Indonesian Journal of Economic Education

Journal homepage: https://ejournal.upi.edu/index.php/IJEE

Indonesian Journal of Economic Education (IJEE)
e-ISSN 2615-5060 p-ISSN 2615-5001
Vol 1 (2) (2024) 41-60
Doi:

The Influence of Problem Posing and Problem Solving Methods on Students' Creative Thinking Skills

Nurul Haeriyah Ridwan[1]*
[1]Economic Education, Universitas Pendidikan Indonesia, Bandung 40154, Indonesia
*Correspondence: E-mail: nurulhaeriyah@gmail.com

ABSTRACT

His study aims to determine the effect of the filing method and meode problem solving to students' ability to think creatively. Issues that are the focus of this research is due to the low level of students' ability to think creatively. Both models of learning are equally focused on solving the problem, the difference between the two is, in Problem Solving learning model, the issue raised came from teachers, while on Problem Posing learning model, the issue raised came from the students themselves. This research is a quasi-experimental research design noneequivalent control group design. The study population was all students of class XII IIS SMA Negeri 1 Lembang and a sample of 113 people. Data analysis using SPSS version 21 with statistical hypothesis testing through paramentric. The average difference test (paired sample test). Results of the study found There are significant differences increase creative thinking ability of students' use of the methods of problem posing with problem solving.

OPEN ACCESS

Article History:
Submitted 01 March 2024
First Revised 15 April 2024
Accepted 05 May 2024
First Available online 10 May 2024
Publication Date 31 August 2024

Keyword:
Creative Thinking,
Method Of Filing A Problem,
Troubleshooting Methods,
Problem Identification,
Solution Development.

CONTACT: nurulhaeriyah@gmail.com

INTRODUCTION

In anticipation of Indonesia's Golden Generation 2045, a pivotal national agenda that envisions a highly competent and globally competitive workforce, the Indonesian education system is facing increasing demands to reform and adapt. This transformation is taking place in the midst of a rapidly evolving technological landscape, where innovation, information access, and digital integration are reshaping every sector of society, including education. This technological revolution is closely intertwined with the progression of economic systems, digital entrepreneurship, and global financial knowledge, requiring educational institutions to cultivate more advanced cognitive and problem-solving skills in students (Redondo-Rodríguez et al., 2023).

One of the fundamental objectives of economics education at the secondary level, as outlined in the national curriculum, is to develop students' logical reasoning, analytical abilities, systematic and critical thinking, as well as creativity and collaboration. These competencies are no longer viewed as optional but rather as essential components of 21st-century learning outcomes (Wu et al., 2021). In this regard, creative thinking is not only a desirable trait but a necessary skill to empower students to navigate and solve complex economic issues, design innovative solutions, and make informed financial decisions in their daily lives and future careers.

The importance of fostering creative thinking in economics education is emphasized in national and international learning frameworks. However, despite these ambitions, the reality in classrooms often diverges significantly from curricular ideals. Empirical observations in educational settings reveal several persistent challenges in actual classroom practice. For example, based on interviews with economics teachers at SMA Negeri 1 Lembang, it was revealed that many students struggle to engage in creative economic reasoning. Their ability to formulate new ideas, approach problems from different angles, and connect economic theory to real-life applications remains limited.

The author's preliminary research at the school, which included a review of student test results in economics, further confirmed this issue. Many students failed to demonstrate satisfactory levels of achievement, especially on assessment items requiring open-ended responses, problem interpretation, or novel solution development (Bartholomew & Strimel, 2018). Teachers noted that their students frequently lost interest during lessons and showed a lack of enthusiasm for engaging in economic problem-solving. This disengagement has been linked to monotonous instructional strategies, particularly traditional, teacher-centered methods such as lecturing, note-taking, and rote memorization, which tend to suppress creativity and discourage higher-order thinking.

The development of students' creative thinking skills is intricately connected to their ability to engage in problem-solving. Ye, Ng, and Cui (2023) argued that flexibility of thought, an essential element of creative thinking, is arguably the most important quality that distinguishes effective problem-solvers. In line with this perspective, the educational process must move beyond content delivery to include cognitive development strategies that cultivate mental agility, divergent thinking, and curiosity-driven inquiry.

One instructional model that aligns well with this aim is Problem Posing, a student-centered approach that involves presenting learners with authentic or simulated real-world situations and encouraging them to formulate their own problems or questions. In economics, this model invites students to explore pressing issues, critically assess assumptions, and construct their own pathways to understanding economic phenomena. Rather than passively receiving information, students become active investigators, which not only enhances their motivation but also nurtures a sense of ownership over their learning (Lee & Hannafin, 2016).

Complementing this model is the Problem Solving instructional method, which requires students to confront challenges, either constructed by the teacher or drawn from actual societal contexts, and apply structured reasoning to arrive at solutions. According to Nicolay et al. (2021) the act of solving problems facilitates deeper learning by requiring students to apply and integrate existing knowledge in new contexts. Furthermore, the Indonesian Ministry of National Education (2008, p. 33) underscores that problem-solving is more than a technique; it is a complex cognitive process involving data analysis, hypothesis formulation, testing, and conclusion drawing. When students engage in this type of learning, they are required to think flexibly, adapt strategies, and reflect on their reasoning processes, hallmarks of creative and critical thinkers.

The use of both Problem Posing and Problem Solving methods is also supported by Indonesia’s 2013 Curriculum, which represents a nationwide effort to enhance educational quality through competency-based, student-centered learning models. Within this curriculum, active learning strategies are emphasized, particularly those that cultivate learners' creativity, communication, collaboration, and critical thinking (the "4Cs"), key competencies aligned with 21st-century skills. Both models encourage student autonomy, active exploration, and the integration of prior knowledge with new experiences, making them especially suitable for economics instruction (Reeve & Shin, 2020).

Despite the theoretical and curricular support for these instructional models, their implementation remains uneven. There is limited empirical research in the Indonesian context, particularly at the senior high school level, comparing the

effectiveness of Problem Posing and Problem Solving methods in enhancing creative thinking, especially in economics. Moreover, many teachers are still unfamiliar with how to effectively integrate these models into their instructional routines or how to assess students' creative thinking objectively.

Given these realities, the present study is both timely and necessary. It seeks to fill the gap in the literature and offer practical insights into the comparative impact of Problem Posing and Problem Solving methods on students' creative thinking abilities in the subject of economics. The study specifically focuses on students in Class XII at SMA Negeri 1 Lembang during the 2015/2016 academic year, a group representing an important cohort preparing for national exams and post-secondary opportunities. By examining how these instructional models influence students' ability to think creatively, the research aims to provide evidence-based recommendations for educators, curriculum developers, and policymakers. Thus, the study is entitled: "**The Influence of Problem Posing and Problem Solving Methods on Students' Creative Thinking Skills: A Quasi-Experimental Study on Economics Learning at SMA Negeri 1 Lembang.**"

METHODS

This study adopted a quasi-experimental research design, a methodological approach commonly used in educational and social science research where true experimental control is not entirely feasible due to natural settings and ethical considerations. Unlike true experimental designs that require random assignment to groups, quasi-experiments allow researchers to investigate causal relationships in real-world educational contexts, where students are already assigned to specific classes and cannot be randomly redistributed (Gopalan et al., 2020). This approach is particularly appropriate in school-based interventions, where natural classroom groups must be maintained for administrative and pedagogical consistency.

The specific design used in this study was the Nonequivalent Control Group Design with Pretest and Posttest, which is widely recognized as one of the most robust quasi-experimental designs. This design involves at least two groups: an experimental group that receives the treatment or instructional intervention, and a control group that does not. Both groups are assessed before (pretest) and after (posttest) the intervention to determine the effect of the independent variable, here, the teaching method, on the dependent variable, which is students' creative thinking ability in economics education (Čančer, 2014).

In this study, the experimental group was exposed to two distinct student-centered instructional approaches: the Problem Posing Method and the Problem Solving Method. These methods are rooted in constructivist learning theory, which posits that learners actively construct knowledge through interaction, reflection, and

problem-based engagement. Meanwhile, the control group followed conventional teacher-centered instruction, primarily involving direct explanation and memorization-based strategies. This distinction between experimental and control conditions provided a comparative basis for evaluating the efficacy of more interactive, inquiry-based pedagogies in enhancing creative thinking.

The Problem Posing Method engages students in the process of formulating questions or problems based on a given context or learning material. Students are not only required to understand the content but also to generate meaningful problems that reflect critical understanding and curiosity. This method encourages deeper engagement and allows learners to explore economic issues from multiple angles. It is especially powerful in cultivating creative thinking, as it requires the use of divergent thinking to construct new, relevant, and often original problem scenarios (Wigert et al., 2022).

The Problem Solving Method, on the other hand, focuses on structured problem resolution. Students are given specific problems to solve, often based on real-life scenarios or hypothetical economic situations. Through this method, students apply theoretical knowledge to practical contexts, using logic, analysis, and synthesis to develop solutions. This method supports convergent thinking, which is also a key aspect of creativity, especially when integrated with flexible problem resolution strategies (Luchini et al., 2023).

To determine the effectiveness of these methods, both groups were subjected to pretests and posttests designed to measure their creative thinking abilities. The assessment instruments were constructed based on recognized criteria of creative thinking, including fluency (the ability to generate many ideas), originality (the uniqueness of ideas), flexibility (the variety of ideas across different categories), and elaboration (the amount of detail in responses). These components were adapted from established creativity measurement frameworks and adjusted to suit the economics learning context (Weng et al., 2022).

In addition, the study also integrated students' initial characteristics, such as their learning motivation, cognitive engagement, and prior academic performance, to better understand the potential mediating factors influencing the learning outcomes. The classroom environment, teacher consistency, and instructional materials were controlled as much as possible to minimize external confounding variables.

The data collected from both pretest and posttest assessments were analyzed using SPSS version 21, a statistical software package commonly used for social science research. Before conducting inferential statistical tests, the data were first subjected to assumption testing to ensure their suitability for parametric analysis. The

Kolmogorov–Smirnov test was used to verify the normality of data distribution, and Levene's test was employed to assess the homogeneity of variances across groups. Both assumptions were met, indicating that the data were appropriate for further parametric testing.

For the main analysis, paired-sample t-tests were conducted to measure changes within each group between the pretest and posttest results, while independent-sample t-tests were used to compare differences between the experimental and control groups. In addition, Analysis of Covariance (ANCOVA) was considered as a supplementary analysis to control for any potential pretest differences, thereby increasing the internal validity and statistical power of the study (Egbewale et al., 2014).

The implementation of this rigorous methodological framework was guided by the overarching aim to explore which instructional method, Problem Posing or Problem Solving, more effectively enhances students' creative thinking. The choice to focus on creative thinking as the outcome variable stems from the increasing recognition that 21st-century education demands learners who are not only knowledgeable but also innovative, adaptive, and capable of solving novel problems in uncertain contexts (Dilekçi & Karatay, 2023).

In conclusion, this study's methodological approach reflects a comprehensive and carefully structured effort to examine pedagogical innovation in the classroom. The quasi-experimental design, combined with validated assessment instruments, systematic data collection, and robust statistical analysis, provides a strong foundation for generating meaningful insights into the relationship between teaching strategies and students' creative cognitive development.

RESULT

This study was conducted at SMA Negeri 1 Lembang during the second semester of the 2015–2016 academic year, targeting students in the eleventh grade. A total of three classes were purposively selected to participate in this quasi-experimental research design, which aimed to investigate the comparative effectiveness of different instructional methods on students' critical thinking and problem-solving abilities in economics education.

The selected sample was divided into three groups: two experimental groups and one control group. The first experimental group was taught using the Problem Posing instructional method. In this model, students were actively engaged in the formulation of questions or problems based on the learning content, particularly focusing on economics-related scenarios. This method was designed to foster deeper

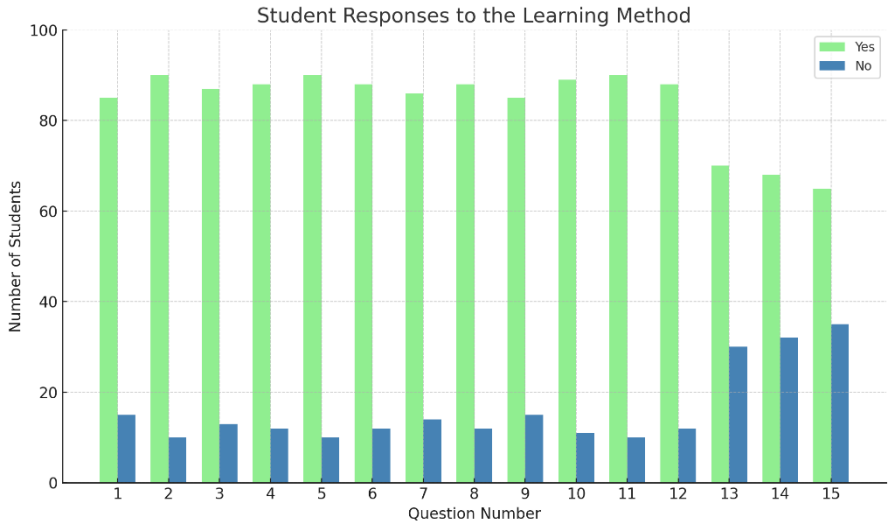
conceptual understanding by encouraging students to deconstruct and reconstruct knowledge, thereby promoting metacognitive awareness and inquiry-based learning.

The second experimental group was exposed to the Problem Solving approach. Students in this group were presented with structured or semi-structured economic problems, either designed by the teacher or drawn from real-world contexts such as inflation, unemployment, or budget planning. This approach emphasized logical reasoning, analytical skills, and the application of theoretical concepts to practical issues, aligning with pedagogical goals for higher-order thinking in economics.

In contrast, the control group continued with conventional instructional strategies, which primarily relied on lecture-based teaching, textbook exercises, and teacher-centered discussions. Students in this group were generally passive recipients of information, with limited opportunities to engage in reflective or interactive learning tasks.

To evaluate the effectiveness of each instructional method, both experimental and control groups underwent a series of assessments, including a pretest and posttest, to measure changes in cognitive outcomes. These tests focused on assessing students' ability to analyze, interpret, and solve economic problems. In addition to these quantitative measures, students in the two experimental groups were also asked to complete questionnaires that captured their perceptions, motivations, and learning experiences during the implementation of the respective teaching methods.

The collected qualitative data were systematically analyzed and used to triangulate the quantitative findings, offering a more comprehensive understanding of how the instructional models influenced not only academic performance but also student engagement and satisfaction. This mixed-methods approach provided robust insights into the pedagogical value of problem-centered learning strategies in secondary-level economics education.



ISSN 2615-5001

Figure 1. *Student responses to the Problem Posing method*

As illustrated in Figure 1, students in the Problem Posing group responded positively to the method. The majority of students answered "Yes" to items measuring engagement, interest, and motivation during the learning process. These responses indicate that the Problem Posing method fostered an interactive learning environment and encouraged students to take initiative in constructing their understanding.

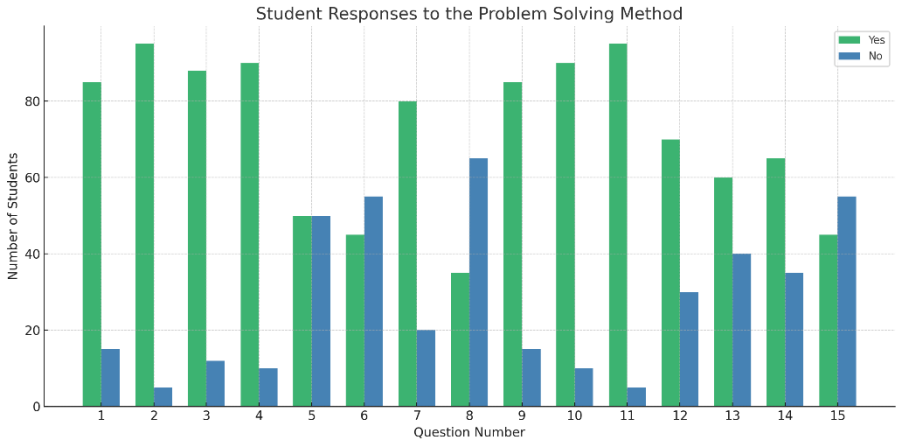


Figure 2. *Student responses to the Problem Solving method*

Likewise, Figure 2 presents students' responses to the implementation of the Problem Solving method. The results indicate comparably high levels of satisfaction among students, mirroring those observed in the Problem Posing group. A majority of respondents reported that this method significantly enhanced their ability to engage with economic concepts more meaningfully, particularly through structured activities that required them to identify, analyze, and resolve real-world problems. Students expressed that the structured nature of the tasks provided clarity and focus, allowing them to build confidence in applying theoretical knowledge to practical economic scenarios.

Furthermore, several students highlighted that the Problem Solving approach helped them develop more systematic thinking, encouraged collaboration through group discussions, and promoted deeper cognitive engagement with the subject matter. These findings imply that this instructional strategy not only facilitated academic skill development such as logical reasoning and decision-making but also fostered positive attitudes toward the learning process itself.

Taken together, the positive student feedback from both instructional models demonstrates that learner-centered, problem-oriented teaching methods were well received. These methods offered students greater opportunities to actively construct

knowledge, reflect on their understanding, and apply their learning in practical contexts. The favorable reception of these approaches underscores the potential of constructivist-based instructional strategies in enhancing both the effectiveness and the enjoyment of economics education at the senior high school level.

Table 1. *Pretest and Posttest Results – Problem Posing Method vs. Control Group*

Group	Number of Students	Pretest Mean	Posttest Mean	N-Gain
Problem Posing	39	12.21	18.65	0.62
Control	40	16.97	16.24	0.53

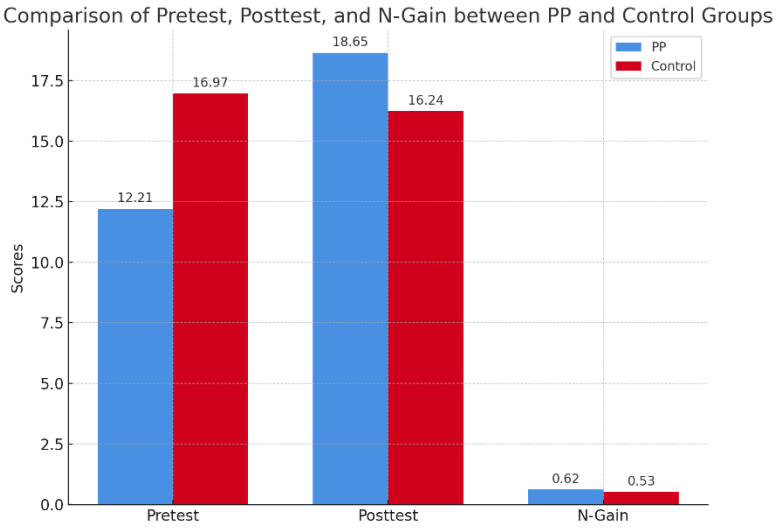


Figure 3. *Line chart comparing pretest and posttest results for Problem Posing and Control groups*

Quantitative data were gathered through a creative thinking test administered before and after the interventions. As shown in Table 1 and Figure 3, students in the Problem Posing group showed substantial improvement. Their average pretest score was 12.21, which increased significantly to 18.65 in the posttest, resulting in an N-Gain score of 0.62, categorized as moderate. On the other hand, the control group had a higher average pretest score of 16.97, but their posttest score slightly declined to 16.24, yielding an N-Gain of 0.53. This contrast highlights that while the control group started at a higher level, they did not benefit from the same instructional gains as the Problem Posing group.

Table 2. *Pretest and Posttest Results – Problem Solving Method vs. Control Group*

Group	Number of Students	Pretest Mean	Posttest Mean	N-Gain

Problem Solving	34	15.15	16.65	0.15
Control	40	16.97	16.24	0.53

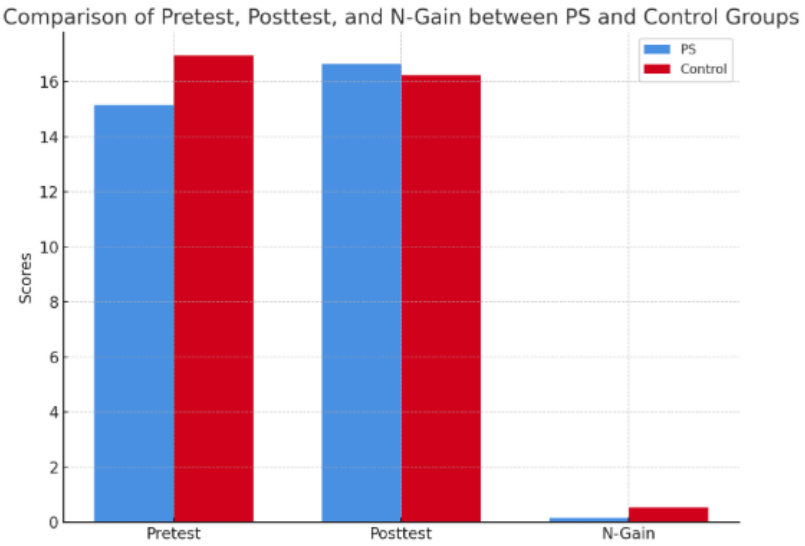


Figure 4. *Line chart comparing pretest and posttest results for Problem Solving and Control groups*

Similarly, in the second experimental group using the Problem Solving method, Table 2 and Figure 4 display a pretest average of 15.15, which increased to 16.65 post-intervention. This resulted in an N-Gain of 0.15, categorized as low. Nonetheless, this small improvement was still more favorable than the slight decrease observed in the control group. This suggests that while the Problem Solving approach had a positive effect, it was not as impactful as the Problem Posing method in stimulating creative thinking.

Hypothesis Testing Results

To validate these observed changes, statistical hypothesis testing using paired sample t-tests and independent sample t-tests was conducted. The results of five hypothesis tests are presented below.

Table 3. *Hypothesis Test 1 – Pretest vs. Posttest (Problem Posing group)*

Group	Number of Students	Pretest Mean	Posttest Mean	Correlation	t-value	p-value
Problem Posing	39	12.44	18.67	0.09	-10.893	0.000

For Hypothesis 1, which tested the effectiveness of the Problem Posing method before and after the intervention, the mean score increased from 12.44 to 18.67. The resulting t-value was -10.893, and the p-value was 0.000, indicating a statistically significant improvement in creative thinking.

Table 4. *Hypothesis Test 2 – Pretest vs. Posttest (Problem Solving group)*

Group	Number of Students	Pretest Mean	Posttest Mean	Correlation	t-value	p-value
Problem Solving	34	15.15	16.65	0.12	-3.339	0.002

In Hypothesis 2, the Problem Solving group showed an increase in average scores from 15.15 to 16.65. The t-value was -3.339, and the p-value was 0.002, also signifying a statistically significant improvement, though the magnitude of change was smaller than in the Problem Posing group.

Table 5. *Hypothesis Test 3 – N-Gain (Problem Posing vs. Control)*

Group	Number of Students	N-Gain	t-value	p-value
Problem Posing	39	6.23	-9.767	0.000
Control	40	-0.53		

Hypothesis 3 compared the N-Gain between the Problem Posing and control groups. The Problem Posing group recorded an N-Gain of 6.23, while the control group's N-Gain was -0.53. The t-test showed a t-value of -9.767 with a p-value of 0.000, indicating a highly significant difference between the two groups.

Table 6. *Hypothesis Test 4 – N-Gain (Problem Solving vs. Control)*

Group	Number of Students	N-Gain	t-value	p-value
Problem Solving	34	4.44	-8.175	0.000
Control	40	-0.53		

Hypothesis 4 tested the effectiveness of the Problem Solving method against the control group. The N-Gain for the Problem Solving group was 4.44, still significantly higher than the control group's negative gain. The t-value was -8.175, with a p-value of 0.000, confirming the superiority of the Problem Solving method in enhancing creative thinking over conventional instruction.

Table 7. *Hypothesis Test 5 – N-Gain (Problem Posing vs. Problem Solving)*

Group	Number of Students	N-Gain	t-value	p-value
Problem Posing	39	6.23	2.367	0.021
Problem Solving	34	4.44		

Finally, Hypothesis 5 compared the two experimental groups directly. The Problem Posing group exhibited a greater gain (6.23) than the Problem Solving group (4.44). The difference was statistically significant, with a t-value of 2.367 and a p-value of 0.021. These findings confirm that although both methods are beneficial, Problem Posing has a stronger effect on the development of students' creative thinking skills.

DISCUSSION

The analysis of the research data reveals several significant insights into the impact of instructional methods on students' creative thinking. The first major finding is that the Problem Posing method significantly enhances students' creative thinking abilities compared to conventional teaching. This aligns with constructivist theories suggesting that when students are encouraged to formulate their own questions, they engage more deeply with the content, leading to richer understanding and increased cognitive activity (Weimer et al., 2017). The act of posing problems helps students move beyond passive absorption of information and into active construction of knowledge. It empowers learners to take ownership of their learning experience and facilitates metacognitive awareness, both of which are essential components of creativity (Urban et al., 2021).

In this study, students who participated in learning activities using the Problem Posing method not only demonstrated greater engagement but also exhibited improvements in fluency, flexibility, and originality of thought, core indicators of creative thinking (Sadak et al., 2022). This suggests that when students are involved in designing or identifying problems, they are compelled to analyze situations more deeply and draw on prior knowledge in novel ways. Such practices not only improve academic performance but also promote lifelong learning skills (Feraco et al., 2022).

Similarly, the Problem Solving method also led to statistically significant gains in students' creative thinking, though the improvement was slightly lower than that of the Problem Posing method. This method focuses on guiding students through structured problem resolution, often involving real-life scenarios that require divergent thinking, decision-making, and adaptability. Such engagement nurtures flexible thinking and innovation, particularly when students are exposed to various solution paths (Randhawa et al., 2021). The strategy promotes learning through experience and reflection, allowing students to test hypotheses, apply theoretical

frameworks, and explore multiple alternatives, important elements in fostering creativity (MacAskill et al., 2023).

However, the slightly lower gain in creativity observed in the Problem Solving group compared to the Problem Posing group suggests a key pedagogical insight: while problem resolution is critical, the act of problem formulation is even more cognitively demanding and rewarding. When students are involved in identifying or constructing the problems themselves, it encourages ownership, curiosity, and self-directed learning, all of which are known to support creative development (Rubenstein et al., 2020). The combination of problem formulation and resolution, therefore, appears to be the most effective in activating higher-order thinking skills and creative ideation.

The comparative analysis between the two experimental groups and the control group reinforces the superiority of student-centered learning strategies over traditional instructional methods. Students in both the Problem Posing and Problem Solving groups significantly outperformed those in the control group, who received conventional lecture-based instruction. This outcome underscores the limitations of passive learning environments in fostering creativity. Conventional teaching methods often center around rote memorization and limited interaction, which do not provide sufficient cognitive stimulation for the development of creative skills (Benedek & Fink, 2019).

Moreover, these results validate the principles underpinning the 2013 Curriculum in Indonesia, which emphasizes the importance of active, collaborative, and inquiry-based learning approaches. The curriculum explicitly aims to cultivate 21st-century competencies such as creativity, critical thinking, communication, and collaboration. The incorporation of Problem Posing and Problem Solving methods serves as a practical strategy to achieve these curricular goals. Loyens et al. (2023) notes that problem-based learning creates learning conditions that encourage students to think critically and creatively.

From a pedagogical standpoint, the findings emphasize the importance of instructional design that integrates inquiry and problem-based learning. Teachers play a pivotal role in creating learning environments that are rich in opportunities for exploration and innovation. They must develop lesson plans that not only present content but also stimulate student curiosity and autonomy. Lessons that incorporate real-life problems, open-ended tasks, and reflective questioning can provide fertile ground for nurturing students' creative potential (Weng et al., 2022). Equipping students with opportunities to navigate uncertainty, challenge assumptions, and explore alternatives aligns with the best practices in creativity-focused instruction.

In terms of practical classroom application, teachers should be trained to effectively implement both Problem Posing and Problem Solving models. This includes designing scaffolding strategies for students who may initially struggle with open-ended tasks, especially in subjects like economics that often involve abstract and complex concepts. Differentiated instruction, formative assessment, and continuous feedback loops can help maintain student engagement and ensure equitable development of creative skills across diverse learner profiles (Haq et al., 2024).

At the policy level, this study provides valuable evidence supporting broader educational reforms that emphasize creativity and innovation. As global economies evolve rapidly, there is a growing demand for individuals who are not only knowledgeable but also capable of generating original ideas and solving complex problems. The integration of creative pedagogy such as Problem Posing and Problem Solving can equip students with these essential future-ready skills (Tang et al., 2020). National education systems should prioritize professional development, curriculum design, and resource allocation that foster creativity as a core competency.

In conclusion, this study reinforces the transformative potential of well-designed instructional strategies in enhancing creative thinking, particularly in economics education. While both Problem Posing and Problem Solving methods were effective, the former demonstrated a greater impact on students' creative development. These findings serve as a compelling call to action for educators, curriculum designers, and policymakers to embrace and institutionalize innovative pedagogical models. Fostering creativity in the classroom is not only a matter of instructional choice but a critical step toward building a generation of independent thinkers, innovators, and problem-solvers prepared to meet the challenges of an increasingly complex and unpredictable world.

CONCLUSION

Based on the comprehensive findings of this study, it can be concluded that the implementation of the Problem Posing and Problem Solving instructional methods has a significant and positive effect on enhancing students' creative thinking skills, particularly within the context of economics education. These two instructional models, both rooted in constructivist theories of learning and emphasizing student-centered pedagogical approaches, foster an engaging and dynamic learning environment in which students are encouraged to become active participants rather than passive recipients of knowledge.

The Problem Posing method, in particular, places students at the center of the learning process by inviting them to formulate meaningful problems based on their understanding of classroom material or real-world issues. This empowers students to

explore ideas creatively, articulate their thoughts independently, and engage in higher-order thinking processes, such as synthesis, evaluation, and innovation. Through this method, students are not only absorbing information but are also learning how to construct knowledge, question assumptions, and imagine alternative possibilities, competencies that are essential for creativity, problem-solving, and lifelong learning.

Similarly, the Problem Solving method proved to be effective in improving creative thinking, though the magnitude of its impact was slightly less than that of the Problem Posing approach. This method emphasizes the application of knowledge to resolve structured or open-ended problems, encouraging students to analyze scenarios, weigh alternatives, and develop logical, evidence-based solutions. While it may be more procedural in nature compared to Problem Posing, it nonetheless requires students to think critically, explore multiple pathways, and adapt their reasoning to different problem contexts, all of which support the development of creative competencies.

The comparative analysis conducted in this research also reveals a crucial distinction: while both Problem Posing and Problem Solving methods contribute positively to students' creative development, Problem Posing produces greater gains. Students exposed to this approach demonstrated higher N-Gain scores, indicating a more substantial increase in creative thinking abilities. This suggests that when students are given the autonomy to identify and articulate problems themselves, they are more engaged, intrinsically motivated, and cognitively invested in their learning. Such autonomy is vital for the cultivation of creativity, as it fosters originality, initiative, and a deeper connection to the learning material.

Conversely, students in the control group, who were taught using traditional lecture-based methods, showed little to no improvement in creative thinking. In fact, some even experienced a decline, as evidenced by negative N-Gain scores. This underscores a critical limitation of passive teaching models that rely heavily on rote memorization, teacher-centered instruction, and limited student interaction. These methods fail to provide the cognitive stimulation and active engagement necessary for fostering creativity, especially in disciplines like economics that demand analytical reasoning, evaluative thinking, and real-world problem-solving.

The findings of this study are in strong alignment with the core competencies promoted in Indonesia's 2013 Curriculum, which advocates for the development of critical, creative, communicative, and collaborative skills as essential attributes for 21st-century learners. Integrating instructional strategies such as Problem Posing and Problem Solving into the regular classroom practice not only supports curriculum

mandates but also equips students with the intellectual tools they need to navigate a rapidly changing and complex global environment.

Based on these conclusions, several actionable recommendations are proposed for different stakeholders in the education sector:

1. **For Teachers**:

   Educators must take a proactive role in shifting their instructional practices toward methods that emphasize active learning, inquiry, and creativity. Teachers should be encouraged to continuously improve their professional competencies through workshops, peer collaboration, and reflective teaching practices. Lesson plans should be intentionally designed to incorporate open-ended questions, real-life scenarios, and opportunities for student exploration. It is essential for teachers to create classroom environments that value curiosity, tolerance for ambiguity, and respect for diverse perspectives, all hallmarks of a creative learning space.

2. **For Educational Institutions**:

   Schools must provide systemic support to facilitate the adoption of innovative teaching strategies. This includes offering access to professional development resources, encouraging experimentation in classroom methods, and recognizing teachers who implement effective creative pedagogies. School leaders should foster a collaborative culture, where teachers can share best practices, co-develop learning modules, and analyze student outcomes together.

3. **For Policymakers and Curriculum Developers**:

   At the policy level, there needs to be a deliberate effort to embed problem-based and inquiry-driven learning approaches into national education frameworks. Curriculum developers should consider revising existing guidelines to provide more room for exploratory learning, interdisciplinary projects, and student-led investigations. Moreover, national assessments should also be reformed to evaluate not only factual knowledge but also students' abilities to think creatively, solve problems, and adapt their thinking to new contexts.

4. **For Future Research and Implementation**:

   This study lays the groundwork for further research into the nuances of problem-based instruction. Future studies could explore the long-term effects of these methods on students' cognitive development, their applicability in different subject areas, and their scalability across diverse educational settings. It would also be beneficial to examine how digital tools and collaborative platforms can be

integrated into Problem Posing and Problem Solving frameworks to enhance engagement and inclusivity.

In conclusion, promoting creativity in education is not merely a supplementary objective; rather, it is a fundamental imperative for equipping students with the skills and mindsets needed to navigate the complex, dynamic world of the 21st century. In an era characterized by rapid technological advancement, global interconnectedness, and ever-evolving socio-economic demands, fostering creativity is essential for developing learners who can think critically, adapt effectively, and generate novel solutions to real-world problems.

The Problem Posing and Problem Solving instructional methods represent two powerful, evidence-based approaches for nurturing such creativity in the classroom. These methods shift the focus from passive knowledge acquisition to active knowledge construction, where students are encouraged to inquire, explore, and challenge existing paradigms. Through problem posing, students engage in the formulation of questions, stimulating divergent thinking and intellectual curiosity. Conversely, problem solving cultivates analytical rigor and logical reasoning, as students tackle structured or open-ended challenges rooted in authentic contexts.

By embracing these pedagogical strategies, educators can transcend the limitations of traditional, lecture-based instruction and create a more engaging, inclusive, and student-centered learning environment. Beyond improving academic achievement, these methods play a crucial role in shaping learners into independent, innovative, and resilient individuals—qualities that are indispensable in today's knowledge-based economies and participatory societies.

Ultimately, embedding creative learning through problem posing and problem solving is not only a matter of pedagogical innovation; it is a commitment to empowering every student to realize their full potential and to contribute meaningfully to the world around them.

REFERENCES

Bartholomew, S., & Strimel, G. (2018). Factors influencing student success on open-ended design problems. *International Journal of Technology and Design Education, 28*, 753–770. https://doi.org/10.1007/S10798-017-9415-2

Benedek, M., & Fink, A. (2019). Toward a neurocognitive framework of creative cognition: The role of memory, attention, and cognitive control. *Current Opinion in Behavioral Sciences, 27*, 116–122. https://doi.org/10.1016/j.cobeha.2018.11.002

Čančer, V. (2014). Teaching creative problem solving methods to undergraduate

economics and business students. *Journal of Further and Higher Education, 38*, 485–500. https://doi.org/10.1080/0309877X.2012.726968

Departemen Pendidikan Nasional. (2008). *Laporan pengembangan model bahan ajar Paket A tingkat I*. Departemen Pendidikan Nasional.

Dilekçi, A., & Karatay, H. (2023). The effects of the 21st century skills curriculum on the development of students' creative thinking skills. *Thinking Skills and Creativity*. https://doi.org/10.1016/j.tsc.2022.101229

Egbewale, B., Lewis, M., & Sim, J. (2014). Bias, precision and statistical power of analysis of covariance in the analysis of randomized trials with baseline imbalance: A simulation study. *BMC Medical Research Methodology, 14*, 49. https://doi.org/10.1186/1471-2288-14-49

Feraco, T., Resnati, D., Fregonese, D., Spoto, A., & Meneghetti, C. (2022). An integrated model of school students' academic achievement and life satisfaction: Linking soft skills, extracurricular activities, self-regulated learning, motivation, and emotions. *European Journal of Psychology of Education, 38*, 109–130. https://doi.org/10.1007/s10212-022-00601-4

Gopalan, M., Rosinger, K., & Ahn, J. (2020). Use of quasi-experimental research designs in education research: Growth, promise, and challenges. *Review of Research in Education, 44*, 218–243. https://doi.org/10.3102/0091732X20903302

Haq, N., Manajemen, J., Islam, P., Cahyono, B., Santoso, E., Sukmawati, F., Prihatin, R., S., Juwita, R., Pendidikan, M., Kreatif, B., Pengajaran, P., & Abstrak, Y. (2024). Project-based educational development management to improve teachers' creative skills through a differentiated teaching approach. *Nidhomul Haq: Jurnal Manajemen Pendidikan Islam*. https://doi.org/10.31538/ndhq.v9i3.6

Lee, E., & Hannafin, M. (2016). A design framework for enhancing engagement in student-centered learning: Own it, learn it, and share it. *Educational Technology Research and Development, 64*, 707–734. https://doi.org/10.1007/s11423-015-9422-5

Loyens, S., Van Meerten, J., Schaap, L., & Wijnia, L. (2023). Situating higher-order, critical, and critical-analytic thinking in problem- and project-based learning environments: A systematic review. *Educational Psychology Review, 35*, 1–44. https://doi.org/10.1007/s10648-023-09757-x

Luchini, S., Kenett, Y., Zeitlen, D., Christensen, A., Ellis, D., Brewer, G., & Beaty, R. (2023). Convergent thinking and insight problem solving relate to semantic memory network structure. *Thinking Skills and Creativity.*

https://doi.org/10.1016/j.tsc.2023.101277

MacAskill, W., Chua, W., Woodall, H., & Pinidiyapathirage, J. (2023). Beyond the written reflection: A systematic review and qualitative synthesis of creative approaches to reflective learning amongst medical students. *Perspectives on Medical Education, 12*, 361–371. https://doi.org/10.5334/pme.914

Mangaroska, K., Sharma, K., Gašević, D., & Giannakos, M. (2021). Exploring students' cognitive and affective states during problem solving through multimodal data: Lessons learned from a programming activity. *Journal of Computer Assisted Learning, 38*, 40–59. https://doi.org/10.1111/jcal.12590

Nicolay, B., Krieger, F., Stadler, M., Gobert, J., & Greiff, S. (2021). Lost in transition – Learning analytics on the transfer from knowledge acquisition to knowledge application in complex problem solving. *Computers in Human Behavior, 115*, 106594. https://doi.org/10.1016/j.chb.2020.106594

Randhawa, K., Nikolova, N., Ahuja, S., & Schweitzer, J. (2021). Design thinking implementation for innovation: An organization's journey to ambidexterity. *Journal of Product Innovation Management.* https://doi.org/10.1111/jpim.12599

Reeve, J., & Shin, S. (2020). How teachers can support students' agentic engagement. *Theory Into Practice, 59*, 150–161. https://doi.org/10.1080/00405841.2019.1702451

Rubenstein, L., Callan, G., Neumeister, K., & Ridgley, L. (2020). Finding the problem: How students approach problem identification. *Thinking Skills and Creativity, 35*, 100635. https://doi.org/10.1016/j.tsc.2020.100635

Sadak, M., Incikabi, L., Ulusoy, F., & Pektas, M. (2022). Investigating mathematical creativity through the connection between creative abilities in problem posing and problem solving. *Thinking Skills and Creativity.* https://doi.org/10.1016/j.tsc.2022.101108

Urban, M., Pesout, O., Kombrza, J., & Urban, M. (2021). Metacognitively aware university students exhibit higher creativity and motivation to learn. *Thinking Skills and Creativity.* https://doi.org/10.1016/j.tsc.2021.100963

Weimer, A., Dowds, S., Fabricius, W., Schwanenflugel, P., & Suh, G. (2017). Development of constructivist theory of mind from middle childhood to early adulthood and its relation to social cognition and behavior. *Journal of Experimental Child Psychology, 154*, 28–45. https://doi.org/10.1016/j.jecp.2016.10.002

Weng, X., Chiu, T., & Tsang, C. (2022). Promoting student creativity and

entrepreneurship through real-world problem-based maker education. *Thinking Skills and Creativity.* https://doi.org/10.1016/j.tsc.2022.101046

Wigert, B., Murugavel, V., & Reiter-Palmon, R. (2022). The utility of divergent and convergent thinking in the problem construction processes during creative problem-solving. *Psychology of Aesthetics, Creativity, and the Arts.* https://doi.org/10.1037/aca0000513

Wu, W., Manabe, K., Marek, M., & Shu, Y. (2021). Enhancing 21st-century competencies via virtual reality digital content creation. *Journal of Research on Technology in Education,* 55, 388–410. https://doi.org/10.1080/15391523.2021.1962455

Ye, H., Ng, O., & Cui, Z. (2023). Conceptualizing flexibility in programming-based mathematical problem-solving. *Journal of Educational Computing Research, 62*, 594–619. https://doi.org/10.1177/07356331231209773