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A Quasi-Experimental Study on Situated Learning and Project-Based Learning in Fifth-Grade Chinese: Effects on Reading Comprehension and Analytical Thinking

Xingxing Xiang [a] 1, Tinnakorn Attapaiboon [b], Nirat Jantharajit [c]

[a,b,c] *Nakhon Phanom University, Faculty of Education, Thailand*

Abstract

In the context of global educational reform emphasizing the cultivation of students' reading comprehension and analytical thinking abilities, this study addresses the research gap regarding the combined effect of situated learning and project-based learning on these skills, especially in the Chinese curriculum for fifth graders. Existing studies mainly focus on single instructional methods, and the combined impact remains unclear. This study employed a quasi-experimental design with 79 fifth-grade students randomly divided into an experimental group (receiving combined situated and project-based learning) and a control group (receiving traditional teaching). Among the research instruments were found to be the reading comprehension test paper and the analytical thinking assessment scale, and both reliability and validity were appropriately verified. Primary findings point out that (1) the experimental group achieved significantly higher test scores than their initial scores as well as higher average scores compared to the control group in the post-test. Due to the incorporation of the combined instructional approach, it can thus be concluded that the strategy worked successfully. The manuscript's major distinguishing point is to be novel in its investigation of the integrated teaching method conducted at the Chinese teaching context and its design as well as empirical evidence of the good effect it brings, whereas the limitations do exist and the further research should be foreseen.

Keywords: Analytical Thinking; Instructional Approach; Project-Based Learning; Reading Comprehension; Situated Learning

1. INTRODUCTION

With the establishment of education, the objectives shift toward faculties of reading comprehension and analytical abilities as the main goals of worldwide improvement (Quinn et al., 2020; Klimova & Zamborova, 2020; Kwangmuang et al., 2021). While the skills are not only the secret for students' academic success but also the basic abilities for students to deal with complicated society and address different issues. In this respect, actually studying how to enhance students' comprehension and analytic thinking skills

1 Corresponding author: Xingxing Xiang ORCID ID.: https://orcid.org/0009-0005-7825-0653
E-mail address: yusiliang910630@163.com

through appropriate teaching methodologies will yield important theoretical and practical outcomes.

Current educational research developers have located situated learning and project-based approach at the center of the innovative teaching methodologies. Situated learning, on the one hand, helps learners get a more solid linking between facts and skills by integrating hands-on learning process into real or simulated situations (Ledger & Fischetti, 2020; Landon-Hays et al., 2020); on the other hand, project-based learning emphasizes that learners may actively generate knowledge systems and higher-order thinking abilities through task-based learning (Žerovnik & Nančovska Šerbec, 2021; Song et al., 2024). However, although these two methods have relatively high educational potential in theory, their specific impacts on students' reading comprehension and analytical thinking in practical applications are still unclear. In addition, existing studies mostly focus on the effects of a single teaching method and lack discussions on the combined effects of multiple teaching methods. These issues constitute the important background and research gaps of the current research.

This research aims to explore the impacts of the teaching method combining situated learning and project-based learning on the reading comprehension and analytical thinking abilities of fifth-grade primary school students. The hypotheses of this research are as follows: (1) Students participating in situated learning and project-based learning will have a significant improvement in reading comprehension and analytical thinking abilities compared to before the intervention; (2) Students adopting the teaching methods of situated learning and project-based learning will perform better in the post-tests of reading comprehension and analytical thinking abilities than those adopting traditional teaching methods. To test the above hypotheses, a quasi-experimental study was carried into action, and the design of it can be clarified in the following text. The subjects were 79 fifth-grade students from a Shandong Province's primary school. The students were randomly organized into an experimental and a control group. Students of the experimental group adopted the teaching method involving the appropriate incorporation of situated learning and project-oriented learning, whilst the control group continued to use the traditional method of teaching. The research evaluated the performance variations through pre-tests and post-tests of the two student groups in reading comprehension and the analytical thinking skills. Reliably, the data collected and ensured the research's validity by means of control measures, such as unified teaching content, teachers' training sessions, standardized testing tools, and intervals.

The results of the research demonstrate that the method using situated learning and project-based learning for teaching purposes has shown noteworthy success in enhancing both the educational results in reading comprehension and the abilities of students belonging to the experimental group. Students in the experimental group outperformed those in the control group at the final examination and the effect size was bigger. Presented results provide evidence that supports the hypotheses of the research undertaken and give a practical rationale for practicing in the field of education. Though such research has offered impressive pointers to advanced training technologies, there still exist certain constraints. For instance, the study was conducted only through 5th-grade students of the primary school, and the sample size was comparatively smaller, which might minimize the generality of the results. Also, the research results did not analyze separately the impacts

of situated learning and project-based learning, which might set the direction of further investigation.

2. LITERATURE REVIEW

2.1 Situated Learning

Situated learning thus enables students to quite easily finalize the experience and integration of new knowledge and skills by putting this in a real or practical context (Ledger & Fischetti, 2020; Landon-Hays et al., 2020; Salvane & Orongan, 2024). Integrating situated learning has considerably improved the students' skills not only in reading comprehension but even in the area of analytical thinking. Through research, it has been observed that involvement in real or simulated contextualized situation learning activities creates more participation of the students and understanding of the knowledge as well. One of the examples is Anaktototy & Lesnussa (2022), which focused on how to apply the technique of the Directed Reading Thinking Activity (DRTA). The DRTA directs the learning process into the life of the students through the interaction of texts in real life. Eventually, students should always be predicting, cross-checking, and thinking about what they have just read. The term "situated cognitions" in the context of its central idea, which is deeply congruent with situated learning, aims at the promotion of high degree comprehension and hence application of the attained achivements to real world experiences. From the research results, students were found to have better reading comprehension when they used predicting and confirming about the reading content. This approach surely steers students to actively and meaningfully do the text analysis.

Besides, Kwangmuang et al. (2021) did a research involving designing and developing learning innovations as strategies capable of enhancing the higher-order thinking skills of junior high school students in Thailand. In any kind of teaching, it is necessary for educators to set out problem cases that can be directly related to the student's day-to-day life to facilitate learning, and the findings of the research on this area indicate that there was a higher analytical thinking skill mean score among those learners that experienced the learning innovations than those who did not. On the one hand, situated learning could successfully reinfuse students' understanding of reading comprehension and analytical thinking by means of real and interactive learning settings and task designs that are offered by expert methodologies and techniques.

2.2 Project-Based Learning

Project-based learning is where students are keen on creating and manipulating knowledge systems independently and try to enhance their higher-order thinking competencies by project completion (Song et al., 2024). PBL primarily aims to advance the learning process through involvement in projects that require both theory-based knowledge and interdisciplinary fields. In this way of teaching your students, they can learn to think critically, show problem-solving skills, and work as a team by using the real-world issues in their education. More recently, the researchers Imbaquingo and Cárdenas explored the significance of

Project-based Learning (PBL) on the English reading proficiency of ninth-grade students at a school located in Quito. Following their project-based learning lessons, the 20 participating students exhibited more motivation and manifested improvement in their scores on the reading tests. In the opinion of Imbaquingo and Cárdenas, PBL creates space where students engage with the subject issues in a positive and novel way that is ultimately beneficial for the development of their reading and comprehension skills (Imbaquingo & Cárdenas, 2023). In the second study, which used a quasi-experimental design with a non-equivalent study group, it was investigated whether there was any significant variation in reading comprehension scores between students who employ project-based learning and those who do not. As far as the data are concerned, the study found its hypotheses confirmed that there was a statistically significant improvement in reading comprehension scores with project-based learning (Maros et al., 2023).

Likewise, in another research by Li (2016), further effects of PBL on students' cognitive achievements were put into research. For the purpose of this study, these tests were adopted: analytical ability (thinking flexibility, language reasoning, reading comprehension, BI reasoning, mechanical reasoning). Analyzing the data from the students' test results, we discovered that project-based learning enhanced students' analytical thinking. Moreover, although a study on French reading indicated that the impact of project work on comprehension ability was modest, students' motivation and analytical abilities improved empirically, revealing that PBL promotes students' analytical and summoning capacities (Michalsky, 2021). Therefore, PBL does not only improve students' reading comprehension but passenger academic knowledge to superior level of critical thinking.

2.3 Reading Comprehension

Reading comprehension is one of the most crucial processes of readers whereby they understand, take in, and possibly sum up information when they read written materials (Adedokun & Adedokun, 2024). The essence of reading comprehension is bundled together with various cognitive functions: the possession of prior knowledge, the capacity to understand vocabulary, the ability to reason, and the skills to suppress errors while reading the texts. The main part of research suggests that background knowledge and vocabulary are the primary factors used to help the improvement of reading comprehension (Elleman & Oslund, 2019). Reading effectively means more than reading the words and understanding what they mean; it also means that you should be able to relate the information to what you already know, and then teach yourself something more about the topic. Finally, the reading comprehension of EFL students should be enhanced through the process of reading in an active way, as the language attribute only becomes a supporting feature if the reading comprehension is achieved. In the process of comprehending a text, predicting the content and inferring implications are just some of the skills

that could be developed (Soto et al., 2019). Besides improving their comprehension abilities, these skills also contribute to the strengthening of their critical thinking, hence socio-linguistic progress.

As well, linguistic expression construction has a high correlation with reading comprehension, particularly in the high school level. Reinforcement of reading comprehension will thus be a medium for enhanced communication, development of critical thinking, and overall experience of the students' learning competency (Pertiwi et al., 2024). Thus, reading comprehension does not just act as a fundamental ground of the academic achievement, but it is also a major unlocking key to successful communication and thinking formation. The philosophy of pedagogy discerns that the notion of reading comprehension does not comprise mere perceiving symbols but extends its grasp on the level of an information processing system. Research proves that reading strategy usage by a reader will largely define their ability to read and understand an assigned reading task (Reiber-Kuijpers et al., 2021). Since this is the case, reading comprehension connotes much more than just an exercise in understanding information. It is a complex cognitive practice, involving numerous traits, such as background knowledge, language skills, critical thinking, and meta-cognitive regulation. All the important elements together form a complicated comprehension mechanism.

2.4 Analytical Thinking

Analytical thinking is characterized by problem-solving capability, evaluating information, and thinking from various perspectives, including reasoning (Parks, 2021). Studies substantiate the idea that the analytical aspect of thinking extends beyond mere logic but also encompasses the complex processes of cognition, for example, the collection and interpretation of data, the evaluation of results, and the formulation of conclusions (Rahman, 2019). A document has pointed out that by forming PBL, POGIL, and group investigation as teaching models, students can be developed effectively in analytical thinking skills. To illustrate, the most successful analytical thinking cultivation in high school students happens through the "excretory system" biology class case, where the teacher employs the POGIL model, and as a result, the students' analytical prowess is hugely improved according to the research of Rosadi et al. (2018). Apart from these, intelligent learning models such as ICA, where gathering data, analysis, and evaluation are included, are capable of enhancing the mental skills of students; however, these are mostly demonstrated at the primary level (Jamil et al., 2021).

On the other hand, research indicates that teachers usually encounter difficulties while scoring students' analytical thinking. Some teachers engage in trial-and-error practices and getting feedback from their peers, while others have no effective tools and methods to accurately know students' analytical thinking

(Wong & Lim, 2019). Consequently, designing efficient evaluation tools has been a notable priority for improving the students' analytical thinking too. Case studies have established the need for a comprehensive assessment tool, which can measure chemical literacy and analytical thinking, that has been usable, and as a result, improved performance in chemical education (Ad'hiya & Lakson, 2018). In conclusion, the development of analytical thinking skill consists of a wide variety of cognitive skills, which are helpful for the solving of complex problems. Teaching models and assessment tools that are effective can be regarded as the vital tools for improving the students' analytical thinking skills..

3. RESEARCH METHODOLOGY

3.1 Research Design

This research used a quasi-experimental design with control groups for pretest and posttest and a 0.05 alpha level, which was the significance level chosen. Pretest was conducted for both the experimental and control groups with the objective of assessing the reading comprehension and analytical skills of the students, which will be the basis for the next stage of the study. Over 20 teaching days, the students in the experimental group taught in the blended mode that consisted of situated learning and project-based learning models. Conversely, the control group was taught using the traditional model. The testing was after the teaching or training, which consists of the test or exam among the two groups of students as a means of school performance assessment to determine the effectiveness of the approach mandatory.

3.2 Definition of Concept

3.2.1 Reading Comprehension Abilities

As expressed by Pardede (2019), reading comprehension means understanding a text, including the ability to internalize and process written materials. This is research about reading comprehension abilities among students studying Chinese language classes; it refers to understanding and absorbing written materials and textbooks. This entails the ability to understand the main idea (the understanding of theme and the central idea of the passage), the understanding of details (capturing gist, understanding and getting detailed information on the subject), the inferential ability (logical inferences and deductions derived from the content of the text), the vocabulary understanding (inferring meaning of some words in relation to the context), and the expression ability, that is, the ability to generalize, summarize and conclude according to the content of the paragraph.

3.2.2 Analytical Thinking Abilities

Spaska et al. (2021) characterize analytical skills such as resolving issues, appraising information, and reasoning and thinking from various points of view as analytical thinking skills. For this purpose, Rahman (2019) explains that analytical thinking encompasses a variety of cognitive functions, including the processes of data collection and reading of data, the assessment of results, and conclusion formulation. In this study on analytical thinking skills, we only talk about analytical skills of students while dealing with Chinese materials, including but not limited to those relating to problem understanding and identification, information collection and organization, reasoning and logical thinking, solving problems and making decisions, and reflection and evaluation.

3.2.3 Situated and Projected-Based Learning Approach

This means that students then can better develop these skills by contextualizing their knowledge through real-life practice (Landon-Hays et al., 2020). On the other hand, project-based learning means that students are working on tasks that require them to build their own knowledge systems and to develop a higher-order thinking skill by bringing their thoughts into contact with the reality, which is done through project-based learning (Song et al., 2024). Likewise, this investigation is based on two kinds of learning (in project-based and context) and its main aim is to create a new educational model using the interface of these two styles of learning. The second part of this project uses elements from situated and project-based learning theory in particular to make a link between the students and their environment through authentic or real-world contexts. Through project-based learning (PBL), students start with contextual setup, project task design, group collaboration, and role assignment and go through knowledge construction by the teacher's guidance, and ultimately present results and reflect.

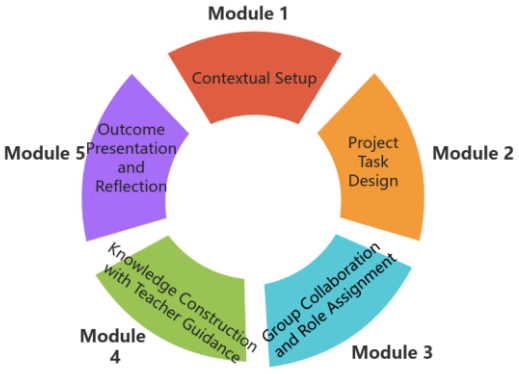

Figure 1 Shows instructional approach for situated and project-based learning

3.2.4 Traditional Approach

The traditional teaching method is a teacher-centered teaching model whose main purpose is to transmit knowledge. Under this model, teachers dominate the teaching process, students passively receive knowledge, classroom interaction is limited, and students' participation and initiative are restricted (Dole et al., 2016). In the traditional teaching method adopted in this research, teachers conduct teaching based on the problems presented in the mathematics textbooks. The process of this teaching method includes problem introduction, explanation, students' practice and teachers' summary and feedback.

3.3 Research Population and Sample

In this research, 79 students were randomly selected from 276 fifth-grade students in the Sixth Primary School in Bincheng District, Binzhou City, Shandong Province, and randomly divided into three groups. Among them, two groups were clearly defined as the experimental group (Class A: 26 students) and the control group (Class B: 28 students). The experimental group adopted the teaching methods based on situated learning and project-based learning, while the control group adopted the traditional teaching method. The third group, the inspection group (Class C: 25 students), participated in evaluating the reliability and validity of the research tools used in this research.

Table 1 Shows **p**articipants information

Items	Number	Number(Male)	Number(Female)
Sample size	79	40	39
Experimental group	26	14	12
Control group	28	15	13
Validation group	25	11	14

3.4 Research Hypothesis

The two research questions examined in this study are:

IStudents who engage in learning through situated learning and project-based learning methods will show a statistically significant improvement in reading comprehension and analytical thinking abilities compared to their pre-intervention performance.

IIStudents taught using situated learning and project-based learning methods will demonstrate significantly higher levels of reading comprehension and analytical thinking abilities compared to students in the control group.

3.5 Research Treatment

This research adopted multiple measures to ensure the reliability of the results. Firstly, to ensure the representativeness of the sample, we randomly selected 79 students from fifth-grade classes as the research subjects. Secondly, the assessors involved in the research underwent standardized training to ensure the consistency of the assessment criteria. Then, the experimental group and the control group used the same teaching content, and the only difference was that they adopted different teaching methods. In addition, in order to minimize the impact of individual teaching levels and styles on the experimental results, the experimental group and the control group were taught by the same teacher. Before the research, 20 teaching designs were formulated respectively for the same teaching content, and the teacher was trained. Finally, to reduce the impact of the pre-test on the post-test results, the same test papers were used, and sufficient time intervals between the two assessments were ensured. Therefore, 20 teaching intervention plans were implemented, and each plan lasted for 45 minutes.

3.6 Research Instruments

3.6.1 Reading Comprehension Abilities Test-Paper

This test was designed based on the "Chinese Curriculum Standards for Compulsory Education" promulgated by the Ministry of Education of the People's Republic of China (2022), combined with the key theories on the development of Chinese reading abilities and relevant research in cognitive psychology. The curriculum standards clearly stated that attention should be paid to the comprehensive development of students' abilities in understanding the main idea, analyzing details, making logical inferences and using language in reading. In addition, the test question types referred to the reading literacy test framework of internationally renowned assessment tools such as PISA (Programme for International Student Assessment) (OECD, 2019), as well as the classification of core skills in reading comprehension at home and abroad (such as Kintsch's (1988) theoretical model of reading comprehension), to ensure the scientific and comprehensive nature of the content. The Chinese reading comprehension ability test paper used in this research covered 5 main dimensions with a total of 20 items. The assessment was based on four items per dimension, each of which was rated five points out of 100. This main idea as a measure was intended to assess the student's understanding of the theme and the main point; the detail understanding, to measure the student's ability to put together the information contained in the article; inferential ability, to examine the student's skill in reasoning from the facts; the vocabulary comprehension, mainly aimed at recognizing the new words and phrases as well as figuring out the meaning of homonyms according to the context; whereas the expression ability was to evaluate the student's capacity of summarizing, generalizing, and concluding according to the content of the passage. This test was dedicated to measuring the effect of reading comprehension in various aspects, and the findings were thoroughly considered.

3.6.2 Analytical Thinking Abilities Assessment Scale

The model of critical thinking proposed by Ennis (1985) highlights the central skill sets of knowing the problem, analyzing the information, reasoning, and evaluation as the theoretical underpinning of this scale. In addition, this research drew on the dimension classification and measurement methods in existing assessment tools (such as the Watson-Glaser (1980) Critical Thinking Test) to ensure the content validity of the scale. Meanwhile, according to the core literacy standards of disciplines issued by the Ministry of Education of the People's Republic of China (2022) and the application requirements of analytical thinking in academic and professional scenarios, five dimensions including problem understanding, information collection, reasoning, decision-making and reflection were designed to ensure the practical relevance of the scale. The analytical thinking assessment scale used in this research contains 5 main dimensions, with 4 items in each dimension, totaling 20 items, and the scoring adopts a Likert scale ranging from 1 to 5 points. Among them, the dimension of problem understanding and identification assesses whether students can accurately understand problems and dig out key elements and core points. The dimension of information collection and organization measures whether students can efficiently collect relevant information and organize, classify and summarize it to lay the foundation for subsequent analysis. The dimension of reasoning and logical thinking evaluates students' abilities to use logical thinking for reasoning and analysis and to derive new conclusions or problem-solving methods from existing information. The problem-solving dimension and decision-making ability of the student involves the ability to suggest and make effective decisions based on logical thinking, which involves considering various options and the best method to arrive at a solution. The dimension that entails self-reflection and evaluation is crucial in measuring the students' abilities to reflect and evaluate their own argumentation processes. This would involve scrutinizing the choice of thinking methods, the level of success for the methods used, and ways to increase performance.

3.6.3 Instrumental Reliability and Validity

Twenty-five students from the verification group participated in the test of the assessment scale. They will next receive and take an assessment scale essentially at the same time. The results revealed that the mean scores of verification students regarding reading comprehension and analytical thinking ability were 70.6 (SD = 8.33) and 73.6 (SD = 6.67) correspondingly. Besides, this study also considers using the Crombach's alpha coefficient and the KMO test to assess the reliability and the validity of the reading comprehension test scale and design of the analytical thinking skill evaluation. According to the results, the α coefficients of the scales derived using Cronbach's were found to be as 0.825 and 0.872, on the other hand, for KMO the found values were 0.821 and 0.785. However, the research instruments used, in this research those have comparable or good internal consistency and validity.

3.7 Data Collection

This research collected assessment data twice. Among them, the assessment of analytical thinking abilities was carried out immediately after the implementation of the initial teaching plan, and the second assessment was conducted after the implementation of the last teaching plan. The assessment of reading comprehension abilities was conducted before the implementation of the initial teaching plan, and the second assessment was carried out after the implementation of the last teaching plan.

3.8 Data Analysis

3.8.1 Homogeneity Testing

To ensure that the baselines of the experimental group and the control group were consistent and to guarantee the comparability of the subsequent results, an independent-samples t-test was used in this research to conduct statistical analysis on the pre-test scores of the two groups of students in reading comprehension abilities and analytical thinking abilities. As shown in Table 2, the t-test results ($t = -0.45$ & -0.32; $p > 0.05$) did not reach statistical significance, indicating that the differences in the pre-tests between the two groups could be ignored.

Table 2 Shows comparison of pre-test

Item Classification	Group	M	SD	t	df	p
Reading Comprehension Abilities	Experimental Group	67.31	7.51	-0.45	53	0.65
	Control Group	68.39	7.82			
Analytical Thinking Abilities	Experimental Group	69.92	6.52	-0.32	53	0.68
	Control Group	70.61	8.79			

*P<0.05

3.8.2 Comparative Analysis

In this research, the paired-samples t-test was used to analyze the pre-test and post-test scores of the experimental group students in reading comprehension and analytical thinking. This analysis tested the hypothesis: "Students who engage in learning through situated learning and project-based learning methods will show a statistically significant improvement in reading comprehension and analytical thinking abilities compared to their pre-intervention performance".

In this study, the independent-samples t-test was conducted to analyze the outcome

measures such as reading comprehension and critical thinking skills in the experimental group versus the control group. This analysis tested the hypothesis: "Students taught using situated learning and project-based learning methods will demonstrate significantly higher levels of reading comprehension and analytical thinking abilities compared to students in the control group".

3.9 Ethical Affirmation

This research, titled "An Instructional Approach Through Situated Learning and Project-Based Learning to Enhance Reading Comprehension and Analytical Thinking Ability for 5th Grade Students in Chinese Course", has been ethically approved by the Research Ethics Committee of Nakhon Phanom University, Thailand. This ethical approval, with the reference number HE16967 and the record number 169/2567, was issued on October 16, 2024, and is valid until October 15, 2025.

4. RESULTS

4.1 Hypothesis 1 Test

Students who engage in learning through situated learning and project-based learning methods will show a statistically significant improvement in reading comprehension and analytical thinking abilities compared to their pre-intervention performance.

Table 3 Shows comparison of pre-test and post-test in the experiment group

* P<0.05

Students' Scores in Different Tests	M	SD	t	df	p	Cohen's d
Pre-test of Reading Comprehension Abilities	67.31	7.51	-21.47	25	0.000*	4.21
Post-test of Reading Comprehension Abilities	84.23	5.78				
Pre-test of Analytical Thinking Abilities	69.92	6.52	-21.03	25	0.000*	4.13
Post-test of Analytical Thinking Abilities	79.65	5.46				

The analysis revealed a statistically significant improvement in the reading comprehension and analytical thinking abilities of students in the experimental group following the intervention. The pre-test and post-test comparison for reading comprehension yielded a mean increase from 67.31 (SD = 7.51) to 84.23 (SD = 5.78), with

a t-value of -21.47, degrees of freedom (df) = 25, and $p < 0.05$, indicating a highly significant difference. The Cohen's d of 4.21 suggests a large effect size, underscoring the intervention's substantial impact on enhancing reading comprehension.

Similarly, for analytical thinking, the mean score increased from 69.92 (SD = 6.52) in the pre-test to 79.65 (SD = 5.46) in the post-test, with a t-value of -21.03, df = 25, and $p < 0.05$. This result, alongside a Cohen's d of 4.13, highlights a significant improvement with a strong effect size. These findings support Hypothesis 1, confirming that the situated and project-based learning methods significantly enhanced students' reading comprehension and analytical thinking abilities compared to their pre-intervention performance.

4.2 Hypothesis 2 Test

Students taught using situated learning and project-based learning methods will demonstrate significantly higher levels of reading comprehension and analytical thinking abilities compared to students in the control group.

Table 4 shows comparison of post-test

Item Classification	Group	M	SD	t	df	p	Cohen's d
Reading Comprehension Abilities	Experimental Group	84.23	5.78	4.98	53	0.000*	1.36
	Control Group	74.47	8.32				
Analytical Thinking Abilities	Experimental Group	79.65	5.46	3.14	53	0.000*	0.86
	Control Group	73.68	8.15				

*P<0.05

The comparative analysis between the experimental and control groups also demonstrated statistically significant differences in both reading comprehension and analytical thinking abilities. For reading comprehension, the post-test mean score for the experimental group was 84.23 (SD = 5.78) compared to 74.47 (SD = 8.32) in the control group. This difference was statistically significant, with a t-value of 4.98, df = 53, and $p < 0.05$, and a Cohen's d of 1.36, indicating a large effect size. This suggests that the instructional approach notably benefitted the experimental group over the control group.

About the level of analytical thinking, the average post-test score for the experimental group was 79.65, and those for the control group was 73.68. The difference caused the t-value to be 3.14, df = 53, $p < 0.05$, with a Cohen's d of 0.86, suggesting a moderate to large effect size. These results further support Hypothesis 2, affirming that significant readings and analytical thinking were among the features of students who were exposed to situated and project-based learning compared to the control group.

5. DISCUSSION

The study's main objective was to examine the influence of situated learning and project-based learning looked at together on fifth-grade students' reading comprehension and analytical thinking skills in Chinese classes. To give an answer, a non-equivalent control group essay with 79 fifth-grade students randomly separated into an experimental group and a control group was done. The experimental group was using the combined approach while the control group was using the traditional method. The findings revealed that the experimental group had a statistically remarkable incidence of change in reading comprehension and analytical thinking abilities compared to pre-intervention performance. Apart from that, the experimental group not only performed better than the control group during pre-tests but also during post-tests, suggesting the usability and effectiveness of the combined instructional strategy.

Innovation in this study covers many aspects. To begin with, it adopts the approach which is based on the integrating of situated learning and project-based learning model into Chinese language teaching and program for fifth graders, which is quite a field adventure. And while previous studies have focused on these two teaching approaches independently or in other subjects, our research projects explore the influence that these two strategies may have when combined in order to facilitate specific language skills and cognitive abilities in the Chinese language curriculum. Secondly, the instructional model comprised five core modules, each dedicated to a particular aspect of teaching methods, offering an elaborate framework for the amalgamation of the tangible and project-based learning principles with practice. It summarizes the practical way for educators to introduce such an approach into the classroom.

In relation to the correlation with past studies, the findings of this work are in accordance with studies previously documented on situated learning and project-based approaches, both of which have been noted to improve learning. An example can be found in Anaktototy & Lesnussa (2022), who demonstrated through the use of Directed Reading Thinking Activity that was in line with the existing principles of situated learning that reading comprehension and critical thinking skills of students can be improved. This report also features the information that Imbaquingo & Cárdenas (2023) project-based learning was useful for students in enhancing their reading and understanding skills. However, our study can be considered to be an addition to those findings as we investigated the combined instructional methods, which had not been studied before to this extent.

One should take into consideration some points during the preparation of the joint teaching method. Initially, the learning context and the design of project tasks are indispensable elements and they should be engineered in such a way as to reflect real life. When contextualized, authentic tasks tend to embrace students and make their learning meaningful (Roach et al., 2018; Miller et al., 2021). Secondly, educational practitioners have to not only encourage the learners during the process of acquiring knowledge and the skills but also have to assist them in the building of their own knowledge and abilities (Kim, 2019; Xiao & Yang, 2019). Next, the students must be organized into groups with responsible roles so as to make use of their potency in team spirit and communication skills (Forslund Frykedal & Hammar Chiriac, 2018; Chen & Kuo, 2019).

Above all, this research introduces some concern as well. Although the study took place in one school, it has a relatively small sample size that may somehow belittle the

applicability of the results. Future research might be aided by a larger sample, where this study has been expanded to include more schools or various regions, so that the findings may be externalized more. Moreover, in this study, we did not conduct independent analyses on situated or project-based learning. Further investigation may be made to ascertain such information in the future, hence offering clear and precise analysis for the process of teaching practice, and its development.

6. CONCLUSION

All in all, based on this study, it is clear that a joint teaching approach, also known as situated learning and project-based learning, has a very positive effect on the reading comprehension and analytical thinking abilities of fifth graders in a Chinese class. To summarize the study, it revealed that the experimental group (the group of students who received the intervention) had a greater improvement on both skills when compared to their preintervention levels. Rotating around the encapsulation of the two methods in the context of China and creating specific learning models, the study offers numerous schools with explicit insights for implementation. Nevertheless, on the other hand, the study is short of big sample size, yet it is one-school setting, and analysis of individual method effects, as well as assessing the effect of all methods in the long run, requires further research. Therefore, the results support that the combined approach has a potential to be effective in improving students' performance in Chinese language education; but the further studies, which are more comprehensive and in-depth, are still needed to precisely understand and adjust its effective use.

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