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Effects of Cooperative Learning Combined with Critical Thinking on Chinese Reading Ability of Fourth-grade Students in Zhengzhou Chuangyi Primary School

Zhang Kai[1], Angkana Karanyathikul[2] and Sombat Kotchasit[3]
[1]Master student, Curriculum and Instruction Program, Valaya Alongkorn Rajabhat University under the Royal Patronage, Pathum Thani Province, Thailand
[2,3] Lecturer, Curriculum and Instruction Program, Valaya Alongkorn Rajabhat University under the Royal Patronage, Pathum Thani Province, Thailand
E-mail: zhang.kai@vru.ac.th, ORCID ID: https://orcid.org/0009-0005-6484-2850
E-mail: angkana@vru.ac.th, ORCID ID: https://orcid.org/0009-0008-6288-6923
E-mail: Sombat@vru.ac.th, ORCID ID: https://orcid.org/0000-0002-8057-7656

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Abstract

Background and Aims: In recent years, China's Ministry of Education has introduced a series of education reform policies, emphasizing the importance of cultivating students' reading skills. For example, "Primary School Chinese New Curriculum Standard" clearly points out that primary school Chinese education should pay attention to students 'active learning and cooperative inquiry, and improve students' reading ability. The objective of this study is: 1) To compare the Chinese reading ability before and after receiving cooperative learning combined with critical thinking, 2) To compare the Chinese reading ability after using cooperative learning combined with critical thinking with the criterion of 70 percent, and 3) To assess students' satisfaction learning through cooperative learning combined with the critical thinking.

Methodology: This study utilized a pre-experimental design featuring a one-group pretest-posttest model. The sample was 30 grade 4 students from Zhengzhou Chuangyi School, Henan Province, China. They derived from cluster random sampling. The research tools are: (1) the six lessons of the Chinese Course with a mean of congruence of 4.62; (2) the Chinese reading ability evaluation form, reliability index is .735; (3) the student satisfaction questionnaire, reliability index is.717, The statistics used to analyze the data are mean, standard deviation, t-test for sample-dependent, and t-test for one sample. Conduct a pretest and post-test on the sample using the Chinese reading ability form test, and analyze the mean, standard deviation, paired sample t-test, and one-sample t-test of the data using statistical software.

Result: After using cooperative learning combined with critical thinking, 1) Students' Chinese reading ability is higher than before learning, with a statistically significant difference of .01; 2) the Chinese reading ability test result is above 70%, and the difference is statistically significant at .01; and 3) Students have a higher satisfaction rate after learning through cooperative learning combined with critical thinking (M = 4.02, SD = 0.77).

Conclusion: This study shows that students' Chinese reading ability can be significantly improved through cooperative learning combined with critical thinking. The various stages of cooperative learning combined with critical thinking, including Problem setting and guidance, Group cooperation construction, Critical thinking training, Information sharing and integration, Reflection, and Summary, all play a positive role in promoting the improvement of students' reading ability. Moreover, students had high satisfaction with this teaching model, which further verified the effectiveness and feasibility of this teaching method.

Keywords: Cooperative Learning; Critical Thinking Learning; Chinese Reading Ability; Chinese Course

Introduction

In recent years, China's Ministry of Education has issued a series of education reform policies, emphasizing the importance of fostering pupils' critical thinking and reading skills. For example, the New Curriculum Standards for Primary School Chinese point out that primary school Chinese education should pay attention to students 'active learning and cooperative inquiry, and improve students' critical thinking and reading ability. In addition, relevant literature also shows that cooperative learning has a positive impact on cultivating critical thinking and reading ability. Numerous studies have shown that cooperative learning has significant advantages in cultivating critical thinking among primary school students. The practice has proved that cooperative learning can promote communication and cooperation among students, and improve their problem-solving and critical-thinking abilities. Cooperative learning is helpful

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to improve students' Chinese reading ability through group discussion and shared reading. Teachers play a guiding and promoting role in cooperative learning, and stimulate students' critical thinking and reading interest by designing appropriate activities. Cooperative learning can improve the participation of primary school students, make them more actively participate in classroom discussion and learning, and thus improve their critical thinking ability and reading ability (Li, 2022).

At present, in the primary school Chinese reading teaching in Zhengzhou, China, teachers are faced with the following problems in improving their reading ability: 1) Under the influence of traditional exam-oriented education, some teachers still pay too much attention to the transfer of knowledge, while ignoring the subject status of students. This teaching method can easily lead to a lack of independent thinking and critical thinking skills. 2) Students' reading ability and language expression ability have not been fully cultivated and improved. The problems that fourth-grade students face in improving their reading ability are as follows: 1) Lack of critical thinking, difficulty in questioning, and lack of information integration ability; 2) There are problems such as uneven participation, communication barriers, and unclear task allocation in cooperative learning. To improve these conditions, it is necessary to strengthen critical thinking training, optimize the cooperative learning mode, and provide personalized guidance to comprehensively improve students' reading ability and comprehensive literacy (Chen, 2021).

The cooperative learning method in primary school Chinese reading teaching is a teaching strategy that aims to solve problems and share knowledge and experience through interaction, discussion, and cooperation among students, to improve learning efficiency. The key for teachers to use cooperative learning methods to improve students' reading ability lies in reasonable grouping, selecting materials, designing tasks, strengthening guidance, and paying attention to evaluation and feedback, to promote interaction and cooperation among students, thus deepening reading comprehension, broadening reading horizons, and stimulating students' interest and enthusiasm in reading (Zhang & Wang, 2019).

Critical thinking in primary school Chinese reading teaching is a way of thinking that creatively analyzes, evaluates, and solves problems. It requires students to examine information from multiple perspectives, question assumptions, infer implied meaning, evaluate the authenticity and rationality of ideas, and form independent opinions. The key for teachers to use critical thinking teaching methods to improve students' reading ability is to create a positive reading atmosphere, teach critical thinking skills such as questioning, questioning, analysis, and evaluation, promote students' application of these skills through practical activities such as group discussion and debate, and provide timely feedback and diversified assessment to comprehensively improve students' reading ability and critical thinking literacy (Ma, 2020).

In summary, Chinese primary school teachers in Zhengzhou, China, began to pay attention to and practice new teaching methods, such as cooperative learning and critical thinking teaching, and carried out targeted interventions in primary school Chinese reading teaching. The researchers conducted a study on "The influence of cooperative learning combined with critical thinking on the Chinese reading ability of fourth-grade students" in a primary school in Zhengzhou, China. This study can provide methods and teaching steps for implementing the strategy of cooperative learning combined with critical thinking. By using cooperative learning combined with the critical thinking teaching method, educators can encourage students to actively participate in teaching activities, stimulate students' learning interests, and improve students' reading ability.

Research questions

1) How is the Chinese reading ability of the fourth-grade students in Zhengzhou Chuangyi Primary School before and after receiving cooperative learning combined with critical thinking?

2) How is the Chinese reading ability of the fourth-grade students in Zhengzhou Chuangyi Primary School after using cooperative learning combined with critical thinking, with the criterion of 70 percent?

Research objectives

1) To compare the Chinese reading ability before and after receiving cooperative learning combined with critical thinking.

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2) To compare the Chinese reading ability after using cooperative learning combined with critical thinking with the criterion of 70 percent.

3) To assess student satisfaction after receiving cooperative learning combined with critical thinking.

Literature Review

In recent years, with the continuous deepening of the new curriculum reform, primary school Chinese reading teaching has gradually become a hot topic in the field of education. Many scholars, such as Zhang (2022), pointed out that although the importance of reading is self-evident, in current teaching practice, some teachers are still constrained by traditional teaching strategies and neglect the cultivation of students' subjectivity, resulting in limited effectiveness of reading teaching. Zhang (2022) further analyzed the problem of the rigid teaching model, emphasizing that the traditional teaching model makes it difficult to stimulate students' enthusiasm and initiative in reading, and the classroom is not lively enough. Guo (2022) explored the phenomenon of "shallow reading" in his research and called for deepening students' reading experience and thinking level through deep learning strategies to better connect to cultivate core literacy. Tan (2021) reiterated the cornerstone role of reading in the all-around development of primary school students, believing that it is not only related to the improvement of language ability but also the key to broadening horizons, enriching emotions, and promoting intellectual growth. To sum up, primary school Chinese reading teaching is facing a situation where challenges and opportunities coexist. It is urgently needed for teachers to be bold in innovation, be student-centered, explore more flexible and diverse teaching models, lead reading teaching to a new level, and make reading a valuable asset that students can benefit from throughout their lives.

In addition, the New Curriculum Standards for Primary School Chinese clearly state that primary school Chinese education should focus on students' active learning and cooperative exploration to improve their reading ability. Related literature also shows that cooperative learning and critical thinking have a positive impact on the cultivation of reading ability.

Research discussed in detail the role of cooperative learning in improving the Chinese reading ability of fourth-grade students in his study of Cooperative Learning in Chinese Reading Teaching in Primary Schools. Through comparative experiments, he found that the students who used cooperative learning methods showed significant improvements in both reading comprehension and critical thinking. This study provides strong support for the application of cooperative learning in teaching Chinese reading (Yao, 2018).

In their research on the Empirical Study on the Effect of Cooperative Learning on critical thinking for Primary School Students 'Chinese Reading Ability, through comparative experiments and data analysis, the students' Chinese reading ability has been significantly improved. They stressed that cooperative learning, through group discussion, role play, and critical analysis of text content, structure deep meaning, and summary of the learning style, provides students with more opportunities to think and communicate, thus promoting the significant improvement of Chinese reading ability (Zhang & Wang, 2019).

This study used convenience sampling to select 68 public administration students studying administrative law in the second semester of the 2017 academic year. Researchers using a collaborative learning program then collect academic performance tests and student satisfaction questionnaires. The statistics used in the study are frequency, percentage, mean, standard deviation, and T-test. Studies have shown that academic performance is .05 higher than before the study. Students had the highest satisfaction with the use of cooperative learning (Hanpichai, 2020).

This study is an experimental study using the pre- and post-equivalent group design and aims to use the cooperative learning way of the eighth-grade student's mathematics learning quality comparison, from the learning results and students in the process of learning and implementation activities can compare the difference, using mathematics learning test and student activity table to collect data. The experiment was conducted in five sessions by giving sample categories for pretesting, different treatments, and post-testing. The results show that the number of students after cooperative study is higher than before (Mustafa

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& Ruslan, 2021).

The above analysis shows that Chinese and Western scholars of cooperative learning and critical thinking have carried out extensive research and exploration, and found that both can not only significantly improve students' Chinese reading ability, but also can effectively exercise their critical thinking, enhance learning satisfaction, and broaden their reading horizons and deepen reading comprehension. These studies have laid a solid foundation for the research, development, and application of the combined teaching of both.

Research Conceptual Framework

The conceptual framework of this thesis was composed of three variables: one independent variable is cooperative learning combined with critical thinking, and the other two dependent variables are the Chinese reading ability and Students' satisfaction.

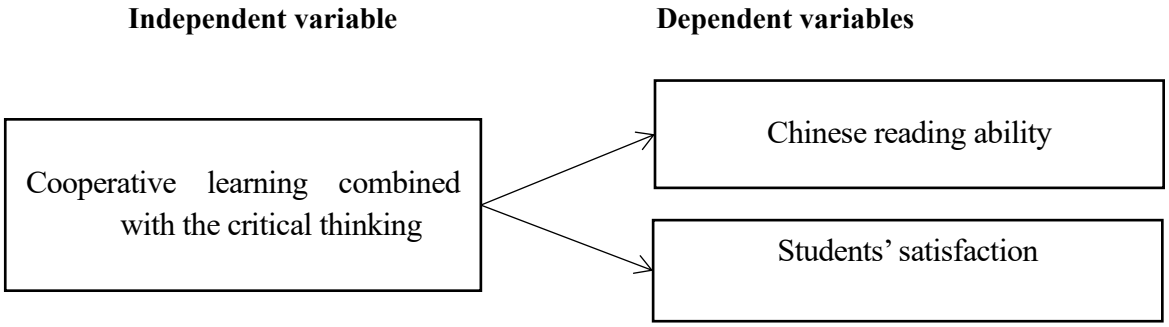

Figure 1 Research Conceptual Framework

Methodology

1. Population and sample

1.1 The population of the study is 60 students in the fourth grade of Zhengzhou Chuangyi Primary School in Henan Province were divided into 2 classes in the study year 2023.

1.2 The sample of this study is 30 students (1 class), which was derived from the cluster random sampling method.

2. Research instruments

Research instruments were the tools for collecting data. The research instruments that were used in this study were:

2.1 Instruments for Measuring Students' Chinese Reading Ability

Evaluate cooperative learning combined with critical thinking. The researcher created the evaluation form for lesson plans.

2.1.1 An expert group composed of five experts evaluates the evaluation form. The experts were required to hold the title of professor or associate professor and have at least 5 years of research experience in the relevant field. The five experts include three from China and two from Thailand in a field related to education. After collecting data, analyze the collected data to determine the appropriateness and consistency of the lesson plans. If the average score of appropriateness and consistency assessed by a group of experts is higher than 3.51, it means that the components of the lesson plans have good appropriateness quality and internal consistency. After obtaining the expert evaluation results, the developed teaching model was revised and improved according to the expert's suggestions.

2.1.2 It was found that the mean score of appropriateness was at 4.62 and the standard deviation was at 0.53, which means the lesson plans had the quality at a very high level. Therefore, applying the lesson plans of learning management using cooperative learning combined with critical thinking to the teaching of foreign students in Zhengzhou Chuangyi Primary School of foreign students can improve students' Chinese reading ability.

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2.2 Instruments for collecting data

An instrument for measuring: Chinese reading ability evaluation form for students and a Questionnaire for students' satisfaction.

2.2.1 Chinese reading ability evaluation form for students

Students are required to read a text in the prescribed time and then submit it to the teacher for evaluation according to the evaluation form. Teachers are required to mark each student's performance against detailed criteria. The teacher uses a Student's Chinese reading ability evaluation form to evaluate the student's ability. Before the experiment, a pretest is conducted, and after the experiment, a post-test is conducted on the students with this evaluation form. The results of the two tests are compared and evaluated to test the effectiveness of the experiment. To evaluate the Chinese reading ability of primary school students, the author adopts the form of a Likert scoring scale to evaluate 15 items from five aspects: (1) Basic reading ability (2) Reading comprehension ability (3) Literary appreciation ability (4) Critical thinking ability (5) Reading strategies and skills. There are 5 options, such as very excellent 5 points, excellent 4 points, pass 3 points, fail 2 points, and completely fail 1 point. The index of Item Objective Congruence (IOC) value of the Evaluation criteria in the test paper was 0.80 at the lowest and 1.00 at the highest. The result of analyzing the IOC value showed that all test items were appropriate and could be used in the test. The Chinese reading ability evaluation form's reliability is 0.735 and more than 0.7 (Richardson & Kuder, 1939).

2.2.2 Questionnaire for students' satisfaction (5-point Likert scale)

The questionnaire is provided to 5 experts for a content validity check and suggestions. The quality of the questionnaire is considered according to the Index of Item Objective Congruence (IOC) obtained from the achievement test evaluation form. The IOC of each item of the satisfaction questionnaire was between 0.80-1.00. The result of analyzing the IOC index showed that 15 items in the satisfaction questionnaire were appropriate and could be used in the satisfaction evaluation of Gamification combined with mobile learning. The Cronbach's Alpha coefficient of the reliability of the student satisfaction questionnaire is 0.717, which is greater than 0.70 (Cronbach, 1951). This showed that the internal consistency of the student satisfaction questionnaire met the requirements.

3. Data collection

The procedures of data collection were as follows:

3.1 The samples were given the pretest by measuring Chinese reading ability with a constructed instrument.

3.2 The samples were taught by using cooperative learning combined with critical thinking management.

3.3 The samples were given the post-test by measuring Chinese reading ability on cooperative learning combined with critical thinking with the constructed instrument.

3.4 After finishing the instruction, the samples received the post-test by using the same instrument that was used in the pretest.

3.5 The sample was given the students' satisfaction questionnaire.

4. Data analysis

In this study, data were analyzed using the statistical program according to the research objectives

4.1 Compare Chinese reading ability before and after receiving cooperative learning combined with critical thinking by using a t-test for the dependent sample.

4.2 Compare Chinese reading ability with the determined criteria set at 70 percent by using a t-test for one sample.

4.3 Assess the student's satisfaction with cooperative learning combined with critical thinking by using the arithmetic mean and standard deviation.

Results

The results were presented according to the research objectives as follows:

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1. The result of comparing the mean score of Chinese reading ability before and after learning through using cooperative learning combined with the critical thinking method.

The table below shows descriptive statistics and t-tests as analyzed by the statistical package program. This table aimed to answer the research objective about whether learning management using cooperative learning combined with critical thinking was able to enhance Chinese reading ability.

Table 1 Paired sample test about Chinese Reading Ability

Group	*n*	Pretest scores		Post-test scores		*t*	*p*
		M	*SD*	*M*	*SD*		
Experimental group	30	51.73	4.72	70.30	3.41	45.74**	.001

**$p < .01$

As presented in Table 1, the mean score of the pretest of students' Chinese reading ability was 51.73 (SD=4.72), and the post-test of students' Chinese reading ability was 70.30 (SD=3.41). The result of this table showed that after learning management using cooperative learning combined with critical thinking in the classroom, post-test scores of students' Chinese reading ability were greater than pretest scores at .05 level of statistical significance (t_{29}= 45.74, p=.001<.01). The average scores of the study developed increasingly higher than pretest.

2. The result of comparing the mean score of compare Chinese reading ability of students before and after learning management using cooperative learning combined with critical thinking, with the determined criterion set at 70 percent of full scores.

The table below shows descriptive statistics as analyzed by the statistical package program. This table aimed to answer the research objective about whether cooperative learning combined with critical thinking was able to improve students' Chinese reading ability.

Table 2 The result of comparing the mean score of Chinese reading ability of students before and after learning management using cooperative learning combined with critical thinking, with the determined criterion set at 70 percent of full scores.

Group	*n*	Full score	Criteria score	*M*	*SD*	*t*	*p*
Experimental group	30	75	52.5	70.30	3.41	28.63**	.001

**$p < .01$

As presented in Table 2, the mean scores of students' Chinese reading ability after learning through cooperative learning combined with critical thinking were 70.30 and the standard deviation was 3.41which was statistically higher than the criterion of 70% at a .01 level of statistical significance (t_{29}=28.63, p=.001< .05). According to the research results, we can draw the following conclusions:

The average score and standard deviation of the students who adopted learning management using cooperative learning combined with critical thinking were 70.30 points (out of 75 points), which was higher than the standard of 70% at the level of statistical significance of .01. It can be seen that the Chinese reading ability score of the students who accept learning management using cooperative learning combined with the critical thinking are higher than 70%.

3. To assess the students' satisfaction with the cooperative learning combined with critical thinking

The result of comparing the mean score of satisfaction after learning management using cooperative learning combined with critical thinking. The table below shows descriptive statistics and t-tests as analyzed by the statistical package program. This table aimed to answer the research objective about whether learning management using cooperative learning combined with critical thinking was able to enhance satisfaction.

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Table 3 Data analysis result of the Students' satisfaction questionnaire

NO.	ITEM	*M*	*SD*	Level of appropriateness
	Instructional Objectives			
1.	Are students satisfied with the effect of this course in improving students' basic reading abilities (such as word recognition and sentence comprehension)?	3.97	0.89	High
2.	Are students satisfied with the effect of this course in enhancing students reading comprehension ability (such as the theme of the article and the author's intention)?	3.93	0.74	High
3.	Are students satisfied with the effect of this course in cultivating their literary appreciation ability (such as the analysis of literary works and emotional resonance)?	4.07	0.69	High
4.	Are students satisfied with the effect of this course in strengthening students' critical thinking ability (e. g. questions, perspective analysis)?	3.77	0.73	High
5.	Are students satisfied with the effectiveness of this course in teaching reading strategies and skills (e. g. prediction, inference, summary)?	3.93	0.78	High
Total for Instructional Objectives		3.93	0.77	High
	Instructional Strategies			
6.	Are students satisfied with the design of the problem setting and guidance link in the course?	4.13	0.78	High
7.	Are students satisfied with the way and content of team-building activities?	4.07	0.78	High
8.	Are students satisfied with the critical thinking training session in the course?	3.90	0.80	High
9.	Are students satisfied with the organization and implementation of information sharing and integration?	4.10	0.76	High
Total for Instructional Strategies		4.05	0.78	High
	Media and Learning Resources			

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NO.	ITEM	*M*	*SD*	Level of appropriateness
10.	Are students satisfied with the content and presentation method of the teaching PPT?	3.97	0.67	High
11.	Are students satisfied with the choice and use of textbooks and reference books?	4.07	0.74	High
12.	Are students satisfied with the provision and use of online resources (such as online articles, videos, etc.)?	4.07	0.78	High
Total for Media and Learning Resources		4.04	0.73	High
	Measurement and Evaluation			
13.	Are students satisfied with the assessment method of the course?	4.23	0.77	High
14.	Are students satisfied with the learning performance evaluation criteria of the course?	4.00	0.83	High
15.	Are students satisfied with the feedback and advice provided in the course?	4.03	0.85	High
Total for Measurement and Evaluation		4.09	0.82	High
Overall Total		4.03	0.78	High

Based on the results, we can state the following: As shown in Table 3, in the 15 items of the satisfaction questionnaire, the lowest mean score was 3.77(SD = 0.73), and the highest mean score was 4.23(SD = 0.77). The result of this Table showed that the students' satisfaction was High level (M =4.02, SD = 0.77).

Discussion

1. Students' reading ability and academic performance significantly improved after learning through cooperative learning combined with critical thinking. The fourth-grade students in the experiment used "cooperative learning combined with critical thinking" in the "Chinese Course" to take the pretest of academic achievements. The average pretest score of students' academic achievements was 51.73 (SD= 4.72), and the average post-test score of students' academic achievements was 70.30 (SD =3.41). The Statistical significance level is .01 (t_{29} =45.74, p=.001).In this study, the fourth-grade students of Zhengzhou Primary School adopt five teaching steps of cooperative learning combined with critical thinking, teachers guide students to jointly solve complex problems and build knowledge through in-depth communication and sharing of resources, and emphasize the critical analysis of the content, structure and deep meaning of the text in cooperative learning. (Mustafa & Ruslan, 2021) Conducted an experimental study using a pretest and post-equivalent group design, aiming to compare the quality of mathematics learning of eighth-grade students using cooperative learning methods, and to compare the differences in

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learning outcomes and students' learning and implementation activities, using mathematics learning tests and student activity sheets to collect data. The experiment was conducted in five stages, providing sample categories for pretest, different treatments, and post-test. The results showed that students' scores after cooperative learning were higher than before. This teaching strategy not only encourages positive interaction, effective communication, and close cooperation between students, to deepens reading comprehension, broadens reading horizons, and effectively improves Chinese reading ability.

The five teaching steps of this study proved to be very effective and practical:

Step 1: Problem setting and guidance: The teacher first sets a controversial or in-depth issue to ensure that the question can stimulate students' curiosity and desire to explore. Guide students to think about many aspects of the question through questioning or discussion, and encourage them to put forward their views and questions.

Step 2: Group cooperation construction: Students are divided into small groups, each discussing set topics. Members of the group need to be actively speaking, sharing their opinions, and listening to and respecting the views of others. During this process, teachers should inspect the teams and provide necessary guidance and support to ensure that the discussions can be conducted in depth.

Step 3: Critical thinking training: Teachers teach the basic skills of critical thinking, such as logical reasoning, evidence analysis, etc. Students use these techniques in group discussions to conduct an in-depth analysis of the topics and identify the rationality and limitations of different views. Encourage students to give retort opinions and deepen their understanding of the topic through debate and discussion.

Step 4: Information sharing and integration: Each group will organize the discussion results and prepare to share them throughout the class. During the sharing process, other groups can ask questions or put forward different opinions for further communication and discussion. The teacher guides the whole class to summarize and evaluate the sharing of each group to form a more comprehensive understanding.

Step 5: Reflection and Summary: After the discussion, students need to reflect and summarize their gains and shortcomings in the discussion process. The teacher summarizes the whole teaching process and emphasizes the importance and application value of critical thinking. Arrange relevant homework or extend reading to encourage students to continue to explore relevant issues.

2. After the cooperative learning combined with the critical thinking method was adopted for students' Chinese reading ability, the scores of fourth-grade students' Chinese and reading ability were both higher than the 70% standard, with statistical significance of .01 (M=70.30, SD=3.41, t29=28.63, p=.001). The experiment has statistical significance and feasibility. This research on cooperative learning combined with critical thinking in Chinese reading ability used the Chinese reading ability evaluation form from five aspects. Basic reading ability, 2) Reading comprehension ability, 3) Literary appreciation ability, 4) Critical thinking ability, and 5) Reading strategies and skills. From 15 items focus on the training and assessment of students. Significantly improves students' learning initiative, improves students' participation in the teaching process, stimulates students' thirst for knowledge, and activates their thinking. In Zhang & Wang's (2019) research on the Empirical Study on the Effect of cooperative learning combined with critical thinking on Primary School Students' Chinese Reading Ability, through comparative experiments and data analysis, the students' Chinese reading ability has been significantly improved. They stressed that cooperative learning, through group discussion, role play, and critical analysis of text content, structure deep meaning, and summary of the learning style, provides students with more opportunities to think and communicate, thus promoting the significant improvement of Chinese reading ability.

3. Course satisfaction survey is a kind of questionnaire survey, supplemented by online evaluation, and understand students' satisfaction with the course content and teaching methods. Through the survey, educational institutions can better grasp the needs and expectations of students, improve the teaching methods and content, and improve the learning effect and satisfaction of students. Cooperative learning combined with the critical thinking method can motivate the students' satisfaction; the lowest mean score was 3.77(SD=0.73), and the highest mean score was 4.23(SD =0.77). The result of this Table showed that

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the students' satisfaction was High level (M =4.03, SD =0.78). The reasons may be related to the following aspects: 1) Students have a high degree of satisfaction with the teaching form. In the classroom, students are guided to communicate deeply, share resources, solve complex problems, build knowledge together in teamwork, and emphasize critical analysis of text content, structure, and deep meaning in cooperative learning. In teaching evaluation, teachers no longer blindly evaluate students' performance in exams, but praise students' active interactive learning behavior in class, encourage more students to participate in class and express their questions and opinions, evaluate students' learning effect according to students' Chinese reading ability evaluation form, and make appropriate evaluation of each student's performance. In the following teaching analysis, students are taught more appropriately. 2) Students have high satisfaction with the course content. The teaching content of the Chinese reading course is practical. It is a course designed to help learners improve their Chinese reading ability, which is conducive to students' various kinds of life and learning in daily life. 3) Students have high satisfaction with the course results. After the Chinese reading course is carried out through cooperative learning on the critical thinking method, the students' scores after the test are significantly higher than those before the test. Therefore, students are satisfied with a high degree of satisfaction, and the statistics used in the study are frequency, percentage, mean, standard deviation, and T-test. Studies have shown that academic performance is higher than before the study. Students had the highest satisfaction with the use of cooperative learning (Hanpichai, 2020).

In summary, this study first improved students' satisfaction with the teaching process of cooperative learning combined with critical thinking through five compact and related teaching steps, Then through asking questions, critical thinking training, and group cooperation and sharing, making the class more interesting, letting the students no longer feel bored in the study, but feel relaxed and happy, gradually teaching students to adapt to the new methods, also improves their Chinese reading ability and independent learning abilities. It improves students 'thinking ability and communication abilities, improves students' participation, effectively improves students' Chinese reading performance, and greatly improves students' satisfaction with the teaching method.

Conclusion

Through comparative analysis of the students using cooperative learning combined with the critical thinking pretest and post-test, after the intervention of cooperative learning combined with the critical thinking, the conclusions were as follows:

1) The mean scores of the pretest of students' Chinese reading ability were 51.73 (SD= 4.72), and the post-test of students' Chinese reading ability was 70.30 (SD =3.41). Chinese reading ability evaluation form test scores of the students who received cooperative learning combined with critical thinking have higher scores than before at a statistically significant level of .01 (t_{29} =45.74, p=.001).

2) Students who used cooperative learning combined with critical thinking have higher scores than the determined criterion of 70%. (M= 70.30, SD =3.41)

3) The results of students' satisfaction after learning through cooperative learning combined with critical thinking. The overall results of cooperative learning combined with critical thinking by students are at a high level (M=4.03, SD= 0.78). Thus, it was concluded that students' satisfaction of the students after receiving cooperative learning combined with critical thinking was high.

Therefore, cooperative learning combined with critical thinking is feasible in the teaching of Chinese composition courses in the fourth grade, which is helpful to improve students' learning effect and achievement. The experimental results verify the research hypothesis. This study uses mathematical analysis software to assess the satisfaction of adaptive learning systems in teaching. The results showed that students had higher satisfaction with cooperative learning combined with critical thinking. The teaching process of using cooperative learning combined with critical thinking can meet students' personalized learning needs, stimulate students' learning interests, improve their learning efficiency, improve students' enthusiasm for learning, and help improve students' reading ability performance.

Citation
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Recommendation

Recommendation for implication

Following the results, we have some suggestions:

1) Enrich cooperative learning mode: In addition to the existing critical thinking training, more diversified cooperative learning activities, such as role-playing and debate competition, can be introduced to stimulate students to think about the text from multiple perspectives and enhance their interest and participation in reading.

2) Strengthening the application of critical thinking tools: Teach students to use visual tools such as mind maps and concept maps to organize and express their reading opinions, help them systematically analyze text content, and improve their critical thinking ability.

3) Stratified teaching strategies: Considering the differences in students' reading ability, stratified teaching strategies are implemented to design critical reading tasks and cooperative learning activities suitable for different levels of students, to ensure that every student can make progress on the original foundation.

4) Home-school cooperation: encourage parents to participate in their children's reading and learning, and jointly create a family atmosphere of critical reading. Parents can accompany their children to read, guide them to ask questions, discuss ideas, and form a good mechanism for home-school co-education.

5) Continuous tracking and feedback: Establish a tracking mechanism for the development of students 'reading ability, regularly collect and analyze the change data of students' reading performance, cooperative performance, and critical thinking ability, and provide feedback for teachers to timely adjust teaching strategies.

Recommendation for further research

Given the future research direction of critical thinking cooperative learning in improving the Chinese reading ability of fourth-grade students, the following suggestions are put forward:

1) Cross-school and cross-regional research: This study is conducted only on students in a primary school in Zhengzhou, Henan Province. The future study should be extended to different schools, different regions, and even different cultural backgrounds to verify the universality and effectiveness of the critical thinking cooperative learning model.

2) Long-term effect tracking: This study may only focus on the learning effectiveness of students in the short term, and future research should extend the research cycle to track the changes in students' long-term reading ability and critical thinking ability after receiving cooperative learning of critical thinking.

3) Dimension analysis of refined ability: In further research, the specific dimensions of the improvement of students' reading ability can be refined and analyzed, such as reading comprehension depth, information screening ability, reasoning, and judgment ability, etc., to more accurately evaluate the effect of critical thinking cooperative learning mode.

4)Technology-assisted critical thinking cultivation: With the development of information technology, we can explore how to use educational software, online platforms, and other technical means to assist the cooperative learning of critical thinking, such as the development of specialized critical thinking training software or platform, to provide students with a more personalized and interactive learning experience.

5) Teacher professional training: Cooperative learning of critical thinking requires teachers to have high professional quality and teaching skills. Future research should focus on how to effectively train teachers and enhance their competence in critical thinking teaching to ensure the effective implementation of cooperative learning models

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