis in Taiwan

The subjects of the previous studies related to the strategies of structural analysis and story mapping are distributed in second, third, fifth, and sixth graders in element school and a few cases from junior high resource class. The results of previous researches reveal several facts. First, the strategy of story structural analysis can enhance reading comprehension as well as writing proficiency. Second, the instruction of story mapping has a great benefit to reading comprehension. Also, it tremendously enhances the reading performance of junior-high readers who have reading disabilities. The results of related studies are presented in the following table.

Table 1 Related Studies in Applying Structural Analysis in Taiwan

Researcher and year	subject	content	result
Tsai, M. J. (1995)	Third & fifth graders	Adopt structural analysis in teaching both narrative and expository reading and writing	Structural analysis teaching enhances students' reading comprehension and writing abilities
Hsu, W. J. (2001)	Sixth graders	Adopt story mapping in teaching writing	Story mapping has significant effect on sixth graders' writings
Yeh, S. M. (2002)	Second graders	Adopt story mapping in teaching reading	Story mapping teaching promotes students' reading comprehension abilities
Lin, P. J. (2003)	3 students in junior high resource class	Adopt narrative structure strategy in teaching Chinese lesson	Narrative structure strategy has instant improvement on students with reading disability

2.3.2.Related studies on computer-aided reading comprehension

Rosegrant [17] adopts a word processing software with vocal effects to help students who have reading disability. The researcher conducts a six-month reading instruction experiment and finds that the software has a great effect on student's learning. As a result, there are more related researches gradually conducted.

MacArthor and Haynes [13] design the SALT for ninth and tenth graders who have reading disability or low reading proficiency. The system consists of some hypermedia materials, including online voice instruction, indication of important point, and outline summary. The study suggests that the teaching system is superior to those traditional textbooks in presenting reading material. Learners with reading disabilities are able to gain higher scores in reading comprehension tests with the help of the system. Additionally, Montali and Lewandowski [14] conduct an experiment to investigate reading comprehension of learners with normal and learners with lower reading proficiency. Researchers use visual and auditory double perception materials as teaching and research modes. Their study reveals that visual and auditory double perception materials are beneficial for low achievement learners to absorb the information.

In terms of the related studies in Taiwan, Huang [8] designs an integrated system which adopts various reading strategies to help the fifth and sixth graders in reading comprehension. The strategies include self-question, mistake catching, inference, summary, and prior knowledge integration. Huang discovers that the application of reading comprehension strategies can not only help pupils with higher reading proficiency to practice intense reading, but also encourage lower proficiency students to do independent reading. Moreover, Lin [10] designs a reading comprehension teaching system that combines with data base, internet platform and reading strategies, such as predict, summary, article structure, inference, and self-question. In the study, Lin finally concludes that computer-assisted data collection process enables high-proficiency readers to do intense reading. On the other hand, it also

encourages readers with lower reading proficiency to read independently and to increase their reading interests at the same time.

3.Methodology

3.1. System framework

The study designs a reading comprehension teaching system (RCTS) whose construction is displayed in Figure 1. The system consists of two individual operating interfaces for both teacher and student. The interface for students involve with user's basic personal information compilation, system operating instruction (both in word and video), narrative structure analysis strategy, learning process, and reading comprehension test. As for the teacher users, they can use the system to compile personal information, start test, modify the evaluation system, edit the reading materials, and observe students' statuses.

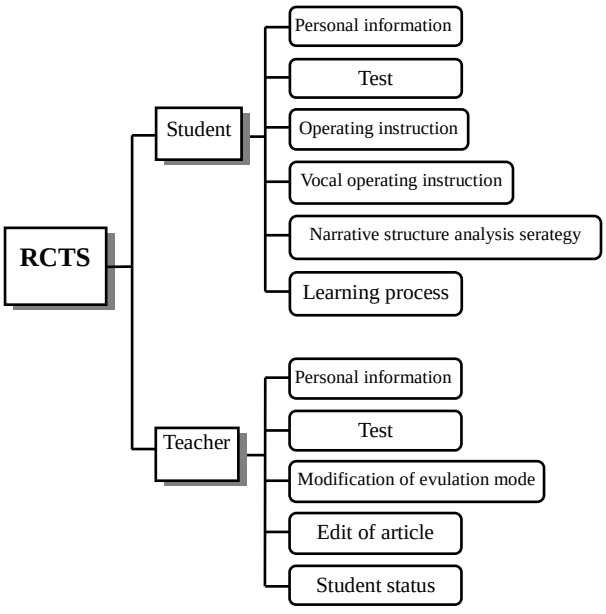

Figure 1 System framework

3.2. The procedures of the teaching system

The RCTS is on the basis of narrative structural analysis and is supported with multiple choice questions to check user's reading comprehension. In response to the need of individualized instruction, the system will record each user's learning process and then give evaluation. The test score will be used to determine whether the user succeeds in the reading unit or has to do it all over again. The flowchart of the systematic instruction is illustrated in Figure 2.

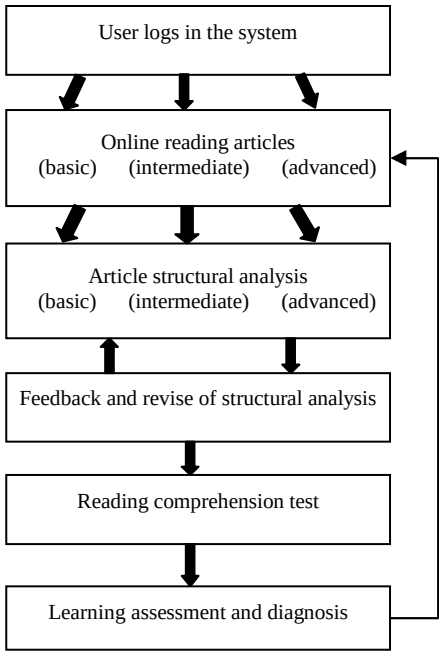

Figure 2 Flowchart of RCTS

3.2.1. Users log in the system

According to identities and log in purposes, users could be identified as students or teacher (administrator). As shown on Figure 3, the system provides student users several different functions, including individual learning process, grade, earned experience point, the strategy of narrative structural analysis, video system operating instruction, and test. While teacher user can inspect students learning records, add and revise reading materials, change evaluation modes, manage and maintain the system, and set up user permissions.

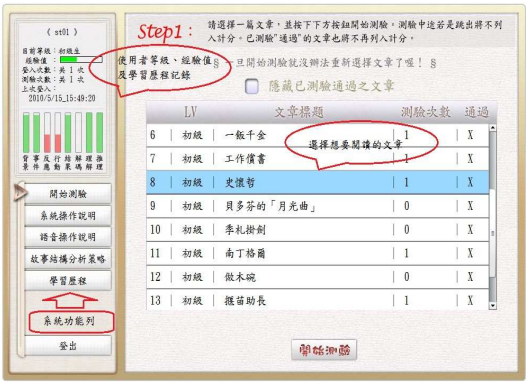

Figure 3 the webpage after user logs in the system

3.2.2. Article reading

Through browser, students are able to read the articles classified into three levels, basic, intermediate, and advanced. Each level contains fifteen articles which in total of forty-five. Users depend on their reading abilities to choose articles randomly from one of the three levels, start reading, and finally apply structural analysis.

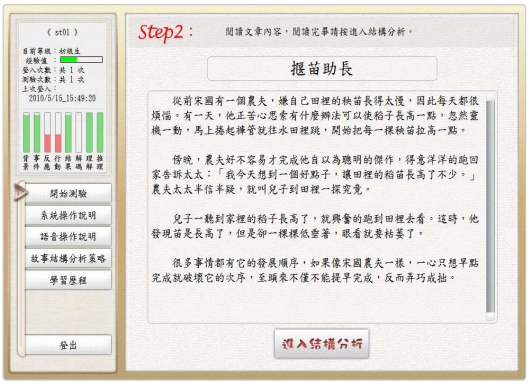

Figure 4 The webpage of article reading

3.2.3. Article structural analysis

As illustrated in Figure 5, the operation of structural analysis is presented in double-screen rendering. The reading article is shown on the left screen, while the right screen is used to analyze five structural elements of the passage. Users are asked to select five exact sentences which stand for the five structural elements. For each article, each user has three opportunities to do the article structural analysis before he or she gets all the answers right. In the beginning level, the system underlines six possible sentences in the reading article and users only need to eliminate one incorrect element. And finally, match the rest five sentences to the correct structural elements. In the intermediate level, eight possible sentences in the article are underlined, while the advanced users are not provided with any implication. The advanced users have to identify five correct structural elements by themselves.

3.2.4. Feedback and revise of article structural analysis

Users send out the selected structural elements and then the system start to process the evaluation. The results will be demonstrated immediately to users. If there is any mistake, users need to correct it and redo the article structural analysis again. Otherwise, they may move on to the next stage. However, each user only has three chances to make the correction. After that, users have to enter next stage.

Figure 5 the operation and feedback of article structural analysis

3.2.5. Reading comprehension test

Once users have finished article structural analysis, they need to answer multiple choice questions which concern on the content of the reading passage. In order to understand users' comprehension toward the reading articles, those questions have to relate to the processes of decoding, literal comprehension, and inferential comprehension as well as to be able to reflect to article structural elements.

Figure 6 Reading comprehension test

3.2.6. Learning assessment and diagnosis

At the final stage, the system evaluates users' operations and then provides scores as well as suggestions according to the accuracy of structural analysis and multiple choice questions. If the teaching system proves users have succeeded throughout the reading process, they will gain one experience point. On the contrary, users will be asked to do the process all over again if the system indicates users' failure.

Figure 7 Assessment of learning result

In conclusion, users have to go through six steps once they log in RCTS. Additionally, they need to achieve a certain evaluation standard in order to gain experience points and move on to the next level. In this way, the system acts as a monitor to the individual learning progress. In accordance with individual learning progress and teacher's target requirement, users need to finish three different-leveled curriculums within the allotted time.

The reading materials in the system are classified into three different stages, including basic, intermediate, and advanced level. The beginners gain one extra point as they succeed one reading comprehension test. They can be promoted to the intermediate level as soon as they earn ten points and ten more points will be qualified for the advanced level. The curriculums of the system will be completed after users have finished all thirty articles.

3.3 Data Analysis

3.3.1 Participants

The study adopts quasi-experimental method and fifty participants are higher graders in an elementary school in Pingtung County. They were divided into control and experimental groups on the basis of their reading scores obtained from the pre-test of reading comprehension check. Each group consisted of both high and low score students with twenty-five subjects. During the experiment, the experimental group participated in the instruction of RCTS while the control group maintained traditional reading teaching methods.

3.3.2. Data Analysis

Fifty students were required to take post-test after an eight-week teaching procedure. In order to determine if the instruction of RCTS has a significant influence on the reading proficiency of higher graders in elementary school, the study further conducted a statistic analysis. The scores of post-test were taken as dependent variables and the group classifications as independent variables.

First, the scores of pre-test were gathered as covariance and analyzed by one-way analysis of covariance (ANCOVA) to test the homogeneity of regression coefficient of students of two groups, and to find out whether there are any significant differences in students' reading abilities before receiving any reading comprehension teaching. Table 2 displays the results of tests

for homogeneity of regression coefficient and there is no significant difference between students of two groups. Hence, it is confirmed with the basic assumption of homogeneity of regression. Then, in order to investigate whether there is a significant difference in the post-test performance of the two groups, the post-test scores are gathered and analyzed by ANCOVA again.

Table 2 Summary of one-way analysis of covariance on the pre-tests of control and experimental groups

Source	SS	df	MS	F	p
Between Groups (regression coefficient)	12.11	1	12.11	2.86	.10
Within Groups (Error)	195.14	46	4.24		

As can be seen in table 3, the post-test scores of these two groups have significant difference (F＝5.26，p＝.03) after excluding the disturbance of pre-test scores. The result indicates that the performance of the experimental group is better than the control group. The reading comprehension abilities of students of the experimental group are superior to those of the control group after obtaining eight-week instruction of RCTS. In addition, the post-test of the experimental group (M=9.60) is significantly higher than the post-test of the control group (M=8.28) which means the instruction of RCTS has effect on promoting higher graders' reading comprehension proficiencies in elementary school.

Table 3 Summary of one-way analysis of covariance on the post-tests of control and experimental groups

Source	SS	df	MS	F	p
Between Groups (regression coefficient)	21.34	1	21.34	5.26*	.03
Within Groups (Error)	190.67	47	4.06		

*P<.05

4.Conclusion

As the study mentioned before, student's reading comprehension proficiency has great impact on the learning of various subjects. It, however, takes great efforts for teachers to be familiar with different reading strategies as well as to prepare various reading materials. Additionally, it is difficult to practice individual reading instruction under current regular teaching curriculum and environment. The purpose of this study is to design a reading comprehension teaching system and to investigate the effects of the system on student's reading proficiency.

As the result shows, there is a significant difference (F＝5.26，p＝.03) between the performance of the post-tests of the control and experimental groups. It is suggested that the performance of the experimental group is better than that of control group. Therefore, the study concludes that RCTS is helpful for promoting higher grader's reading proficiency in elementary school level. The system can be used as a teaching means in regard to reading comprehension as well as article structural analysis.

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