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The Effects of Cooperative Project-Based Learning through Social Praxis Project Proposal Development on Students' Conceptual Understanding and Concept Application

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Abstract: This study aims to determine the effectiveness of the Cooperative Project-Based Learning (CPjBL) strategy on students' conceptual understanding and concept application abilities compared to the Project-Based Learning (PjBL) strategy, as well as to analyze the influence of Field Independent (FI) and Field Dependent (FD) cognitive styles on student learning outcomes. The study employed a quantitative approach using a quasi-experimental research design with a non-equivalent control group factorial design of 2 × 2. The research subjects consisted of 100 students from the History Education Study Program at Universitas Negeri Malang who were divided into experimental and control groups. Data collection was conducted through conceptual understanding tests, concept application tests, and the GEFT (Group Embedded Figures Test) cognitive style instrument. Data were analyzed using MANOVA after fulfilling prerequisite tests, including normality, homogeneity, linearity, and multicollinearity tests. The findings indicate that learning strategies significantly affect students' conceptual understanding and concept application abilities. Students who learned using the CPjBL strategy achieved higher average learning outcomes compared to those who learned using the PjBL strategy. In conceptual understanding ability, the CPjBL group obtained an average score of 84.42, while the PjBL group achieved an average score of 79.30. In concept application ability, the CPjBL group obtained an average score of 90.02, whereas the PjBL group achieved an average score of 86.14. The results also revealed that FI and FD cognitive styles did not have a significant effect on students' conceptual understanding or concept application abilities. In addition, an interaction effect between learning strategies and cognitive styles on student learning outcomes was identified. The findings confirm that the CPjBL strategy is more effective in improving conceptual understanding and concept application abilities because it creates an active, collaborative, and student-centered learning environment. This strategy also provides opportunities for students to develop critical thinking, collaboration, communication, and problem-solving skills throughout the learning process.

Keywords: cooperative project-based learning, project-based learning, cognitive style, conceptual understanding, concept applications.

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INTRODUCTION

Education plays a very important role in shaping the intellectual, social, and moral development of individuals. Education is not only a process of acquiring knowledge, but also a means of preparing students to face the challenges of modern life (Zahra et al., 2024). Through education, students can develop critical thinking skills, creativity, discipline, and communication skills that are highly needed in both personal life and the workplace. In addition, education instills social values such as tolerance, responsibility,

cooperation, and mutual respect in social life (Nurhaliza, 2024). Therefore, education is regarded as one of the main foundations for national progress and societal development (Kishore Singh, 2016).

For students, education has significant meaning as it provides opportunities to enhance quality of life and achieve future aspirations. Schools and educational institutions serve as spaces where students can explore their potential, build self-confidence, and acquire competencies needed in daily life and the professional world (Makkawaru, 2019). In today's globalized and rapidly advancing technological landscape, educational achievement is a key factor influencing economic opportunities and social mobility (Sabiq & Khasanah, 2025). Students who obtain quality education generally adapt better to change and are more capable of making positive contributions to society.

In addition, education also plays a role in reducing poverty and social inequality by providing equal opportunities for every individual regardless of economic or social background. A good educational system can create qualified and innovative human resources capable of encouraging sustainable economic development (Rohmah & Jannah, 2025). Therefore, governments, communities, and families continue to pay great attention to access to quality education. Education must remain protected as a fundamental human right and as a public interest oriented toward human development, rather than merely as a means of economic profit (Neo et al., 2001).

Education is not only expected to improve students' academic abilities, but also plays an important role in shaping students' character and personality (Putra et al., 2025; Susanti et al., 2024). In an effort to build students' character, the government also emphasizes the importance of strengthening character education through the implementation of values such as cooperation, responsibility, discipline, independence, social awareness, and cooperation in learning activities. These values are expected not only to be understood theoretically, but also to be applied by students in everyday life both at school and in society. Therefore, the learning process needs to be designed in a way that provides active and meaningful learning experiences for students (Utami et al., 2021).

Despite the fact that students in the History Education Study Program generally exhibit satisfactory academic performance, there is a scarcity of empirical evidence regarding the comparative effectiveness of Project-Based Learning (PjBL) and Cooperative Project-Based Learning (CPjBL) in enhancing students' conceptual understanding and concept application in social praxis learning. Previous studies have reported the benefits of project-based and collaborative learning in various educational contexts; however, few studies have examined whether integrating cooperative elements into project-based learning provides additional advantages in history education while considering students' cognitive styles. Therefore, investigating the relative effectiveness of these instructional strategies remains important. In the learning process, selecting appropriate instructional strategies is essential for facilitating meaningful learning experiences (Naibaho, 2021). Learning that actively involves students not only promotes deeper conceptual understanding but also enhances critical thinking and problem-solving abilities related to real-life situations (Handayani et al., 2024). One instructional strategy that may address these objectives is Cooperative Project-Based Learning (CPjBL), which emphasizes collaborative project activities throughout the learning process.

Project-based learning remains one of the most relevant instructional approaches in modern education because it connects learning activities with authentic problems encountered by students

in real-life contexts. According to Revelle et al. (2020), project-based learning positions students as active participants who engage in meaningful projects with authentic purposes, real audiences, and strong connections to experiences beyond the classroom. Through this process, students not only gain academic knowledge but also develop essential skills, including critical thinking, communication, collaboration, and problem-solving. Their study found that students who participated in project-based learning demonstrated greater improvement in reading skills, social studies knowledge, and learning engagement than those who experienced conventional instruction. These findings suggest that project-based learning continues to be highly relevant in supporting twenty-first-century educational goals, particularly those emphasizing higher-order thinking skills and active student participation (Revelle et al., 2020).

Siegel (2005) shows that teachers implement the main elements of cooperative learning according to theory, such as face-to-face interaction, individual accountability, positive interdependence among group members, social skills training, and group evaluation. However, teachers do not apply them rigidly according to theoretical books, but rather make various adaptations according to classroom needs. For example, teachers do not assign fixed roles to each student, but instead ask students to take turns carrying out tasks so that everyone can master various skills. Teachers also limit group membership to two to four students because it is considered more effective in ensuring active participation from all students. This study also demonstrates that variations in teaching practices are not signs of failure, but rather forms of teacher creativity in solving classroom learning problems. Teachers are regarded as active practitioners who can adapt methods to real school conditions. Therefore, this study rejects the idea of "full fidelity" to instructional models designed by researchers (Lam et al., 2009). In real educational practice, teacher flexibility becomes an important factor for learning success. Thus, effective cooperative learning is not a rigidly implemented model, but one that can be adapted to students' social and academic contexts (Siegel, 2005).

Piccinini et al. (2006) introduce the concept of self-organized project learning, in which students are given considerable freedom to determine project ideas, formulate learning objectives, and organize their own group work mechanisms. However, this freedom does not mean that students are left entirely without guidance. Instructors still play a vital role as mentors, facilitators, and sources of feedback throughout the learning process. Instructors function as facilitators who help students clarify project ideas, improve learning objectives, and direct group work processes to make them more effective. The instructor's role is especially visible during the early stages of project formation when students still experience difficulties in formulating learning objectives and organizing group work structures. Collaborative project-based learning is not merely a strategy to improve academic outcomes, but also a means of developing students' higher-order thinking skills. During the learning process, students learn to analyze problems, formulate solution strategies, manage risks, develop group communication, and evaluate their own work processes. These activities suggest that collaborative project-based learning can enhance Higher Order Thinking Skills (HOTS), particularly in critical thinking, problem-solving, and decision-making. Students no longer merely memorize theories, but are required to understand how concepts are applied in real practice.

Project-Based Learning (PBL) is a modern educational approach that is student-centered and designed to develop 21st-century skills. Learning is no longer solely oriented toward memorizing material or achieving academic grades, but must

also build critical thinking, collaboration, creativity, communication, and the ability to solve real-life problems. PBL positions students as the main subjects of learning. Students do not passively receive information from teachers, but actively seek knowledge through inquiry, research, discussion, and project creation. In this model, teachers function as facilitators who guide the learning process rather than as the sole source of knowledge. This demonstrates a paradigm shift from teacher-centered learning toward student-centered learning. Such a shift is highly important in the 21st century because the modern world demands individuals who are capable of independent thinking, decision-making, and cooperation in dealing with complex problems (Bell, 2010).

Analytically, traditional educational systems often fail to develop students' real abilities because they focus too heavily on standardized tests and rote memorization of concepts. The author criticizes standardized testing because it only measures basic academic abilities, while important skills such as creativity, communication, leadership, and adaptability cannot be measured through conventional examinations (Ferreira & Trudel, 2012). Therefore, PBL is viewed as an alternative solution that is more relevant to the needs of global society and the modern workplace. In project-based learning, students learn by confronting real-world problems, making the learning process more meaningful and contextual (Lubis et al., 2024).

PBL has a significant impact on improving student achievement (Hendriana, 2018). Students who learn through the PBL approach achieve better outcomes compared to students in traditional learning settings. However, developing a deeper conceptual understanding is more significant than merely enhancing academic scores. Furthermore, students not only demonstrate knowledge of formulas or theories, but they are also capable of applying it to real-world scenarios. This suggests that PBL fosters higher-order thinking, which includes the synthesis of knowledge, analysis, and evaluation.

PBL helps students become more independent, disciplined, and responsible. During project processes, students are required to manage time, develop work plans, set objectives, and evaluate their own work outcomes (Syafitri et al., 2025). Such situations train self-management abilities that are highly needed in social life and professional environments. This type of learning helps students understand that success depends not only on academic intelligence, but also on the ability to cooperate and complete tasks responsibly.

Through various learning activities, students are encouraged to develop cooperation, exchange ideas, and take responsibility for both individual and group tasks. Although students in the History Education Study Program generally demonstrate satisfactory academic performance, limited empirical evidence is available regarding the comparative effectiveness of Project-Based Learning (PjBL) and Cooperative Project-Based Learning (CPjBL) in improving students' conceptual understanding and concept application in social praxis learning. Previous studies have demonstrated the effectiveness of project-based learning and collaborative learning in various educational contexts. However, only a few studies have specifically compared the effectiveness of PjBL and CPjBL while simultaneously considering students' Field Independent (FI) and Field Dependent (FD) cognitive styles in history education. Therefore, further empirical investigation is needed to determine which instructional strategy provides greater benefits for students with different cognitive characteristics.

Accordingly, this study aims to examine the effects of Project-Based Learning (PjBL), Cooperative Project-Based Learning (CPjBL), Field Independent (FI) and Field Dependent (FD) cognitive styles, as well as their interaction,

on students' conceptual understanding and concept application in social praxis learning.

Based on the theoretical framework and previous empirical findings, this study proposes the following hypotheses. First, students taught using Cooperative Project-Based Learning (CPjBL) will demonstrate higher conceptual understanding and concept application than those taught using Project-Based Learning (PjBL). Second, students with different cognitive styles (Field Independent and Field Dependent) will exhibit significant differences in conceptual understanding and concept application. Third, there will be a significant interaction between instructional strategy (CPjBL and PjBL) and cognitive style (FI and FD) on students' conceptual understanding and concept application.

METHOD

Research Design

This study employed a quantitative approach using a quasi-experimental research design. The research adopted a Non-Equivalent Control Group Design with a 2 × 2 factorial arrangement. This design was selected to examine the effects of learning strategies and cognitive styles on students' conceptual understanding and concept application. The independent variable was the learning strategy, consisting of Project-Based Learning (PjBL) and Cooperative Project-Based Learning (CPjBL). The second factor examined in this study was students' cognitive style, categorized as Field Independent (FI) and Field Dependent (FD).

Participants

The participants consisted of 100 undergraduate students enrolled in the History Education Study Program at Universitas Negeri Malang. The students were divided into two classes. One class was assigned as the experimental group and received instruction through the Cooperative Project-Based Learning (CPjBL) strategy. In contrast, the other class served as the control group and received instruction through the Project-Based Learning (PjBL) strategy. The assignment of experimental and control classes was conducted using cluster random sampling.

Table 1. Demographic and academic characteristics of participants

Characteristics	PjBL Group (n=50)	CPjBL group (n=50)
Male, n (%)	20 (40%)	18 (36%)
Female, n (%)	30 (60%)	32 (64%)
GPA Range	3.25-3.90	3.28-3.88
Mean GPA (SD)	3.56 (0.18)	3.58 (0.17)
Passed prerequisite courses, n (%)	50 (100%)	50 (100%)
Conceptual Understanding Pretest Score (SD)	76.30 (5.21)	74.60 (5.47)
Concept Application Pretest Score (SD)	75.82 (5.08)	75.14 (5.36)

Note. All participants had completed and passed the prerequisite courses before participating in the study. Descriptive statistics indicate that the PjBL and CPjBL groups exhibited relatively comparable demographic characteristics, academic backgrounds, and pretest scores prior to the intervention.

To ensure comparability before the intervention, demographic and academic background information was collected, including gender, cumulative grade point average (GPA), completion of prerequisite courses, and pretest scores. As shown in Table 1, the distributions of gender, academic achievement, and pretest performance were relatively similar across the PjBL and CPjBL groups. In addition, all participants had completed the relevant

prerequisite courses before participating in the study. These characteristics suggest that the two groups shared broadly comparable baseline conditions, providing an appropriate basis for examining the effects of the Project-Based Learning (PjBL) and Cooperative Project-Based Learning (CPjBL) instructional strategies.

Research Instruments

Data were collected using three research instruments. Students' cognitive styles were identified using the Group Embedded Figures Test (GEFT), which was employed to classify students into the Field Independent (FI) and Field Dependent (FD) categories. Conceptual understanding was measured using a multiple-choice test developed based on indicators of conceptual understanding and concept application. In contrast, concept application was assessed through essay questions designed to evaluate students' ability to apply social praxis concepts in various contextual situations.

Prior to implementation, all research instruments underwent content validation through expert judgment involving specialists in history education and educational assessment. Subsequently, the instruments were piloted with 30 students who were not included in the research sample to evaluate item clarity, readability, difficulty level, and overall instrument quality. The item validity analysis (Table 2) indicated that the conceptual understanding test had item validity coefficients ranging from 0.41 to 0.82, while the concept application test demonstrated coefficients ranging from 0.45 to 0.79. Reliability testing using Cronbach's Alpha yielded coefficients of 0.87 for the conceptual understanding instrument and 0.84 for the concept application instrument. According to Arikunto's (2012) classification, both instruments demonstrated very high internal consistency and were therefore considered appropriate for use in the present study.

Prior to data collection, permission to conduct the study was obtained from the History Education Study Program at Universitas Negeri Malang. All participants were informed about the objectives, procedures, and purposes of the study before the learning activities commenced. Participation was voluntary, and students were free to participate without any academic consequences. All data collected were treated confidentially and were used solely for research purposes.

Table 2. Instrument validity and reliability results

Instrument	Range of Item Validity Coefficients (r)	Cronbach's Alpha
Conceptual Understanding Test	0.41–0.82	0.87
Concept Application Test	0.45–0.79	0.84

Before implementation, all research instruments underwent content validation through expert judgment involving two experts in history education and educational assessment. The experts evaluated the instruments in terms of content relevance, construct appropriateness, indicator clarity, language, organization, and overall feasibility using a five-point rating scale. The content validity was analyzed using Aiken's V coefficient. The results showed that the Aiken's V values ranged from 0.750 to 1.000, with a mean coefficient of 0.925, indicating very high content validity. Following expert validation, the instruments were revised based on the experts' recommendations and subsequently piloted with students who were not included in the research sample. The pilot study demonstrated item validity coefficients ranging from 0.41 to 0.82 for the conceptual understanding instrument and from 0.45 to 0.79 for the concept application

instrument. Reliability testing using Cronbach's Alpha yielded coefficients of 0.87 and 0.84, respectively, indicating very high internal consistency.

Research Procedure

The study was conducted in two stages: preparation and implementation. During the preparation stage, the researchers developed learning materials and research instruments and coordinated with the course instructors. To minimize teacher-related bias, instructors in both the experimental and control groups employed the same learning materials, including the Semester Learning Plan (RPS), instructional content, learning outcomes, time allocation, and identical assessment instruments. Furthermore, prior to the implementation of the study, coordination meetings were conducted to ensure a common understanding of the instructional procedures. This measure was intended to ensure that any differences in learning outcomes would more accurately reflect the effects of the learning strategies rather than differences in instructor characteristics.

Pretest and posttest scores were used to calculate the normalized gain (N-Gain) for each learning indicator. The N-Gain values were used solely for descriptive visualization to illustrate students' learning improvement after the instructional intervention and were not included in the inferential statistical analysis. The pretest scores were used to describe students' initial learning conditions prior to the intervention, whereas the posttest scores were used for hypothesis testing. Accordingly, a two-way factorial Multivariate Analysis of Variance (MANOVA) was employed to examine the effects of instructional strategy (Project-Based Learning and Cooperative Project-Based Learning), cognitive style (Field Independent and Field Dependent), and their interaction on students' conceptual understanding and concept application.

The instructional treatment was conducted over eight meetings, with each meeting lasting 2 × 50 minutes. The experimental group received instruction through the CPjBL strategy, whereas the control group was taught using the PjBL strategy.

In both instructional groups, students worked collaboratively in small groups to develop a social praxis project proposal related to historical issues in their surrounding community. The project required students to identify a local historical problem, formulate project objectives, design community-based historical activities, prepare implementation procedures, determine expected outcomes, and develop evaluation strategies. Each group presented and defended its proposal as the final project of the Social Praxis course. The difference between the two groups lay in the learning strategy employed to complete the project: students in the experimental group followed the Cooperative Project-Based Learning (CPjBL) model, whereas those in the control group completed the same project using the conventional Project-Based Learning (PjBL) approach.

At the end of the treatment period, both groups completed a posttest to measure conceptual understanding and concept application. To further minimize teacher effects, both groups were provided with identical learning objectives, instructional materials, time allocation, and assessment criteria. The only difference between the groups was the learning strategy employed, namely PjBL in the control group and CPjBL in the experimental group.

Data Analysis

The data were analyzed using Multivariate Analysis of Variance (MANOVA) with IBM SPSS Statistics at a significance level of 0.05. Prior to hypothesis testing, the data were screened to ensure that the assumptions underlying multivariate analysis were satisfied.

First, the dataset was examined for missing values and multivariate outliers. Second, the normality assumption was assessed using the Shapiro-Wilk test because the sample size within each group was relatively small. A significance value greater than 0,05 indicated that the data were normally distributed. Third, the homogeneity of variances was evaluated using Levene's Test, with $p > 0,05$ indicating equal variances across groups. Fourth, the homogeneity of variance-covariance matrices was assessed using Box's M test. Following the recommendations of Huberty and Petoskey (2000) and Field (2024), a significance value greater than 0.001 indicated that the assumption of equal covariance matrices was satisfied. Fifth, multicollinearity among the dependent variables was examined using Pearson correlation coefficients. Correlation coefficients below 0.90 indicated that multicollinearity was not a concern.

After all assumptions had been satisfied, MANOVA was conducted to examine the effects of learning strategy, cognitive style, and their interaction on students' conceptual understanding and concept application. When the multivariate test was statistically significant ($p < 0.05$), follow-up univariate ANOVAs were performed to determine which dependent variables contributed to the observed multivariate effects.

■ RESULT AND DISCUSSION

Preliminary Analysis

This study was conducted to analyze the influence of Project Based Learning (PjBL) and Cooperative Project Based Learning (CPjBL) strategies, Field Independent (FI) and Field Dependent (FD) cognitive styles, as well as the interaction between both variables on students' conceptual understanding and concept application abilities in social praxis learning within the History Education Study Program. Data analysis was conducted using MANOVA after all prerequisite tests had been fulfilled. Following Field (2024), the assumption of homogeneity of covariance matrices is considered satisfied when the significance value of Box's M exceeds 0.001.

Table 3. Summary of MANOVA assumption tests

Assumption Test	Statistic	Value	Criterion	Decision
Normality (Kolmogorov–Smirnov)	Sig.	0.061	$p > 0.05$	Normal
Homogeneity of Covariance Matrices (Box's M)	Sig.	0.527	$p > 0.001$	Homogeneous
Linearity	Sig.	0.188	$p > 0.05$	Linear
Multicollinearity	Tolerance.	0.946	>0.10	No multicollinearity
	VIF	1.057	<10	No multicollinearity

Prior to hypothesis testing, all assumptions underlying MANOVA were examined. A summary of the assumption test results is presented in Table 3. The findings indicate that the assumptions of normality, homogeneity of covariance matrices, linearity, and the absence of multicollinearity were all satisfied. Therefore, the dataset met the requirements for subsequent MANOVA.

Effect of Learning Strategy on Students' Conceptual Understanding and Concept Application

The multivariate MANOVA results indicated that learning strategy had a significant multivariate effect on the combined dependent variables of conceptual understanding and concept application (Wilks' Lambda = 0.798, $F(2,95) = 12.020$, $p < 0.001$). Cognitive style

did not show a significant multivariate effect (Wilks' Lambda = 0.973, F(2,95) = 1.321, p = 0.072). However, the interaction between learning strategy and cognitive style produced a significant multivariate effect (Wilks' Lambda = 0.963, F(2,95) = 1.845, p = 0.034).

Table 4. Multivariate MANOVA test results

Effect	Wilks' Lambda	F	Hypothesis df	Error df	p
Learning Strategy	0.798	12.020	2	95	< 0.001
Cognitive Style	0.973	1.321	2	95	0.072
Learning Strategy × Cognitive Style	0.963	1.845	2	95	0.034

Based on the Tests of Between-Subjects Effects (Table 5), learning strategy had a significant effect on students' conceptual understanding, F(1,96) = 15.853, p < 0.001, partial ç² = 0.142, indicating a large effect size. These findings suggest that instructional strategy explained approximately 14.2% of the variance in students' conceptual understanding. Furthermore, the estimated marginal means indicated that students taught using the CPjBL strategy achieved higher conceptual understanding scores than those taught using the PjBL strategy. Therefore, the first hypothesis was supported.

Table 5. Tests of between-subjects effects

Source	Dependent Variable	F(df1. df2)	p	Partial η²	Effect size
Learning Strategy	Conceptual Understanding	F(1,96) = 15.853	< 0.001	0.142	Large
	Concept Application	F(1,96) = 11.260	0.001	0.105	Large
Cognitive Style	Conceptual Understanding	F(1,96) = 2.632	0.078	0.027	Small
	Concept Application	F(1,96) = 3.350	0.070	0.034	Small
Learning Strategy × Cognitive Style	Conceptual Understanding	F(1,96) = 7.676	0.008	0.074	Medium
	Concept Application	F(1,96) = 0.207	0.650	0.002	Small

Table 6 presents the descriptive statistics for each combination of instructional strategy and cognitive style. Students in the CPjBL–FI group achieved the highest mean scores in both conceptual understanding (M = 86.321) and concept application (M = 90.250), whereas the PjBL groups showed comparatively lower mean scores.

Table 6. Estimated marginal means and descriptive statistics of conceptual understanding and concept application by instructional strategy and cognitive style

Instructional Strategy	Cognitive Style	n (number of students)	Conceptual Understanding (Mean ± SD)	Concept Application (Mean ± SD)
PjBL	Field Dependent (FD)	25	79.480 ± 4.81	86.400 ± 3.72
PjBL	Field Independent (FI)	25	79.120 ± 5.04	85.880 ± 4.05
CPjBL	Field Dependent (FD)	25	82.000 ± 4.32	89.727 ± 3.84
CPjBL	Field Independent (FI)	25	86.321 ± 4.11	90.250 ± 3.60

Figure 1 presents a scatter plot illustrating the distribution of individual students' pretest and posttest scores. Each point represents one participant, while the diagonal reference line indicates equal pretest and posttest scores. Points located above the diagonal line indicate improvement after the instructional intervention, whereas points below the line indicate a decrease in performance. Overall, most data points are positioned above the diagonal reference line, suggesting that the majority of students demonstrated improved learning outcomes following the implementation of the instructional strategy.

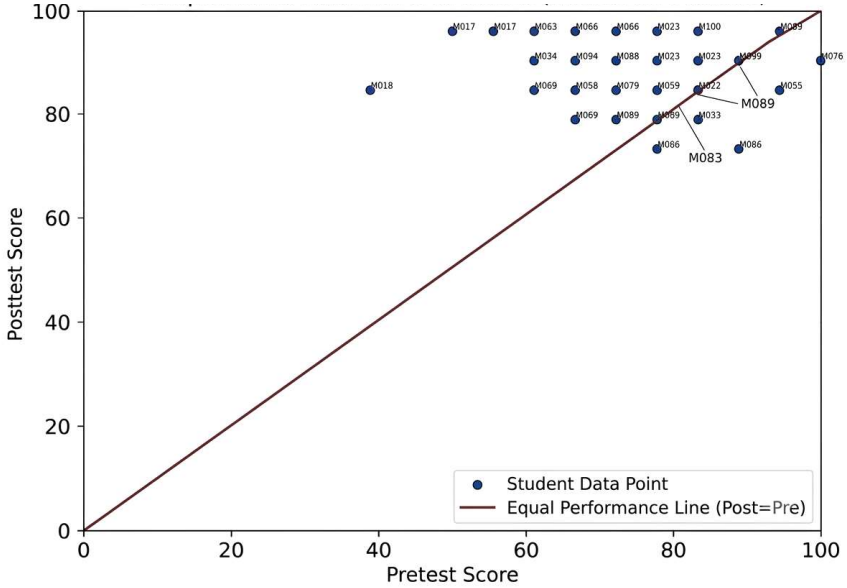

Figure 1. Scatter plot of individual students' pretest and posttest scores

Figure 2 illustrates that the improvement in conceptual understanding was greater among students with the Field Independent (FI) cognitive style under the CPjBL strategy than under the PjBL strategy. The different slopes of the two lines indicate that the effectiveness of the instructional strategy varied according to students' cognitive style, supporting the significant interaction effect identified in the MANOVA results.

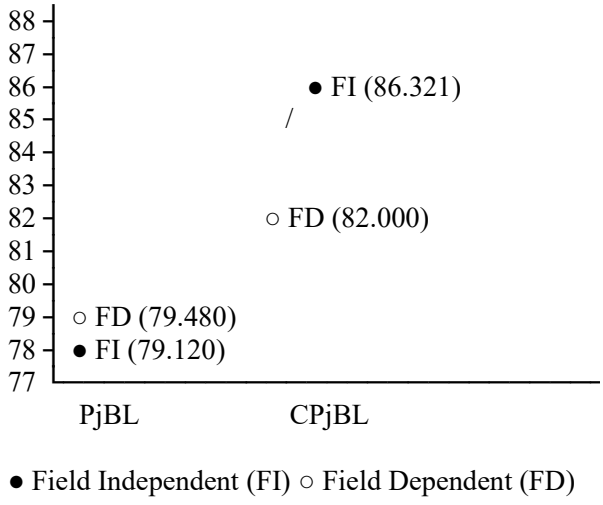

Figure 2. Interaction plot of learning strategy and cognitive style on conceptual understanding (estimated marginal mean)

Figure 3 presents the interaction between learning strategy and cognitive style on concept application. Both cognitive style groups achieved higher concept application scores under the CPjBL strategy than under the PjBL strategy. However, the increase was slightly greater among students with the Field Independent (FI) cognitive style, indicating that the effectiveness of the learning strategy varied according to students' cognitive style characteristics.

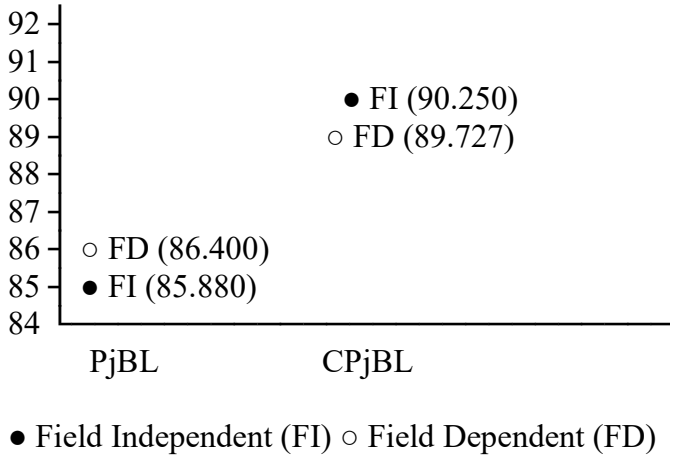

Figure 3. Interaction plot of learning strategy and cognitive style on concept application (estimated marginal mean)

Effect of Cognitive Style on Students' Conceptual Understanding and Concept Application

Meanwhile, the MANOVA results indicated that cognitive style did not have a significant multivariate effect on students' conceptual understanding and concept application abilities (Wilks' Lambda = 0.973, F(2,95) = 1.321, p = 0.072). The univariate Tests of Between-Subjects Effects further showed that cognitive style did not significantly affect conceptual understanding (F(1,96) = 2.632, p = 0.078, Partial ç² = 0.027) or concept application (F(1,96) = 3.35, p = 0.070, Partial ç² = 0.034). Therefore, no significant differences were found between students with Field Independent (FI) and Field Dependent (FD) cognitive styles.

Interaction between Learning Strategy and Cognitive Style

Furthermore, the MANOVA results showed a significant interaction between learning strategies and cognitive styles on students' conceptual understanding and concept application abilities. The interaction significance value was 0.034 (<0.05). The Tests of Between-Subjects Effects also indicated that the interaction between learning strategy and cognitive style significantly affected conceptual understanding (sig. 0.008) and concept application (sig. 0.010).

The interaction mean test results showed that students with FI cognitive style who learned using the CPjBL strategy obtained the highest conceptual understanding and concept application scores compared to other group combinations. In conceptual understanding ability, the CPjBL-FI group obtained an average score of 86.321, while the PjBL-FI group obtained an average score of 79.120. In concept application ability, the CPjBL-FI group achieved an average score of 90.250, while the PjBL-FI group obtained an average score of 85.880. These findings indicate that the CPjBL strategy was more effective when applied to students with both FI and FD cognitive styles.

Construction of Conceptual Understanding through Collaborative Project-Based Learning

The research findings indicate that the CPjBL learning strategy was more effective than the PjBL strategy in improving students' conceptual understanding and concept application abilities in social praxis learning. These findings demonstrate that the collaborative element in CPjBL contributed more significantly to students' knowledge construction processes. Through collaborative activities, group discussions, and collective project completion, students gained opportunities to exchange ideas, strengthen conceptual understanding, and develop critical thinking and problem-solving skills.

The findings of this study not only support the perspective of social constructivism, which emphasizes the role of social interaction in knowledge construction, but are also consistent with previous studies reporting the effectiveness of collaborative project-based learning. Earlier research has demonstrated that collaborative project-based learning enhances conceptual understanding, critical thinking, and concept application because students actively discuss, evaluate, and reflect upon knowledge throughout the project process.

The difference in conceptual understanding achievement between students who learned using the Project Based Learning (PjBL) strategy and those who learned using the Cooperative Project Based Learning (CPjBL) strategy indicates that project-based learning developed through group collaboration exerts a stronger influence on students' knowledge construction processes. The average conceptual understanding ability of students who learned using the CPjBL strategy was higher than that of the PjBL group. This condition demonstrates that learning activities involving social interaction, group discussions, and collaborative project completion are able to help students understand social praxis concepts more deeply. In CPjBL learning, students are not only directed to complete academic tasks. However, they are also involved in exchanging ideas, defending arguments, developing solutions, and connecting concepts with real problems encountered during the learning process.

Pedagogically, the higher level of conceptual understanding in the CPjBL group indicates that knowledge is not formed merely through receiving information from lecturers, but develops through active and collaborative learning experiences. This situation is in line with the social constructivist perspective, which places interaction as an important part of knowledge construction. When students work in groups, they help one another understand the material, clarify concepts that are not yet understood, and correct misconceptions through collaborative discussions. These activities cause students not only to memorize social praxis concepts theoretically, but also to understand the meaning and application of those concepts in social life.

In the context of history learning and social praxis, conceptual understanding holds a very important position because students are required to see the relationship between theory and the social realities of society. The CPjBL strategy provides broader opportunities for students to explore various social issues through contextual learning projects. Through this process, students learn to understand that social praxis concepts are not merely abstract academic material, but part of the dynamics of social life that can be analyzed and understood critically. Learning becomes more meaningful because students gain direct experience in connecting theory with the social realities around them.

The collaborative learning process implemented through CPjBL provides opportunities for students to participate more actively in classroom discussions and project completion. Such learning experiences may contribute to deeper conceptual understanding

by encouraging students to exchange ideas and examine problems from multiple perspectives.

Collaborative project-based learning also provides learning situations that potentially facilitate the development of communication, collaboration, and problem-solving skills, as reported in previous studies. Although these competencies were not directly measured in the present study, they may represent additional pedagogical benefits of collaborative learning.

This condition demonstrates that the use of appropriate learning strategies has a major influence on the quality of learning. The CPjBL strategy is capable of creating a more active, participatory, and student-centered learning atmosphere, enabling students not only to become recipients of information, but also the main actors in the learning process. In this context, lecturers no longer function as the sole source of knowledge, but rather as facilitators who guide students in constructing their own understanding through collaborative learning experiences. Therefore, collaborative project-based learning can be regarded as one of the relevant learning strategies to be implemented in higher education, particularly in history and social praxis learning that require critical thinking skills and contextual understanding of social life.

Strengthening Concept Application Ability through the Cooperative Project Based Learning Strategy

Students' concept application ability showed a fairly clear difference between the group that learned using the PjBL strategy and the group that learned using the CPjBL strategy. The group of students who learned through the Cooperative PjBL strategy achieved higher concept application outcomes compared to the PjBL group. The high level of concept application ability in the CPjBL group indicates that collaborative project-based learning is more effective in helping students apply social praxis concepts to real situations. Learning does not stop at theoretical understanding, but develops toward the ability to use concepts to analyze, solve problems, and make decisions in more concrete social contexts.

The improvement in concept application ability can be explained through the characteristics of the CPjBL strategy, which places students at the center of the learning process. Students do not merely receive material from lecturers, but are actively involved in investigation, discussion, project completion, and group presentation activities. These activities encourage students to think more deeply because they must understand concepts before applying them in learning projects. This situation demonstrates that concept application ability develops optimally when students are allowed to directly experience the process of using concepts in real contexts.

In social praxis learning, concept application ability is highly important because students are not only expected to understand definitions and theories, but also to connect concepts with various social issues in society (Siregar, 2025). The CPjBL strategy provides students with opportunities to engage in this process through contextual and collaborative project activities. When students work together to complete projects, they learn to use concepts to understand social phenomena, develop solutions to identified problems, and connect learning materials with everyday life. Thus, learning becomes more applicable and is no longer limited to memorizing material alone.

More deeply, the high level of concept application ability in the CPjBL group indicates that direct learning experiences have a major influence on the development of students' thinking abilities. Learning that involves real experiences tends to help students understand how concepts are used in various situations (Daud, 2024). In the collaborative learning process, students not

only learn from lecturers, but also from the experiences of other group members. The process of exchanging ideas helps students broaden their perspectives and improve their ability to apply concepts more flexibly and critically.

The development of concept application ability through the CPjBL strategy is also closely related to the development of Higher Order Thinking Skills (HOTS) (Leiju et al., 2024). Students are required to conduct analysis, evaluation, and synthesis of various forms of information before making decisions in project completion. These activities enable students not only to understand concepts theoretically, but also to apply them in the problem-solving process. In the context of higher education, such abilities are highly important because students need to be prepared to face real-world problems that require critical and creative thinking skills.

In addition to improving students' conceptual understanding and concept application, collaborative project-based learning encourages active participation throughout the learning process (Hendikawati et al., 2016; Ilma et al., 2024). Students are required to discuss ideas, exchange perspectives, and complete project tasks collaboratively, creating opportunities for deeper engagement with learning materials. These collaborative learning experiences are likely to facilitate knowledge construction and concept application, which is consistent with the findings of the present study. However, the present study only assessed conceptual understanding and concept application; therefore, no direct conclusions can be drawn regarding changes in students' responsibility, communication skills, or other affective outcomes.

Interaction Between Learning Strategies and Cognitive Styles in Social Praxis Learning

The research findings indicate that there is an interaction between learning strategies and cognitive styles on students' conceptual understanding and concept application abilities in social praxis learning. These findings demonstrate that the effectiveness of a learning strategy is not only influenced by the characteristics of the strategy itself, but is also related to the cognitive characteristics of the students involved in the learning process. In the context of this study, the Cooperative Project Based Learning (CPjBL) strategy proved to be more capable of accommodating the learning needs of students with both Field Independent (FI) and Field Dependent (FD) cognitive styles compared to the Project Based Learning (PjBL) strategy, which places greater emphasis on individual project completion. This condition indicates that learning processes involving social interaction and collaborative work have a substantial influence on students' success in understanding and applying social praxis concepts.

Theoretically, students with a *Field Independent* (FI) cognitive style are characterized by greater independence, analytical thinking, and the ability to distinguish relevant information from surrounding stimuli. These characteristics are generally expected to facilitate problem analysis and systematic concept integration during project-based learning. However, the findings of the present study indicate that the differences between students with FI and *Field Dependent* (FD) cognitive styles were not statistically significant for either conceptual understanding or concept application. Therefore, the theoretical advantages associated with the FI cognitive style were not translated into significantly higher learning outcomes in this study. Nevertheless, descriptive statistics indicated that FI students tended to achieve higher scores when learning through the CPjBL strategy than through the conventional PjBL strategy. However, these differences should be interpreted cautiously because the overall effect of cognitive style was not statistically significant.

One possible explanation is that the Cooperative Project-Based Learning (CPjBL) strategy created a collaborative learning environment in which students with both FI and FD cognitive styles were able to complement one another throughout the project process. Students with FI cognitive styles may have contributed through analytical reasoning and problem-solving, whereas students with FD cognitive styles benefited from discussion, social interaction, and peer feedback. Consequently, the collaborative nature of CPjBL may have reduced the performance differences typically associated with cognitive style, thereby explaining why the theoretical advantages of FI students were not reflected as statistically significant differences in the outcomes.

These findings are consistent with previous studies suggesting that collaborative learning environments reduce performance differences associated with cognitive style by enabling students to complement one another's strengths during project completion. However, the findings differ from studies reporting superior academic performance among Field Independent learners. A possible explanation is that social praxis learning emphasizes collaborative interpretation, discussion of historical sources, and collective problem-solving, thereby providing relatively equal learning opportunities for students with different cognitive styles.

Overall, the findings indicate that learning strategy plays a more important role than cognitive style in influencing students' conceptual understanding and concept application abilities. These results reinforce the view that learning outcomes are determined not only by individual cognitive characteristics but also by the learning environment created during instruction. By integrating collaborative projects, discussion, and contextual problem-solving, the CPjBL strategy provides learning opportunities that benefit students with diverse cognitive characteristics.

From a practical perspective, these findings suggest that lecturers should consider using collaborative learning strategies that accommodate the diversity of students' cognitive characteristics. Rather than emphasizing individual learning preferences, instructional design should provide opportunities for students to collaborate, exchange ideas, and solve authentic problems together. Therefore, CPjBL can be regarded as an effective instructional strategy for promoting conceptual understanding and concept application in social praxis learning within higher education.

■ CONCLUSION

Based on the results and discussion of this study, it can be concluded that the learning strategy exerted a greater influence on students' learning outcomes than cognitive style. The Cooperative Project-Based Learning (CPjBL) strategy proved to be more effective than Project-Based Learning (PjBL) in improving both conceptual understanding and the application of social praxis concepts. Collaborative learning activities enabled students to participate more actively in the learning process, construct knowledge through discussion, and apply concepts in authentic social contexts.

Differences between Field Independent (FI) and Field Dependent (FD) cognitive styles did not exert a dominant influence on students' learning achievement. Although descriptive differences were observed between FI and FD students, these differences were not statistically significant, indicating that appropriately designed learning strategies can facilitate comparable learning outcomes across different cognitive characteristics. Furthermore, although a significant interaction between learning strategy and cognitive style was identified, its effect size was relatively small, suggesting that learning strategy contributed more substantially to students' learning outcomes than cognitive style.

From a practical perspective, these findings suggest that lecturers should prioritize the design

of collaborative learning environments rather than grouping students according to cognitive style. Course syllabi may incorporate heterogeneous learning groups consisting of students with both FI and FD cognitive styles, supported by structured peer tutoring, collaborative project work, and clearly defined group roles. Such an instructional design is expected to provide equitable learning opportunities while promoting students' conceptual understanding and concept application in social praxis learning.

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