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The Effect of Problem Solving Learning Method and Cognitive Style on Students' Analytical Skills in Economics

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ABSTRACT

The purpose of this study to find out the test results: (1) differences in analytical skills of students who studied with problem solving methods and lectures methods, (2) differences in cognitive style field independent and field dependent on the analytical skills of students, (3) the interaction between problem solving method and cognitive style on analytical skills. This research was conducted by applying 2x2 factorial design. The object of this research is class XI SMA Negeri 2 Singaraja. The study hypothesis was tested with a statistical test Analysis of Variance (ANOVA). The results showed that (1) there is a difference of analytical skills students learn problem solving method and lecture method ($F = 38.130$; a significance level of 0.000 ; $p < 0.05$), (2) there are differences in cognitive style field independent and field dependent on analysis skills ($F = 11.400$; a significance level of 0.001 ; $p < 0.05$), (3) there is an interaction effect between the problem solving method and cognitive style on analytical skills ($F = 10.310$; a significance level of 0.002 ; $p < 0.05$).

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INTRODUCTION

Education is a complex and dynamic process that functions as a systematic effort to develop the intellectual, emotional, and social potential of learners. It is commonly conceptualized as a system composed of three integral components: input, process, and output. In this system, the input refers to students who bring diverse backgrounds, abilities, and motivations to the learning environment. The process encompasses the entire teaching and learning activity, including instructional strategies, learning materials, assessment, and interaction dynamics. Finally, the output represents the learning outcomes or the changes that occur as a result of the educational process, typically measured through assessments such as daily tests, midterm exams, final semester exams, and end-of-year evaluations. These components are interrelated and mutually reinforcing, and together they shape the quality of human resources produced by the education system (Wafudu, Kamin, & Marcel, 2022).

In the context of globalization and technological disruption, education is expected not only to transmit knowledge but also to foster critical competencies such as problem-solving, creativity, communication, collaboration, and, most importantly, critical thinking. The success of education is no longer solely determined by how much knowledge a student can memorize, but by how well they can analyze, synthesize, and apply that knowledge in diverse and often complex real-life situations (Forster & Van De Werfhorst, 2019). In formal educational settings, learning is typically accompanied by assessments and evaluations to determine the extent to which educational goals have been achieved. The outcomes of these assessments provide essential feedback for teachers, students, and education stakeholders in identifying strengths, addressing gaps, and improving instructional practices.

One of the critical cognitive abilities in this regard is analytical thinking, which refers to the capacity to break down information into components, examine relationships among those components, and evaluate patterns to form logical conclusions. Analytical thinking is a core element of higher-order thinking skills, which are increasingly recognized as essential in the 21st-century knowledge economy. However, the development of this skill remains a significant challenge in many schools. Students often struggle to engage with learning tasks that require analysis and interpretation, especially in subjects like economics, where abstract concepts and complex decision-making processes are common.

A preliminary study conducted by the researcher at SMA Negeri 2 Singaraja during the odd semester of the 2016/2017 academic year revealed a noticeable deficiency in students' analytical thinking abilities in economics classes. This was evidenced by students' low scores on assessment questions that required analytical

reasoning but were not directly patterned after practice questions or examples provided during class instruction. Although the underlying economic concepts in both the practice and assessment items were identical, many students failed to transfer their understanding to unfamiliar contexts, demonstrating weak analytical processing skills.

The following table presents the results of the preliminary assessment conducted using semester examination questions developed by the economics teacher for Grade XI IPS students:

Table 1. *Student Achievement in Analytical Thinking Tests , Grade XI IPS, SMA Negeri 2 Singaraja, Academic Year 2016/2017*

No.	Class	Criteria	Frequency	Percentage
1	XI IPS 1	High (≥ 75)	8	25%
		Low (≤ 75)	24	75%
2	XI IPS 2	High (≥ 75)	10	31.25%
		Low (≤ 75)	22	68.75%
3	XI IPS 3	High (≥ 75)	12	40%
		Low (≤ 75)	18	60%

The data clearly indicate that a substantial proportion of students fell within the lower category of analytical skill. For example, in class XI IPS 1, only 25% of students scored above the competency threshold of 75, while the remaining 75% scored below it. Similar patterns were observed in the other classes, with most students failing to meet the criteria for high analytical performance. This trend suggests a widespread deficiency in students' ability to apply analytical reasoning, which is crucial for mastering economic concepts.

Analytical thinking, as defined by Semilarski et al. (2022), involves the ability to: (1) determine the interconnections between different sets of information; (2) identify core ideas underlying a body of information; and (3) draw conclusions from information across temporal and dimensional contexts. These skills are foundational not only for academic success but also for informed decision-making in everyday life and in future employment.

One of the contributing factors to students' weak analytical thinking is the continued use of conventional teaching methods in the classroom. These methods typically emphasize content delivery and rote memorization rather than problem-solving or reflective inquiry. According to Wallace in Gweon & Schulz (2019), the

conventional method involves the teacher as the central source of information, while students are passive recipients. Instruction is generally limited to explanation, demonstration, questioning, and textbook-driven tasks, with minimal emphasis on independent exploration or critical discussion.

Brown (2021) further characterizes conventional teaching as a direct instruction model that focuses on structured delivery of information, classroom control, and assessment-driven outcomes. While this model may be effective in transmitting factual knowledge, it often fails to engage students in deeper thinking processes. In economics education, where interpretation, evaluation, and analysis are essential, such instructional practices may hinder the development of students' analytical capacities (Heijltjes et al., 2015).

To overcome this issue, educators must shift toward student-centered learning approaches that actively involve learners in the knowledge construction process. Strategies such as problem-based learning, collaborative inquiry, brainstorming, and guided discovery have been shown to stimulate higher-order thinking skills, including analysis, synthesis, and evaluation (Loyens et al., 2023). These methods not only make learning more engaging but also enable students to apply theoretical concepts to practical scenarios, thereby reinforcing their understanding and cognitive flexibility.

Furthermore, improvements in analytical skills are not solely dependent on teaching methods but also on curriculum design, assessment models, and teacher competencies. A well-structured economics curriculum should incorporate activities that challenge students to reason through economic dilemmas, interpret data, compare alternatives, and predict consequences. Teachers, in turn, need ongoing professional development to adopt new instructional methods and design effective learning tasks that nurture analytical thinking (Sims et al., 2023).

In conclusion, the ability of students to think analytically is a critical component of educational success in the modern world, especially in fields such as economics that require the interpretation of dynamic and complex systems. Preliminary data from SMA Negeri 2 Singaraja illustrate a pressing need to enhance students' analytical skills through innovative instructional strategies. Conventional methods alone are insufficient to meet these cognitive demands. A pedagogical transformation, grounded in research-based practices, is urgently needed to equip students with the tools to succeed academically and thrive in an increasingly competitive global landscape.

LITERATURE REVIEW

Analytical thinking skills in students can be enhanced through the use of instructional methods that emphasize student-centered problem solving. One of the most effective approaches for this purpose is the Problem Solving Learning Method. This method encourages students not only to think analytically but also to develop their skills in solving problems and addressing real-world issues. According to Servant-Miklos, (2018), when students are faced with a problem, they not only learn how to solve it but also acquire new knowledge in the process. Problem solving plays a crucial role not only in science education but also in various other disciplines, especially because it allows learning to occur in a more flexible and adaptive manner. As stated by Yoshimi (2017), problem-solving is not merely a teaching method but a method of thinking, as it involves a sequence of actions starting from data collection to drawing conclusions.

One of the primary factors contributing to students' low analytical thinking ability is the inappropriate selection of instructional strategies, compounded by internal factors such as students' cognitive styles in processing information. Among the key learner characteristics that must be considered when selecting and applying a teaching method is cognitive style. Cognitive style is closely related to how students think, perceive, and interact with learning content, which directly affects their academic performance (Wang & Kao, 2022). Each cognitive style brings different strengths and limitations in achieving learning outcomes. Therefore, teachers are expected to assess their students' cognitive styles and then tailor their teaching approaches to accommodate these differences.

The alignment between students' cognitive styles and teachers' instructional strategies is particularly important. One widely recognized dimension of cognitive style is the distinction between Field-Independent (FI) and Field-Dependent (FD) learners. According to Mahvelati (2020), FI learners tend to perceive information by focusing on individual components, exhibit strong analytical abilities, and are more self-monitoring in processing information, whereas they may be less inclined toward interpersonal engagement. On the other hand, FD learners perceive information holistically, prioritize social relationships, and work more effectively in group-based settings.

FI learners tend to be more autonomous, self-initiated, responsible, and critical. They may also demonstrate strong individual control, demanding behavior, emotional detachment, and lower social sensitivity. Conversely, FD learners are more socially oriented, prefer close interpersonal interactions, and are more sociable and physically expressive in their learning preferences.

Further distinctions are provided by Lo & Hew (2018), who explain that FI learners typically prefer studying mathematics and natural sciences, favoring

analytical processing over rote memorization. In contrast, FD learners enjoy collaborative learning, frequent interaction with teachers, and often show a preference for humanities and social sciences. According to Mahvelati (2020), FI learners are more inclined toward independent study, are better at separating relevant stimuli from contextual noise, and are less influenced by environmental changes. FD learners, on the other hand, struggle to distinguish stimuli from their background and are more susceptible to external influences.

Supporting this view, Verawati et al. (2020) note that FI learners may find it challenging to isolate critical information but are more selective in information intake, relying heavily on internal cognitive filters. FD learners, by contrast, are more affected by external cues and therefore tend to be less selective in processing information.

Considering the varying characteristics of cognitive styles, adapting instructional methods to match these differences is crucial in enhancing student performance, particularly in developing analytical thinking. By aligning cognitive styles with the problem-solving method, students are more likely to experience improved analytical performance, as this method requires breaking down complex issues, exploring solutions, and synthesizing new knowledge. This instructional approach is especially relevant for economics education, where abstract thinking and decision-making are critical. Therefore, the alignment of students' cognitive styles with appropriate instructional strategies such as problem-solving learning is expected to significantly influence students' analytical abilities (Wu & Hou, 2015).

Based on the persistent issue of low analytical skills, which may stem from both ineffective teaching methods and mismatches between instructional strategies and students' cognitive styles, this study seeks to examine the effects of problem-solving learning methods and cognitive styles on students' analytical thinking ability in the context of economics education.

METHODS

The present study employed a quasi-experimental design, specifically using a 2x2 factorial design, which is widely recognized in educational research for its flexibility and effectiveness in exploring causal relationships in real-world classroom settings. Unlike true experimental designs, which require strict randomization and complete control over variables, quasi-experimental designs are more suitable in educational contexts where ethical and logistical constraints often limit the use of random assignment. For instance, schools and teachers may be reluctant to allow random assignment that could disrupt instructional continuity, or institutional policies might prevent unequal treatment of students (Troyer, 2022). Therefore, this

design was chosen as a pragmatic solution that allows for controlled comparisons between groups while maintaining ecological validity (Gordon et al., 2023).

The 2x2 factorial design used in this study allows the researcher to assess not only the main effects of two independent variables, learning method and cognitive style, but also their interaction effects on students' analytical thinking ability. Each independent variable comprises two levels: the learning method variable includes (1) the problem-solving method and (2) the conventional method, while the cognitive style variable includes (1) Field Independent (FI) and (2) Field Dependent (FD) styles. These combinations produce four distinct experimental groups as illustrated in Table 2.

Table 2. *2x2 Factorial Design*

Cognitive Style	Problem-Solving Method (A ₁)	Conventional Method (A ₂)
Field Independent (B ₁)	KA_A ₁ B ₁	KA_A ₂ B ₁
Field Dependent (B ₂)	KA_A ₁ B ₂	KA_A ₂ B ₂

This design enables researchers to determine how specific teaching methods impact students with different cognitive orientations and to identify which combinations of strategies and learner traits are most conducive to enhancing critical and analytical thinking (Lee et al., 2016). This is particularly significant in the context of economics education, where the ability to analyze, synthesize, and evaluate information plays a central role in learning success (Platz, 2022). Moreover, factorial designs such as this are highly efficient, as they allow multiple hypotheses to be tested simultaneously, thus maximizing the information obtained from a single experiment (Jaki & Vasileiou, 2016).

To gather data, two primary instruments were used in this research:

1. Analytical Thinking Test

The first instrument utilized in this study was a custom-designed analytical thinking test, developed to evaluate students' higher-order cognitive abilities, particularly in the domain of analytical reasoning. This test aimed to measure the extent to which students could effectively engage in mental processes such as identifying patterns, distinguishing relevant from irrelevant information, establishing logical relationships, and constructing causal inferences within complex problem-solving contexts. These abilities are crucial in the field of economics education, where analytical thinking underpins core competencies such as interpreting data trends, evaluating economic arguments, and proposing policy recommendations.

The development of the test was guided by Bloom's Revised Taxonomy, with a specific focus on the higher levels of cognitive complexity—especially the “analyze,” “evaluate,” and “create” categories (Adams, 2015). This ensures that the instrument not only assessed students' factual recall or comprehension, but also their ability to break down information into component parts, recognize implicit assumptions, and assess alternative explanations—skills essential for economic literacy and critical discourse.

Each item in the test was contextualized within real-world economic scenarios, such as fiscal policy decisions, market behavior, or resource allocation problems. The use of authentic and situational tasks was intended to simulate the kind of analytical reasoning demanded in academic economics and real-life applications. For example, one item required students to compare multiple economic indicators (such as inflation rate, unemployment, and interest rates) to determine the most appropriate monetary policy response—a task that demands the integration of conceptual knowledge with logical interpretation.

The test format combined multiple-choice items with short constructed responses, providing a balanced assessment of both structured analytical tasks and open-ended reasoning. Scoring rubrics for the constructed responses were designed to capture the depth, accuracy, and coherence of student arguments, with inter-rater reliability checks conducted to ensure consistency across scorers.

In line with Kim et al. (2018), who emphasized the importance of fostering analytical competence in economics education, this test sought to provide an empirical measure of how well students could apply analytical thinking in decision-making scenarios. The instrument was also pilot-tested with a small group of students to ensure item clarity, appropriate difficulty level, and alignment with instructional objectives.

In sum, the analytical thinking test functioned as a diagnostic and evaluative tool, offering insights into students' cognitive engagement and their ability to transfer conceptual knowledge into analytical reasoning. The results served as a foundation for further analysis regarding the effectiveness of instructional interventions and their relationship to other cognitive and affective factors under study.

2. Cognitive Style Assessment (GEFT)

The second research instrument used in this study was the Group Embedded Figures Test (GEFT), a well-established psychometric tool developed by Witkin and colleagues to assess individuals' cognitive styles specifically distinguishing between Field Independent (FI) and Field Dependent (FD)

learners. Cognitive style, in this context, refers to the characteristic ways individuals perceive, think, solve problems, and organize information. It is an essential construct in educational psychology and has been shown to influence how students engage with learning materials, interact with their environment, and respond to instructional strategies.

The GEFT is a visual perceptual test consisting of a series of items in which participants are asked to locate simple geometric shapes embedded within complex visual figures. The test demands analytical attention, perceptual restructuring, and the ability to disembed figures from an irrelevant background skills closely associated with field independence. Individuals who are field-independent tend to be more analytical, self-directed, and capable of extracting relevant information from complex or distracting contexts. In contrast, field-dependent individuals are more likely to rely on external cues, are more socially oriented, and may struggle when dealing with ambiguous or visually complex tasks.

The administration of the GEFT typically includes a timed paper-based or digital assessment divided into three sections. The first section is usually a practice trial, followed by two graded parts containing embedded figures of increasing difficulty. Scoring is based on the number of correct figures identified by the respondent, with higher scores indicating stronger field independence.

According to the classification criteria proposed by Ardana (2008), participants who achieve a score greater than 50% of the maximum possible score are categorized as Field Independent (FI), whereas those who score 50% or less are considered Field Dependent (FD). This threshold allows researchers to make clear distinctions between the two styles, although it is recognized that cognitive style may exist along a continuum rather than as a strict dichotomy. The GEFT's scoring system is both quantitative and diagnostic, allowing for straightforward integration with statistical analysis in educational research.

GEFT has been widely validated and applied across various educational settings and cultural contexts. Numerous studies have shown that FI learners tend to perform better in tasks requiring logical reasoning, abstract thinking, and problem-solving, especially in mathematics, science, and technical subjects. Conversely, FD learners often excel in tasks involving social interaction, group work, and contextual learning, suggesting that matching teaching methods to cognitive style preferences can enhance learning outcomes.

In the context of this study, the use of the GEFT was critical in identifying the cognitive style profiles of the student participants. This classification informed the subsequent analysis of how cognitive style might interact with instructional

interventions or correlate with other variables such as academic performance, learning motivation, or critical thinking ability. Moreover, understanding cognitive style differences allowed the researchers to interpret behavioral patterns and learning preferences more deeply, offering insights into the individualization of instruction and differentiated learning strategies.

FI learners are typically more self-directed, analytical, and less influenced by social or contextual cues. They prefer independent learning and tend to excel in tasks requiring internal structuring of information. In contrast, FD learners are more socially-oriented, respond well to external guidance, and often perform better in cooperative learning settings (Johnson & Johnson, 2017). Research has shown that matching teaching strategies with students' cognitive styles can significantly improve learning outcomes, especially in complex subjects like economics where abstract thinking and problem-solving are critical (Wu et al., 2024).

The use of these two instruments in tandem provides a comprehensive understanding of how both internal learner characteristics and external instructional strategies interact to affect analytical thinking. This methodological framework supports a differentiated instruction model, where educators can tailor their teaching methods to accommodate the cognitive diversity of students in the classroom (Gheysens et al., 2020).

Furthermore, this study contributes to the growing body of evidence suggesting that instructional methods grounded in active learning, such as problem-solving, are more effective in cultivating critical and analytical thinking than traditional, passive learning approaches (Styers et al., 2018). When students engage in solving real-world problems, they not only practice cognitive analysis but also acquire new knowledge and skills that are transferable across contexts.

By examining the interaction between cognitive style and instructional method, this research aims to generate practical recommendations for educators seeking to foster analytical competence in secondary-level economics education. The results are expected to inform curriculum development, teacher training, and classroom practices that better support diverse learner needs and cognitive profiles.

RESULT

This study sought to investigate the influence of different learning methods and cognitive styles on students' analytical thinking skills in economics. To achieve this, a quasi-experimental design was adopted using a 2x2 factorial approach, which enabled the researchers to examine not only the independent effects of teaching method and cognitive style, but also the interaction between these two variables. The two levels of the learning method factor were the Problem Solving method and the

Conventional method, while the two levels of cognitive style included Field Independent (FI) and Field Dependent (FD) learners. This factorial design resulted in four distinct experimental groups: A₁B₁ (Problem Solving + FI), A₂B₁ (Conventional + FI), A₁B₂ (Problem Solving + FD), and A₂B₂ (Conventional + FD).

To ensure that the conditions for conducting inferential statistical analysis were satisfied, several preliminary statistical assumption tests were conducted before the main hypothesis testing.

1. Normality Test

The assumption of normality was examined using the Kolmogorov–Smirnov test, which is a widely accepted method for evaluating whether a given dataset follows a normal distribution. The results revealed that the significance values for all four groups exceeded the threshold of 0.05. This indicates that the distribution of the post-test scores in all groups did not deviate significantly from a normal distribution. Hence, the assumption of normality was met, and the use of parametric tests such as Two-Way ANOVA was considered appropriate.

2. Homogeneity of Variance Test

The next assumption to be tested was the homogeneity of variances, which was evaluated using Levene's test. The output of Levene's test showed a p-value of 0.935, which is well above the 0.05 significance level. This result implies that the variance of the dependent variable (analytical skill scores) was equal across all groups, thereby satisfying the assumption of homogeneity of variance. Meeting this assumption further validates the use of ANOVA to test the research hypotheses.

3. Hypothesis Testing with Two-Way ANOVA

After confirming that the assumptions of normality and homogeneity were fulfilled, the researchers proceeded with a Two-Way ANOVA (Analysis of Variance). This analysis allowed for the simultaneous examination of:

1. The main effect of the teaching method (Factor A),
2. The main effect of cognitive style (Factor B),
3. The interaction effect between teaching method and cognitive style ($A \times B$).

The results of the ANOVA analysis are as follows:

1. Main Effect of Teaching Method:
The analysis revealed a significant effect of teaching method on analytical skills, with an F-value of 38.130 and a p-value of 0.000. This finding suggests

that the teaching method used has a statistically significant impact on students' analytical skill development. Specifically, students taught using the problem solving method outperformed those taught using the conventional method.

2. Main Effect of Cognitive Style:

The ANOVA output also indicated a significant effect of cognitive style, with an F-value of 11.400 and a p-value of 0.001. This result highlights that students' cognitive styles influence their analytical skill levels, with Field Independent students performing better on analytical tasks than their Field Dependent counterparts.

3. Interaction Effect between Teaching Method and Cognitive Style:

The interaction between teaching method and cognitive style was also found to be significant, with an F-value of 10.310 and a p-value of 0.002. This interaction implies that the effectiveness of a particular teaching method depends on the cognitive style of the student. In other words, the benefit gained from a certain instructional strategy varies depending on whether the student is Field Independent or Field Dependent.

4. Post-Hoc Analysis with Tukey HSD

To further explore where the differences lay among the four groups, a Tukey's Honest Significant Difference (HSD) post-hoc test was performed. This test is designed to determine which specific group differences were statistically significant. The table below presents the results:

No	Comparison Group	Mean Difference	Significance (p)	Conclusion
1	A1B1 vs A2B1	13.15938	0.000	Significant
2	A1B1 vs A1B2	18.75000	0.000	Significant
3	A1B1 vs A2B2	19.08063	0.000	Significant
4	A2B1 vs A1B2	5.59063	0.207	Not Significant
5	A2B1 vs A2B2	5.92125	0.166	Not Significant
6	A1B2 vs A2B2	0.33062	0.999	Not Significant

The Tukey test results clearly indicate that the A1B1 group (Problem Solving + Field Independent) achieved significantly higher analytical skill scores compared to all other groups. The large mean differences and low p-values (< 0.05) support this conclusion. Conversely, no significant differences were observed among the other groups (A2B1, A1B2, A2B2), which suggests that the combination of problem solving

teaching and Field Independent cognitive style is particularly powerful for developing analytical thinking in economics.

5. Summary of Findings

- 5.1 The problem solving method is more effective than the conventional method in enhancing students' analytical skills.
- 5.2 Students with a Field Independent cognitive style demonstrate stronger analytical abilities compared to Field Dependent students.
- 5.3 There is a significant interaction between teaching method and cognitive style, indicating that instructional effectiveness is influenced by learners' cognitive characteristics.
- 5.4 The most effective combination observed was Problem Solving method + Field Independent learners, suggesting that these students benefit most from active, inquiry-based learning strategies.

These findings emphasize the importance of adapting teaching methods to accommodate learners' cognitive preferences. They also support the broader pedagogical claim that higher-order thinking skills such as analysis can be significantly enhanced through well-structured instructional design that takes into account both the method and learner characteristics.

DISCUSSION

The discussion section should focus on the interpretation of the findings and link them to existing literature. The author should explain why the findings are significant and how they contribute to enhancing theoretical understanding in the researched field. Additionally, the discussion should include an analysis of any contradictions or differences with previous studies, as well as provide practical and theoretical implications.

The results of this study provide compelling evidence that the problem solving learning method significantly improves students' analytical skills in comparison to conventional learning methods. This finding is aligned with the framework of instructional design based on cognitive theories, particularly the learning hierarchy model proposed Yu et al. (2014), which emphasizes that the presentation of problems requiring students to analyze, synthesize, and evaluate information leads to deeper learning. According to this theory, when learners are challenged with complex, real-life problems, they do not merely develop solutions but also acquire transferable knowledge and higher-order cognitive abilities.

The problem solving approach actively engages students in the learning process. Rather than being passive recipients of information, learners become active investigators, collaborators, and critical thinkers. They are encouraged to examine alternatives, weigh evidence, justify reasoning, and make informed decisions, all of which are essential components of analytical thinking. Several studies have also confirmed that problem-based learning fosters students' ability to transfer knowledge to novel situations and promotes long-term retention of concepts (Wijnen et al., 2016). These advantages position problem solving as an ideal pedagogical approach for subjects like economics, where complex reasoning, cause-effect relationships, and data interpretation are fundamental.

Conversely, the conventional learning method, typically characterized by lecture-based instruction and teacher-centered activities, often prioritizes memorization over meaning-making. Students are expected to absorb information presented to them without much room for inquiry, reflection, or independent thought (Pedaste et al., 2015). As a result, such instructional methods may inadequately support the development of analytical skills. Although they may be effective in delivering large volumes of content in a short time, they do not necessarily equip students with the cognitive tools needed for analytical reasoning and problem solving in real-world contexts.

Another major finding of this study is the significant impact of cognitive style on analytical performance. Specifically, students with a Field Independent (FI) cognitive style outperformed those with a Field Dependent (FD) style on tasks requiring analytical thinking. This is consistent with the cognitive style theory described by Mahvelati (2020), which suggests that FI learners are more likely to separate relevant details from distracting backgrounds, rely on internal frames of reference, and engage in independent decision-making. These traits make them particularly well-suited for tasks that demand logical analysis and critical thinking. In contrast, FD learners are more context-dependent, socially oriented, and often require external cues for learning, which can hinder performance in tasks requiring deep cognitive engagement, especially in individual or inquiry-based learning environments.

Most notably, this study identified a significant interaction effect between learning method and cognitive style, illustrating that the success of a given instructional method is not uniform across learners. Instead, it is influenced by individual learner characteristics. The A₁B₁ group, students with a Field Independent cognitive style taught using the problem solving method, achieved the highest scores in analytical skill assessments. This outcome reinforces the theoretical premise that instructional effectiveness is maximized when teaching strategies are aligned with learners' cognitive styles (Wu et al., 2024). It implies that students with analytical and

autonomous learning tendencies (FI) thrive when placed in environments that challenge them to apply, analyze, and evaluate information independently, as is typical in problem-solving scenarios.

On the other hand, the absence of significant differences among the FD groups, regardless of instructional method, suggests that FD learners may require different forms of support, such as structured guidance, scaffolding, or collaborative learning strategies, to succeed in analytical tasks. This finding underscores the complexity of learning and the need for educators to diversify instructional practices rather than relying on a singular teaching approach.

The findings also provide empirical support for differentiated instruction, a pedagogical strategy that emphasizes tailoring teaching methods to students' learning preferences and needs (Gheysens et al., 2020). Teachers must be equipped to assess cognitive styles early in the instructional process and modify lesson plans accordingly. For FI learners, independent projects and problem-based tasks may be most effective, while for FD learners, peer collaboration, teacher feedback, and contextualized learning may be more appropriate.

Moreover, the results from the Tukey post hoc test further validate the benefits of aligning teaching methods with cognitive preferences. The clear performance advantage of the A₁B₁ group suggests that this match between method and style yields the most favorable learning outcomes. Such evidence supports the broader instructional principle that personalized and responsive teaching fosters more meaningful and lasting learning experiences (Murtaza et al., 2022).

1. Educational Implications

From an instructional design perspective, this study contributes significantly to the growing literature on adaptive pedagogy and cognitive compatibility in learning environments. Educators are urged to move beyond a "one-size-fits-all" model and toward a more nuanced understanding of their students' cognitive traits. In doing so, they can implement instructional strategies that optimize individual learning potential, particularly in subjects like economics that require high levels of cognitive engagement.

These findings also hold implications for curriculum developers, school administrators, and policymakers. There is a clear need to integrate problem solving and other active learning strategies into the core curriculum, while also providing professional development for teachers to recognize and respond to students' cognitive styles. By doing so, schools can foster environments that cultivate higher-order thinking skills, bridge performance gaps, and prepare students for the analytical demands of higher education and the modern workforce.

2. Conclusion of Discussion

In conclusion, this study affirms that teaching methods and cognitive styles both play critical roles in shaping students' analytical skill development. Most importantly, the interaction between these factors suggests that the effectiveness of instructional interventions is context-dependent and learner-specific. The superior performance of Field Independent learners under the problem solving method highlights the importance of matching instructional techniques with student characteristics. As educators strive to cultivate analytical thinkers for the 21st century, instructional personalization and cognitive-awareness should be central tenets of educational practice.

CONCLUSION

In general, the findings of this study demonstrate that the implementation of the problem solving learning method, combined with consideration of students' cognitive styles, can significantly enhance students' analytical abilities, particularly in the context of economics education. The results indicate that students who were taught using the problem solving approach outperformed those taught through conventional, lecture-based instruction. This highlights the importance of using active and student-centered teaching strategies that foster critical and analytical thinking. The problem solving method allows students to be actively involved in the learning process, encourages exploration, promotes inquiry, and facilitates the application of knowledge to real-world situations. These aspects are crucial for developing higher-order thinking skills, which are essential in analyzing, synthesizing, and solving complex economic problems in both academic and practical contexts.

Furthermore, the study revealed a significant difference in analytical performance between students with different cognitive styles. Students who exhibited a Field Independent (FI) cognitive style tended to perform better analytically than their Field Dependent (FD) counterparts. Field Independent learners are generally more autonomous, capable of organizing and processing information independently, and better equipped to deconstruct abstract problems into logical components. These students are more comfortable working on tasks that require minimal guidance and high cognitive engagement, which makes them more adept at dealing with tasks that demand focused analysis and structured reasoning. In contrast, Field Dependent students tend to rely more on external assistance and contextual cues, often preferring collaborative settings and interpersonal interaction. While FD learners may thrive in socially interactive environments, they may face greater challenges when required to navigate complex problems independently, particularly those that require analytical dissection and independent judgment.

Additionally, the findings show a significant interaction between the applied teaching method and students' cognitive styles. Students with both FI and FD cognitive styles demonstrated improved analytical skills when exposed to the problem solving method, but the performance of FI students was significantly more pronounced. This suggests that while the problem solving method is inherently beneficial, its effectiveness can vary based on how well it aligns with individual learning preferences and cognitive orientations. The results reinforce the idea that one-size-fits-all instructional strategies may not serve all learners equally well. Rather, instructional approaches must be flexible and responsive to the cognitive diversity present in the classroom.

This finding has meaningful pedagogical implications. Educators are encouraged not only to incorporate more problem solving-based instruction, but also to conduct preliminary assessments of students' cognitive styles. Such diagnostic efforts can guide educators in selecting or modifying instructional strategies that better match students' learning profiles. In doing so, teachers can foster a more equitable and inclusive learning environment that maximizes each student's potential. For example, additional scaffolding or structured peer collaboration may be provided to FD learners within problem solving contexts to support their engagement and comprehension.

Moreover, this study emphasizes that analytical skill development is not solely the outcome of exposure to content but is strongly influenced by the nature of the learning experience and the learners' internal characteristics. It becomes essential to recognize that cognitive styles are relatively stable traits that influence how learners perceive, process, and respond to information. Therefore, instructional designs must consider such psychological and cognitive factors to foster more meaningful learning experiences.

In the broader context of economics education, enhancing analytical thinking skills is indispensable. Economic literacy requires more than memorizing definitions and formulas, it necessitates the ability to interpret data, assess cause-and-effect relationships, evaluate arguments, and apply theoretical concepts to real-world economic phenomena. By cultivating analytical abilities through problem solving and adaptive pedagogy, students are better prepared to understand economic systems, make informed decisions, and contribute thoughtfully to society.

Overall, this study provides strong empirical support for the assertion that both teaching methods and cognitive styles play a pivotal role in shaping students' analytical thinking abilities. It underscores the need for dynamic and differentiated instructional models that embrace diversity in learners' thinking patterns. As classrooms become more heterogeneous, educators must be equipped with the

knowledge and tools to align pedagogy with learners' cognitive strengths. Only by doing so can schools foster a learning culture that supports all students in developing essential 21st-century competencies, including critical analysis, independent reasoning, and effective problem solving, skills that are foundational to academic success and lifelong learning.

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