Vol. 13 No. 1, 2026
https://ppjp.ulm.ac.id/journal/index.php/jpg

Analysis of Students' Critical Thinking Levels in Geography Education through the Outdoor Learning Approach at SMA Negeri 4 Padang

Ade Irma Suryani[1*], Jamaris Jamna[2], Yurni Suasti[3]
[1] Geography Education Study Program, Faculty of Teacher Training and Education, Universitas PGRI West Sumatra, Indonesia.
[2] Doctoral Program of Educational Sciences, Universitas Negeri Padang, Indonesia.
[3] Geography Education Study Program, Faculty of Teacher Training and Education, Universitas Negeri Padang, Indonesia.
adeirmaunp@student.unp.ac.id

Abstract

This study aims to analyze students' critical thinking skills through the application of the outdoor learning model in Geography subjects at the senior high school level. Critical thinking is an essential competence in 21st-century education and plays a crucial role in helping students understand geographical concepts through real-world experiences. This research employed a quasi-experimental design involving an experimental class and a control class. The experimental class was taught using the outdoor learning model, which emphasizes direct observation, exploration, and interaction with the surrounding environment, while the control class received conventional instruction commonly applied by teachers, such as lectures and question-and-answer activities. The population of this study consisted of 120 eleventh-grade students, from which a sample of 52 students was selected, including 26 students from class XI IPS 4 as the experimental group and 26 students from class XI IPS 2 as the control group. Data were collected using a critical thinking questionnaire developed based on critical thinking indicators and analyzed descriptively to compare students' performance in both groups. The results revealed that students in the experimental class achieved an average score of 82.19%, which was categorized as good and highly critical, while students in the control class obtained an average score of 79.80%, categorized as fairly good and moderately critical. These findings indicate that the outdoor learning model has a positive impact on improving students' critical thinking skills and learning outcomes in Geography by encouraging active participation, contextual learning, and meaningful engagement with geographical phenomena. Therefore, the outdoor learning model can be considered an effective alternative instructional approach for enhancing students' higher-order thinking skills in Geography education.

Keywords: Critical Thinking, Outdoor Learning, Geography Learning Outcomes

DOI: 10.20527/jpg.v13i1.24153
Received: 3 October 2025**; Accepted:** 18 March 2026**; Published:** 06 April 2026
How to cite: Suryani, A., I., Jamaris, J., Suasti, Y. (2026). Analysis of Students' Critical Thinking Levels in Geography Education through the Outdoor Learning Approach at SMA Negeri 4 Padang. JPG (Jurnal Pendidikan Geografi), Vol. 13 No. 1. https://dx.doi.org/10.20527/jpg.v13i1.24153
© 2026 JPG (Jurnal Pendidikan Geografi)
**Corresponding Author*
JPG (Jurnal Pendidikan Geografi) is licensed under
a Creative Commons Attribution-NonComercial-NoDerivatives 4.0 International License

1. Introduction

Recent meta-analytic and longitudinal research further confirms that outdoor and experiential learning environments significantly contribute to students' academic achievement and higher-order thinking skills (Mann et al., 2023; Fägerstam & Blom, 2024). Moreover, structured instructional strategies have been shown to effectively promote critical thinking in secondary education when learning activities require analysis, evaluation, and reflective reasoning (Abrami et al., 2015). In geography education, inquiry-based spatial instruction has demonstrated strong potential in advancing students' spatial reasoning and analytical competencies (Kim & Bednarz, 2024).

The importance of critical thinking skills cannot be underestimated. In the context of education, critical thinking enables students not only to receive information passively but also to evaluate, question, and develop their own perspectives. This ability is crucial for preparing the younger generation to face increasingly complex global challenges, especially in an era of rapid information exchange and widespread misinformation (Ennis, 2018; Paul & Elder, 2019). Critical thinking allows learners to discern valid information, make rational decisions, and become reflective and independent learners—competencies that are essential in 21st-century education (Brookfield, 2012). Critical thinking is an essential skill that enables students not only to absorb information passively but also to analyze, evaluate, and independently develop understanding and opinions. This ability becomes increasingly important in the digital information era, which is filled with distortion, bias, and misinformation. In such a context, learners must possess strong reasoning skills to filter and interpret information objectively (Facione, P.A 2015; Ennis, 2018). The level of critical thinking skills among students in Indonesia, particularly at the senior high school level, remains a major concern in education. Critical thinking is the ability to analyze, evaluate, and construct arguments in a systematic and objective manner, which is essential for developing students' intellectual potential to address complex real-world problems (Facione, 2015). Critical thinking is an essential skill that enables students not only to absorb information passively but also to analyze, evaluate, and independently develop understanding and opinions. This ability becomes increasingly important in the digital information era, which is filled with distortion, bias, and misinformation. In such a context, learners must possess strong reasoning skills to filter and interpret information objectively (Facione, P.A 2015; Ennis, 2018).

In the context of Geography learning, critical thinking skills play a very important role. Geography, as a science that studies the interaction between humans and the environment, involves analyzing phenomena that are not only limited to data but also include the process of understanding cause-and-effect relationships occurring in space and time. According to Wright and Nyerges (2017), in Geography learning, critical thinking enables students to explore and comprehend global issues such as climate change, urbanization, and environmental degradation in a deeper and more structured manner. The development of critical thinking skills in this context prepares students to become individuals who are not only sensitive to social and environmental problems but also capable of contributing to solutions based on strong data and analysis.

Furthermore, outdoor learning has been widely recognized as an effective educational approach to enhance students' engagement and critical thinking skills by providing authentic, real-world learning experiences beyond the classroom (Beames, Higgins, & Nicol, 2012; Beames, Ross, & Gill, 2021). This approach encourages students to actively explore their environment, ask questions, and construct knowledge through direct experience, thereby fostering deeper understanding, collaboration, and problem-solving abilities (Dyment & Bell, 2008; Dillon et al., 2016). Recent studies indicate that outdoor learning not only supports cognitive development but also contributes significantly to students' social and emotional growth, making it a holistic and meaningful learning strategy (Mann et al., 2022). In the context of Geography education, outdoor learning allows students to directly observe, analyze, and interpret physical and human geographical phenomena, helping them connect theoretical concepts with real-world situations

(Lugg & Slattery, 2017). By engaging learners in inquiry-based and experiential activities, outdoor learning promotes critical thinking by encouraging students to question assumptions, investigate environmental issues, and reflect on their observations systematically (Beames et al., 2021; Mann et al., 2022).

Outdoor learning has been increasingly recognized as an effective pedagogical approach in geography education because it provides opportunities for students to directly observe and interact with real environmental phenomena. Experiential learning in outdoor settings enables learners to connect theoretical knowledge with real-world contexts, thereby strengthening conceptual understanding and spatial awareness. Several studies have shown that outdoor learning activities can significantly improve students' spatial intelligence and their ability to interpret geographical patterns and relationships (Amaluddin et al., 2019). Likewise, research by Aliman et al. (2019) demonstrates that learning models emphasizing environmental exploration and spatial engagement contribute positively to students' spatial thinking skills and learning outcomes in geography. Spatial thinking itself is considered a fundamental competency in geoscience education, as it enables students to analyze spatial distributions, relationships, and processes within geographic systems (McLaughlin & Bailey, 2022). Through outdoor learning experiences, students are encouraged to observe, analyze, and interpret spatial phenomena, which supports the development of higher-order thinking skills. Furthermore, outdoor learning environments have been found to enhance student engagement, motivation, and reflective thinking during problem-solving activities (Fägerstam & Blom, 2013). Integrating spatially oriented learning tools such as geographic analysis and mapping activities also promotes critical spatial reasoning and deeper analytical thinking among students (Kim & Bednarz, 2013). These findings suggest that spatially rich learning environments have the potential to foster not only spatial cognition but also broader cognitive competencies. However, most previous studies primarily emphasize the development of spatial abilities rather than explicitly examining how outdoor learning contributes to the enhancement of students' critical thinking skills. Therefore, further research is needed to investigate the relationship between outdoor learning strategies, spatial thinking development, and critical thinking competencies in geography education contexts.

Outdoor learning methods not only provide contextual learning experiences but have also been proven to significantly develop students' spatial intelligence in Geography learning (Putra, 2020). In the context of elementary school learning, the implementation of outdoor learning methods in the Natural Sciences and Social Studies (IPAS) subjects significantly improves students' critical thinking abilities by facilitating direct observation and reflection on economic activities in their surrounding environment (Wulansari & Rosmiati, 2020). In this study, the critical thinking skills used to measure students' critical thinking abilities refer to the theory developed by Peter Facione in *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction* (1990). Facione identifies six core indicators that reflect critical thinking skills, which can serve as a reference for developing test instruments to assess students' levels of critical thinking. The following are Facione's critical thinking indicators:

Geography education requires instructional approaches that emphasize contextual learning and spatial reasoning to support students' understanding of real-world phenomena. Previous studies have demonstrated that outdoor learning enhances students' engagement, experiential understanding, and meaningful learning through direct interaction with authentic environments. Likewise, the spatial approach has been extensively applied in geography education to develop students' spatial thinking, including the analysis of spatial patterns, distributions, and interactions. At the same time, critical thinking skills have emerged as a central objective of 21st-century education and are commonly fostered through instructional models such as problem-based and inquiry-based learning, which are largely implemented in classroom-based settings. Despite these advancements, empirical studies that systematically integrate outdoor learning with a spatial approach to explicitly enhance students' critical thinking skills in geography learning remain

scarce.

The novelty of this study lies in the design and implementation of an outdoor learning model grounded in a spatial approach that is explicitly oriented toward the development of students' critical thinking skills. This study situates learning activities in authentic outdoor contexts and guides students to conduct structured spatial observations, analyses, evaluations, and evidence-based reasoning of geographical phenomena. By integrating experiential outdoor learning with rigorous spatial analysis, the proposed approach reinforces the epistemological foundations of geography as a spatial science and provides an empirically grounded instructional alternative for advancing critical thinking in geography education.

To establish the current state of knowledge in geography education, it is essential to examine how previous studies have addressed outdoor learning, spatial approaches, and critical thinking development. Research indicates that outdoor learning can enhance students' engagement, experiential understanding, and connection to real-world environments (Beames, Higgins, & Nicol, 2012; Beames, Ross, & Gill, 2021). Similarly, spatial approaches have been widely applied to develop students' abilities to analyze patterns, distributions, and interactions in geographical phenomena (Lugg & Slattery, 2017). Meanwhile, critical thinking has emerged as a key objective of 21st-century education, typically fostered through problem-based and inquiry-based learning models (Ennis, 2018; Paul & Elder, 2019). Despite these advancements, existing studies often treat these elements separately or partially connect them. Empirical research that systematically integrates outdoor learning with a spatial approach to explicitly enhance critical thinking in geography education remains limited.

Previous studies have demonstrated the significant potential of outdoor learning in enhancing students' engagement and experiential understanding. Beames, Higgins, and Nicol (2012), as well as Beames, Ross, and Gill (2021), argue that outdoor learning fosters authentic learning experiences and strengthens students' emotional and experiential connections to their environment. However, their work primarily emphasizes affective and experiential outcomes, with limited integration of structured spatial reasoning and explicit critical thinking development. Similarly, Amaluddin et al. (2019) found that outdoor learning activities significantly improve students' spatial intelligence in geography education. However, the study mainly focuses on spatial ability development and does not explicitly discuss how these spatial skills contribute to broader critical thinking competencies.

Furthermore, Susilawati and Sochiba (2022), in their systematic review, concluded that outdoor learning improves students' motivation, conceptual understanding, and overall learning outcomes in geography. Despite these positive findings, their study highlights a lack of empirical models that deliberately integrate outdoor learning with spatial analytical tasks aimed at strengthening critical thinking. Anjarwani et al. (2020) also reported that guided inquiry in outdoor settings significantly improves learners' critical thinking skills. However, their research was conducted outside the specific context of geography and did not incorporate structured spatial analysis of geographical phenomena. In addition, a nature education study. demonstrated that outdoor-based instruction enhances reflective thinking and map literacy. Although reflective thinking and spatial skills were addressed, the study did not explicitly integrate structured spatial reasoning with critical thinking in geography content.

Based on this review, it is evident that previous studies have examined outdoor learning, spatial skills, and critical thinking either separately or partially connected. Empirical research that systematically integrates outdoor experiential learning with structured spatial analysis to explicitly enhance critical thinking in geography education remains limited. Therefore, the present study contributes to the field by proposing and empirically testing an outdoor learning model grounded in spatial inquiry, specifically designed to strengthen students' higher-order critical thinking skills in geography.

2. Method

This study employed a quasi-experimental design using a nonequivalent control group approach (Creswell & Creswell, 2018). The population consisted of 120 eleventh-grade students at SMA Negeri 4 Padang. A purposive sampling technique was used to select two comparable classes: XI IPS 4 (experimental group) and XI IPS 2 (control group), each comprising 26 students.

The experimental group engaged in outdoor learning activities structured around spatial observation and analysis. Students conducted field-based investigations involving the identification of landforms, land-use patterns, settlement distributions, and environmental interactions. These activities were guided by analytical worksheets designed to stimulate interpretation, evaluation, and evidence-based reasoning. The control group received conventional lecture-based instruction covering the same geographical content.

Data were collected using an essay-based assessment instrument developed according to Facione's (2015) framework of critical thinking. The instrument measured six dimensions: interpretation, analysis, evaluation, inference, explanation, and self-regulation. Essay questions were selected to allow in-depth assessment of students' reasoning processes and argument construction.

Pre-test and post-test scores were analyzed descriptively to examine learning gains. An independent samples t-test was conducted to determine whether statistically significant differences existed between the experimental and control groups at a significance level of 0.05. The specific form of the quasi-experimental design used in this study is the nonequivalent control group design. This design is detailed in the following table.

Table 1. Research Sample

No	Group	Pre-test	Treatment	Post-test
1	Control	Q1	–	Q2
2	Experiment	Q1	X	Q2

(Source: Sukardi, 2003, p. 26)

Note:
Q1 : Pre-test for both the experimental and control classes.
X : Learning using the Outdoor Learning model.
– : Learning conducted by the teacher at SMA Negeri 4 Padang, consisting of lectures and question-and-answer sessions.
O2 : Post-test for both the experimental and control classes.

Based on Table I. Research Sample, it can be explained, the subjects of this study were students of class XI Social Sciences (IPS) at SMA Negeri 4 Padang who have relatively similar (homogeneous) characteristics. The subjects were selected from classes with relatively equivalent academic abilities based on the average Geography subject scores. Based on the average Geography scores, two classes were chosen as research subjects: XI IPS-4 as the experimental class and XI IPS-2 as the control class.

The learning outcome assessment instrument used in this study was an essay test based on learning indicators. The rationale for using essay tests in this study is that students' critical thinking skills can be better observed through essay questions. Essay questions are more appropriate for assessing critical thinking skills and learning outcomes of students who have received outdoor learning, especially on regional and spatial material. Data on critical thinking skills were obtained from the test scores of each class. These data were then categorized based on critical thinking ability criteria. The indicators of critical thinking skills in this study are as follow, description Indicators of critical thinking can be seen in Table 2 below.

Table 2. Critical Thinking Skill Indicators

Critical Thinking Skill	Indicators
Interpretation	Categorizing, interpreting content, clarifying implicit and explicit meanings.
Analysis	Testing ideas, identifying arguments, analyzing arguments.
Evaluation	Assessing the credibility of information or opinions, evaluating the quality of arguments using inductive and deductive reasoning.
Inference	Recognizing evidence or facts from information, formulating alternative hypotheses, explaining conclusions using inductive and deductive reasoning.
Explanation	Stating results, adjusting procedures, presenting arguments.
Self-regulation	Self-monitoring, self-correcting.

(Source: Facione in Cole et al., 2015)

Table 2 summarizes the indicators of students' critical thinking skills across six dimensions. Interpretation involves categorizing and clarifying information. Analysis pertains to testing and examining arguments. Evaluation focuses on assessing the credibility and quality of information using inductive and deductive reasoning. Inference includes drawing conclusions and formulating hypotheses. Explanation refers to presenting results and arguments clearly. Self-regulation encompasses monitoring and correcting one's own thinking process. These indicators collectively provide a structured framework for evaluating critical thinking skills.

The table above can be used as a reference to measure students' critical thinking, which will be used for the creation of instruments.

and subsequently, the critical thinking skills score is obtained from the results of the essay test by calculating the students' total average score after assessment was performed on the completed instruments, and the score is then classified. The results can be seen in the following Table 3.

Table 3. Classification of Students' Critical Thinking Skill Scores

Interval	Category
80–100	Very Critical
60–79	Critical
40–59	Fairly Critical
20–39	Less Critical
0–19	Not Critical

As shown in Table 3, students' critical thinking skills are classified into five categories according to score intervals. Scores between 80 and 100 are categorized as *very critical*, indicating a very high level of critical thinking skills. Scores ranging from 60 to 79 fall into the *critical* category, while scores between 40 and 59 are classified as *fairly critical*. Scores of 20–39 are categorized as *less critical*, and scores of 0–19 are classified as *not critical*.

The learning outcome data were obtained from the pre-test and post-test scores. The pre-test was used to gather data on the students' initial abilities before treatment, while the post-test was administered after the treatment to both the experimental and control groups. The gain score, calculated as the difference between post-test and pre-test scores, was used for hypothesis testing.The critical thinking skill data from both the experimental and control classes were compared in terms of percentage. Furthermore, the analysis of the learning outcome data was conducted using an independent samples t-test with SPSS 16.0 for Windows, at a significance level of 5%.

3. Result and Discussion

Descriptive analysis indicates that the experimental group's mean pre-test score was 40.69, increasing substantially to 83.89 in the post-test. In comparison, the control group's mean pre-test score was 44.44 and increased to 80.83 in the post-test. Although both groups demonstrated

improvement, the gain in the experimental group was more pronounced.

Inferential analysis using an independent samples t-test revealed a statistically significant difference between the post-test scores of the experimental and control groups ($p < 0.05$). Bednarz (2019) and Kidman (2020) explain that outdoor learning activities in geography help students develop spatial understanding and encourage higher-order thinking, including critical thinking. These findings suggest that outdoor learning integrated with a spatial approach has a significant positive effect on students' critical thinking skills in geography.

The results indicate that structured outdoor learning grounded in spatial inquiry significantly enhances students' critical thinking skills. The experimental group demonstrated stronger performance in interpreting environmental data, analyzing spatial relationships, evaluating geographical patterns, and constructing evidence-based conclusions.

These findings align with experiential learning theory, which posits that knowledge is constructed through active engagement with authentic contexts (Kolb, 2015). Outdoor learning provides meaningful opportunities for observation, reflection, and inquiry, thereby stimulating higher-order cognitive processes. Moreover, recent research emphasizes that experiential pedagogies foster deeper cognitive engagement and analytical reasoning when learners are actively involved in authentic problem-solving tasks (Hodgson & Spours, 2023).

The spatial dimension of the instructional design further strengthened geographical reasoning. Inquiry-based spatial tasks required students to examine distributions, identify relationships, and evaluate environmental phenomena, processes that correspond directly to the dimensions of critical thinking outlined by Facione (2015). Consistent with Kim and Bednarz (2024), structured spatial inquiry enhances students' ability to synthesize spatial information and develop analytical judgments.

Compared to conventional lecture-based instruction, outdoor spatial learning promotes collaborative inquiry, active participation, and contextual reasoning. These elements contribute to the development of 21st-century competencies, including critical thinking and problem-solving (Fägerstam & Blom, 2024). Therefore, integrating outdoor experiential learning with spatial analysis represents a pedagogically sound and empirically supported strategy in geography education.

A. Descriptive Data of Geography Learning Outcomes

1) Descriptive Analysis of Pre-test in the Experimental Class

A pre-test was administered in the experimental class prior to the implementation of the outdoor learning method. Students' geography scores ranged from 20 to 70, with a mean of 40.69, a median of 40.00, and a mode of 40, indicating that the overall performance was at a moderate level (Table 4).

Table 4. Descriptive Analysis of the Experimental Class (Pre-Test)

Experimental Group	Pre-test
Mean	40.69
Median	40.00
Mode	40
Standard Deviation	13.318
Maximum Score	70
Minimum Score	20
Range	50

Source: Primary data processed using SPSS, 2025

Table 4 presents the pre-test scores of the experimental group before the implementation of the outdoor learning method. The scores ranged from 20 to 70, with a mean of 40.69, indicating that the students' overall performance was at a moderate level. The median and mode were both 40,

suggesting a symmetrical distribution around this central value. The standard deviation of 13.318 reflects moderate variability among students' scores, while the range of 50 shows a relatively wide spread between the lowest and highest scores. According to (Creswell, 2014; Field, 2018), descriptive statistics such as mean, median, mode, and standard deviation are commonly used to describe baseline data before conducting inferential analysis.

2) Descriptive Analysis of Post-test in the Experimental Class

The post-test in the experimental class was conducted after the implementation of the outdoor learning method. The geography learning outcomes obtained showed a highest score of 100 and a lowest score of 65, with a mean score of 83.89, a median of 85.00, and a mode of 80. The data can be seen in the table below:

Table 5. Descriptive Analysis of the Experimental Class (Post-Test)

Experimental Group	Post-test
Mean	83.89
Median	85.00
Mode	80
Standard Deviation	8.953
Maximum Score	100
Minimum Score	70
Range	30

Source: Primary data processed using SPSS, 2025

Table 5 presents the post-test scores of the experimental group after the implementation of the outdoor learning method. The students' scores ranged from 70 to 100, with a mean of 83.89, indicating that the overall performance was high. The median score of 85.00 and mode of 80 suggest that most students achieved scores near the upper range. The standard deviation of 8.953 reflects moderate variability in post-test scores, while the range of 30 shows a narrower distribution compared to the pre-test results. These findings indicate a significant improvement in students' geography learning outcomes following the intervention.

3) Descriptive Analysis of Pre-test in the Control Class

The pre-test in the control class was conducted using the lecture method. The geography learning outcomes obtained showed a highest score of 70 and a lowest score of 20, with a mean score of 44.44, a median of 45.00, and a mode of 45. The data can be seen in the table below:

Table 6. Descriptive Analysis of the Control Class (Pre-Test)

Control Group	Pre-test
Mean	44.44
Median	45.00
Mode	45
Standard Deviation	13.511
Maximum Score	70
Minimum Score	20
Range	50

Source: Primary data processed using SPSS, 2025

Table 6 presents the pre-test scores of the control group before the learning intervention. The scores ranged from 20 to 70, with a mean of 44.44, indicating that students' initial performance was at a moderate level. Both the median and mode were 45, suggesting a fairly symmetric distribution of scores. The standard deviation of 13.511 shows moderate variability among students' performance, while the range of 50 indicates a relatively wide spread between the lowest and highest scores. These findings provide a baseline for comparing the learning outcomes of the control group with those of the experimental group after the intervention.

4) Descriptive Analysis of Post-test in the Control Class

The post-test in the control class was conducted after applying the lecture method. The geography learning outcomes obtained showed a highest score of 100 and a lowest score of 60, with a mean score of 80.83, a median of 80.00, and a mode of 80. The data can be seen in the table below:

Table 7. Descriptive Analysis of the Control Class (Post-Test)

Control Group	Post-test
Mean	80.83
Median	80.00
Mode	80
Standard Deviation	10.724
Maximum Score	100
Minimum Score	60
Range	40

Source: Primary data processed using SPSS, 2025

Table 7 presents the post-test scores of the control group following the conventional learning method. Students' scores ranged from 60 to 100, with a mean of 80.83, indicating a high overall performance. Both the median and mode were 80, suggesting that most students achieved scores near the upper range. The standard deviation of 10.724 reflects moderate variability among students, while the range of 40 indicates a narrower spread compared to the pre-test. These results show that the control group also experienced improvement in geography learning outcomes, although slightly lower than the experimental group, highlighting the effect of the outdoor learning intervention.

Table 8. Distribution of Pre-test Learning Outcomes of Experimental and Control Classes

Score Interval	Experimental Class	Control Class (%)
	F	
20-26	8	22%
27-33	2	6%
34-43	10	28%
44-50	9	25%
51-57	3	8%
58-64	2	6%
65-70	2	6%
Total	36	100%

Source: Primary data processed, 2025

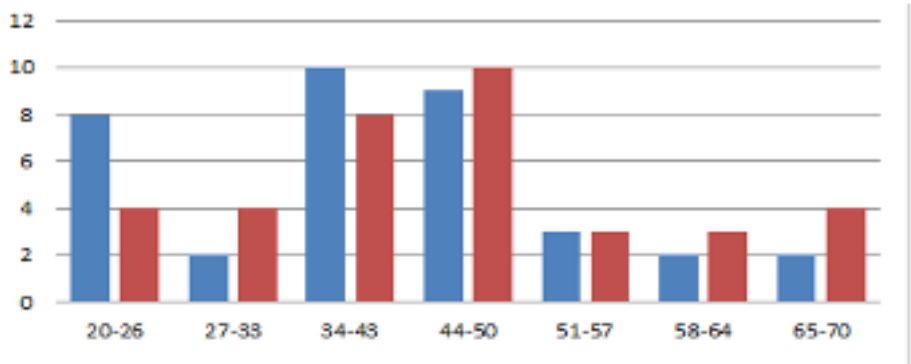

Figure 1. Bar Chart of the Distribution of Students' Pretest Scores in the Experimental and Control Groups.

Table 8 presents the frequency distribution of pre-test scores for the experimental class. The students' scores ranged from 20 to 70, with the highest proportion of students (28%) scoring between 34 and 43. This was followed by 25% of students scoring between 44 and 50, and 22%

scoring between 20 and 26. Smaller percentages of students achieved scores in the higher intervals (51–70). Overall, the distribution indicates that most students in the experimental class had moderate initial geography skills prior to the implementation of the outdoor learning method.

Table 9. Distribution of Posttest Learning Outcomes of Students in the Experimental and Control Groups

Score Interval	Experimental	Control (%)
	F	
60–65	0	0%
66–71	4	11%
72–77	6	17%
78–83	7	19%
84–89	6	17%
90–95	11	31%
96–100	2	6%
Total	36	100%

Source: Primary data processed, 2025

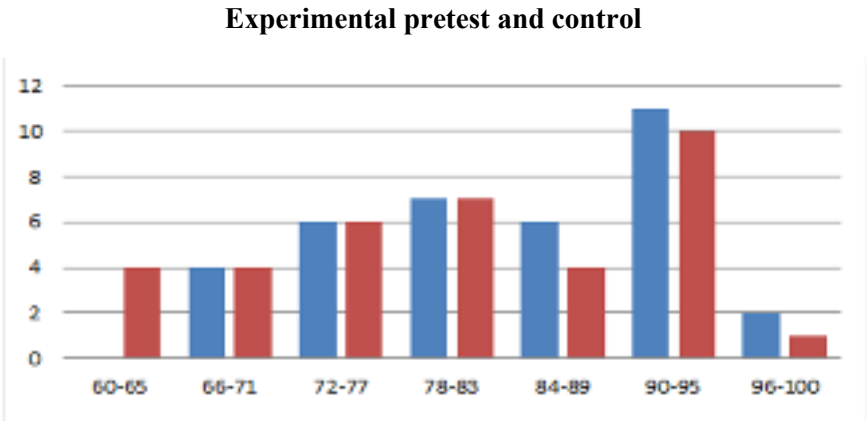

Figure 2. Bar Chart of the Distribution of Students' Posttest Scores in the Experimental and Control Groups

Table 9 presents the frequency distribution of post-test scores for the experimental and control groups. In the experimental group, most students (31%) scored between 90 and 95, followed by 19% scoring 78–83 and 17% scoring 72–77 and 84–89. Only 6% of students achieved the highest scores of 96–100. In the control group, the largest proportion of students (28%) scored 90–95, while 36% scored between 72 and 83, and 11% scored 66–71. These results indicate that both groups showed high post-test performance, with the experimental group having a slightly higher proportion of top scores, reflecting the effectiveness of the outdoor learning intervention compared to the conventional method.

It can be concluded from the bar chart in Figure 2 presented that there is a comparison of the frequency of pretest and posttest scores in the experimental and control classes showing an improvement, where the posttest scores in the experimental class have a higher average value. This improvement is due to the implementation of the outdoor learning method.

4. Conclusion

This study demonstrates that outdoor learning integrated with a spatial approach significantly improves students' critical thinking skills in senior high school geography. The experimental group achieved higher post-test scores than the control group, and statistical analysis confirmed a significant difference between instructional approaches ($p < 0.05$). The findings underscore the importance of experiential, inquiry-based, and spatially structured learning environments in fostering higher-order thinking skills. Experiential and inquiry-based learning allow students to actively construct knowledge through direct engagement with real-world contexts, which can

significantly enhance critical and analytical thinking abilities (Kolb, 2015; Hmelo-Silver, Duncan, & Chinn, 2007). Furthermore, spatially structured learning environments, particularly in geography education, help students develop spatial reasoning and deeper conceptual understanding of geographic phenomena (Bednarz, 2019). Future research may explore longitudinal impacts and broader implementation across diverse educational contexts.

5. Acknowledgment

The author would like to express sincere gratitude to the school community, especially the principal, Geography teacher, and all students at SMA Negeri 4 Padang, for granting permission, cooperation, and active participation in the implementation of this research. Appreciation is also extended to Prof. Jamari and Dr. Yurni Suasti for their valuable guidance, constructive feedback, and suggestions during the preparation of this article. The author also wishes to thank the editorial team and journal reviewers for their evaluations and improvements to the manuscript. It is hoped that this article will make a meaningful scientific contribution to the development of Geography learning practices, particularly in the application of outdoor learning models to enhance students' critical thinking skills.

6. References

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research, 85*(2), 275–314. https://doi.org/10.3102/0034654314551063

Aliman, M., Budijanto, B., Sumarmi, S., Astina, I. K., Putri, R. E., & Arif, M. (2019). The effect of EarthComm learning model and spatial thinking ability on geography learning outcomes. *Journal of Baltic Science Education, 18*(3), 323–334. https://doi.org/10.33225/jbse/19.18.323.

Amaluddin, L. O., Rahmat, R., Surdin, S., Ramadhan, M. I., Hidayat, D. N., Sejati, A. E., Purwana, I. G., & Fayanto, S. (2019). The effectiveness of outdoor learning in improving spatial intelligence. *Journal for the Education of Gifted Young Scientists, 7*(3), 717–730. https://doi.org/10.17478/jegys.613987

Beames, S., Higgins, P., & Nicol, R. (2012). *Learning outside the classroom: Theory and guidelines for practice*. Routledge.

Beames, S., Ross, H., & Gill, T. (2021). *The theory and practice of outdoor learning*. Routledge.

Bednarz, S. W. (2019). Spatial thinking and geospatial technologies in geography education. *Journal of Geography, 118*(2), 70–79. https://doi.org/10.1080/00221341.2018.1492215

Brookfield, S. D. (2012). *Teaching for critical thinking: Tools and techniques to help students question their assumptions*. Jossey-Bass.

Cole, D. R., Ullman, J., & Rooney, P. (2015). Critical thinking and student learning: Examining the development of analytical skills in higher education. *Journal of Educational Research, 108*(5), 1–10. https://doi.org/10.1080/00220671.2014.933150

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Facione, P. A. (2015). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi Report)*. California Academic Press.

Fägerstam, E., & Blom, J. (2013). Learning biology and mathematics outdoors: Effects and attitudes in a Swedish high school context. *Journal of Adventure Education and Outdoor Learning, 13*(1), 56–75. https://doi.org/10.1080/14729679.2011.647432

Fägerstam, E., & Blom, J. (2024). Outdoor education and 21st-century competencies: Evidence from longitudinal school research. *Journal of Adventure Education and Outdoor Learning, 24*(1), 45–60. https://doi.org/10.1080/14729679.2023.2245678

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning. *Educational Psychologist, 42*(2), 99–107. https://doi.org/10.1080/00461520701263368

Hodgson, D., & Spours, K. (2023). Experiential pedagogies and higher-order thinking development in secondary schools. *Teaching and Teacher Education, 121*, 103927. https://doi.org/10.1016/j.tate.2022.103927

Kidman, G. (2020). Outdoor learning in geography education: Authentic learning experiences. *International Research in Geographical and Environmental Education, 29*(3), 236–248. https://doi.org/10.1080/10382046.2019.1699578

Kim, M., & Bednarz, R. (2013). Development of critical spatial thinking through GIS learning. *Journal of Geography in Higher Education, 37*(3), 350–366. https://doi.org/10.1080/03098265.2013.769091

Kim, M., & Bednarz, S. (2024). Advancing spatial thinking in geography education through inquiry-based instruction. *Journal of Geography, 123*(1), 15–29. https://doi.org/10.1080/00221341.2023.2256789

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson Education.

Lugg, A., & Slattery, D. (2017). Use of outdoor learning environments in education: Fostering environmental awareness and experiential learning. *Journal of Outdoor and Environmental Education, 20*(1), 1–10. https://doi.org/10.1007/BF03400998

Mann, J., Gray, T., Truong, S., Sahlberg, P., Ward, K., & Bentsen, P. (2023). The impact of outdoor learning environments on student engagement and academic achievement: A meta-analysis. *Educational Research Review, 38*, 100502. https://doi.org/10.1016/j.edurev.2022.100502

Paul, R., & Elder, L. (2019). *Critical thinking: Tools for taking charge of your learning and your life* (2nd ed.). Foundation for Critical Thinking Press.

Susilawati, S. A., & Sochiba, S. L. (2022). Pembelajaran outdoor study dalam mata pelajaran geografi: Systematic review. *Jurnal Pendidikan Geografi, 27*(2), 120–129. https://doi.org/10.20527/jpg.v27i2.12345

Wright, R., & Nyerges, T. (2017). *Geospatial technologies and geography education in a changing world*. Springer.