International Journal of Mathematics and Mathematics Education
https://journals.eduped.org/index.php/ijmme
Volume 04, No. 1, 2026

e-ISSN 2986-4534
p-ISSN 2988-0734

Comparative Effects of the Numbered Heads Together and Two Stay Two Stray Models on Higher-Order Thinking Skills: The Moderating Role of Adversity Quotient in Learning Number Patterns

Intan Nurdiantasari[1*] , Siswanto[2], Farida Nurhasanah[3]

[1,2,3]Master Program in Mathematics Education, Universitas Sebelas Maret, Indonesia

*Corresponding author: intannurditasari@student.uns.ac.id

Received: 3/11/2025 Revised: 15/12/2025 Accepted: 2/1/2026

ABSTRACT

Purpose – This study aims to examine the comparative effectiveness of Numbered Heads Together (NHT) and Two Stay Two Stray (TSTS) cooperative learning models on students' Higher-Order Thinking Skills (HOTS), investigate the influence of Adversity Quotient (AQ) types (Climbers, Campers, Quitters), and explore the interaction effect between learning models and AQ on HOTS.

Methodology – This research employed a quasi-experimental 3x2 factorial design with stratified cluster random sampling among 8th-grade students in junior high schools. Data were collected through HOTS tests and AQ questionnaires and analyzed using two-way ANOVA.

Findings – The statistical analysis revealed no significant main effect regarding the effectiveness of the NHT versus TSTS models on HOTS overall. However, a significant interaction was found between the learning models and students' Adversity Quotient (AQ). Specifically, the findings indicate that the NHT model is more effective for students with higher resilience (Climbers and Campers), whereas the TSTS model offers greater benefits for students with lower resilience (Quitters). This demonstrates that the effectiveness of cooperative learning strategies on HOTS is moderated by students' psychological resilience profiles.

Novelty – This study uniquely integrates cooperative learning models with students' psychological resilience levels, offering insights into differentiated instructional strategies tailored to learners' AQ profiles.

Significance – This study provides practical benefits for educators and curriculum designers in selecting learning models that align with students' psychological characteristics to optimize HOTS. The findings are also significant for school counselors in developing intervention programs to enhance students' learning resilience.

Keywords: Adversity quotient (AQ); Higher-order thinking skills (HOTS); Mathematics learning; Numbered head together (NHT); Two stay two stray (TSTS).

How to cite: Nurdiantasari, I., Siswanto, & Nurhasanah, F. (2026). Comparative Effects of the Numbered Heads Together and Two Stay Two Stray Models on Higher-Order Thinking Skills: The Moderating Role of Adversity Quotient in Learning Number Patterns. *International Journal of Mathematics and Mathematics Education*, 04(1), pp, 29-39, doi: https://doi.org/10.56855/ijmme.v4i1.1805

1. Introduction

In the era of the Industrial Revolution 4.0, which is characterized by rapid advancements in science and technology, high-quality human resources capable of competing globally are needed. Education, according to the Great Dictionary of the Indonesian Language (KBBI), is the process of acquiring higher knowledge and understanding of a specific subject. Mathematics, as an essential discipline in daily life and the foundation for other sciences, fosters abstract thinking and problem-solving skills (Sutama, 2010). However, challenges in mathematics education still exist, especially in developing higher-order thinking skills (HOTS), which include analyzing, evaluating, and creating according to the revised Bloom's taxonomy (Krathwohl, 2002).

In Indonesia, the Merdeka Curriculum emphasizes HOTS to foster student-centered learning and critical thinking (Kemendikbudristek, 2022). However, the 2012 Programme for International Student Assessment (PISA) results showed that Indonesian students only achieved an average mathematics score of 375, ranking 64th out of 65 countries, indicating a deficiency in HOTS (OECD, 2014). Local data from Junior High Schools (SMP) in Madiun Regency also confirm low mathematics performance, with average Computer-Based National Examination (UNBK) scores ranging from 42.08 to 47.73 from 2014 to 2019, consistently below the provincial average (Puspendik, 2022).

Interviews with local educators, such as Raidah, revealed that teacher-centered teaching methods contribute to students' difficulties in mathematics, fostering passive attitudes and impeding the development of HOTS (Sukmawati et al., 2023). Cooperative learning models, such as Numbered Heads Together (NHT) and Two Stay Two Stray (TSTS), offer student-centered alternatives that encourage active participation and collaboration (Ibnu Badar Al-Tabany, 2017; Suprijono, 2012). Furthermore, students' Adversity Quotient (AQ), which measures resilience in facing challenges and is categorized as Climbers, Campers, or Quitters, may influence their ability to handle complex mathematical tasks (Stoltz, 2007).

Mathematics is a systematic science of logic, quantity, and abstract concepts (Purwanto, 2003; Sutama, 2010). Its abstract nature demands students to think critically, creatively, and systematically, making HOTS essential (Gunawan, 2004). HOTS, according to Rofiah et al. (2013), involves critically and creatively manipulating information to solve new problems, encompassing analyzing (C4), evaluating (C5), and creating (C6) in the revised Bloom's taxonomy (Krathwohl, 2002). HOTS indicators include formulating questions, designing solutions, and evaluating results against criteria. In the context of mathematics, HOTS includes the ability to recognize patterns, make generalizations, and apply concepts in new situations, such as on the topic of number patterns (National Council of Teachers of Mathematics (NCTM), 2000). Research by Brookhart (2011) affirms that HOTS enables students to connect mathematical ideas with real-world applications, enhancing deep understanding and problem-solving skills. However, challenges in developing HOTS often stem from a lack of teaching approaches that encourage divergent and reflective thinking (Anderson & Krathwohl, 2001).

Cooperative learning, which is rooted in constructivism, encourages collaboration among students with diverse abilities (Isjoni H., 2009). NHT involves small groups where students discuss and ensure collective understanding, with randomly selected members answering questions (Al-Tabany, 2017). TSTS organizes students into groups of four, with two members sharing findings with other groups, promoting information exchange (Suprijono, 2012). Both models reduce teacher dominance and increase student interaction, potentially enhancing HOTS (Irawan et al., 2017; Kaharuddin & Hajeniati, 2020). Research by Slavin (2012) shows that cooperative learning increases intrinsic motivation and student engagement through shared responsibility and group dynamics. Further studies by Johnson & Johnson (2009) highlight that cooperative learning strengthens social and cognitive skills, such as communication and problem-solving, which are important for HOTS. NHT excels in ensuring individual accountability through random selection, while TSTS encourages cross-group knowledge exchange, which can enrich students' perspectives (Arends, 2012).

Adversity Quotient (AQ) measures an individual's resilience in turning challenges into opportunities. AQ consists of three types: Climbers (persistent problem solvers), Campers (moderate effort with limited resilience), and Quitters (avoiding challenges). The AQ dimensions—Control, Origin, Ownership, Reach, and Endurance—shape students' responses to mathematical difficulties (Stoltz, 2007). High AQ (Climbers) is hypothesized to enhance HOTS by encouraging perseverance in complex tasks (Diana, 2008). Research by Parvathy & M (2014)shows that individuals with high AQ tend to exhibit greater emotional and cognitive resilience when facing academic problems, which is relevant for HOTS. Furthermore, a study by Phoolka & Kaur (2012) found that AQ affects students' coping strategies: Climbers are more proactive in seeking solutions than Quitters, who tend to avoid challenges. In the context of cooperative learning, AQ may moderate the effectiveness of models like NHT and TSTS, as students with high AQ might be more responsive to group dynamics that demand collaboration and perseverance (Safitri et al., 2018). This research also explores how the TSTS structure might provide additional support for Quitters through structured peer interactions, thereby reducing their tendency to give up.

This study aims to compare the effectiveness of the NHT and TSTS learning models in optimizing students' HOTS on the topic of number patterns, while also exploring the role of Adversity Quotient (AQ) as a moderator variable. The research focuses on four main aspects: (1) identifying which cooperative learning model (NHT or TSTS) is most effective at improving HOTS; (2) determining which AQ type (Climbers, Campers, Quitters) demonstrates superior HOTS; (3) analyzing the performance differences of the NHT and TSTS models among students with diverse AQ levels; and (4) examining how students with different AQ types perform under the application of each respective learning model.

2. Methods

This quasi-experimental research used a 2x3 factorial design, with two learning models (NHT, TSTS) and three AQ types (Climbers, Campers, Quitters). The research was conducted in the eighth grade of public junior high schools in Madiun Regency during the 2023/2024 academic year. Two classes were selected as experimental groups using cluster random sampling: Experimental Group I (NHT) and Experimental Group II (TSTS). AQ was assessed using a validated questionnaire, categorizing students into Climbers, Campers, and Quitters.

Table 1 - Factorial Design

Learning Models	Adversity Quotients (B)		
	Climbers (b1)	Campers (b2)	Quitter (b3)
NHT (a1)	a1b1	a1b2	a1b3
TSTS (a2)	a2b1	a2b2	a2b3

Data on HOTS were collected using pre- and post-tests focusing on number patterns, aligned with the HOTS indicators (C4–C6). AQ was assessed through a questionnaire based on Stoltz's framework. Data were collected over an eight-week period, with the pre-test ensuring group equivalency and the post-test evaluating the HOTS outcomes. Data were analyzed using a two-way ANOVA with unequal cell sizes to examine the effects of the learning model, AQ, and their interaction on HOTS. The analysis was performed using R software version 4.3.2, chosen for its ability to handle complex statistical analyses and its flexibility in data visualization. The Quarto framework (.qmd) was used to integrate the analysis code, narrative, and visualizations into a single structured document, ensuring the reproducibility and transparency of the analysis results.

The analysis process began with data cleaning using the 'dplyr' and 'tidyr' packages in R to ensure the pre-test, post-test, and AQ score data were free from missing values or anomalies. Prerequisite tests were conducted using the 'shapiro.test()' function for the normality test (Lilliefors) and the 'bartlett.test()' function for the homogeneity test (Bartlett), verifying that the data met the ANOVA assumptions. A test for group equivalence was conducted using the 't.test()' function to ensure the equivalence of the pre-test scores. The two-way ANOVA was performed using the 'aov()' function from the R base package, with a model that included the main effects of the learning model (NHT vs. TSTS) and AQ (Climbers, Campers, Quitters), and their interaction. For significant interactions, a Scheffe post-hoc test was conducted using the 'scheffe.test()' function from the 'agricolae' package. All statistical tests used a significance level of alpha = 0.05$.

The Quarto framework enabled the compilation of analysis reports that integrated R code, statistical results, and narrative interpretations within a '.qmd' format. This document was converted to PDF format using 'quarto render' for formal reporting, ensuring that every analysis step was traceable and reproducible. Data visualizations, such as boxplots to compare HOTS scores across groups and AQ types, were generated using the 'ggplot2' package to clarify the statistical findings. The use of R and Quarto enhanced analytical efficiency, supported complex data management, and facilitated the clear, structured of research findings.

3. Results and Discussions

3.1 Results

Based on the research findings, Table 2 presents descriptive statistics on students' problem-solving abilities, including the mode, median, mean (average), standard deviation, and variance for students from SMPN 2 NGLAMES and SMPN 2 WUNGU.

Table 2 - Descriptive Statistics Data on Higher-Order Thinking Skills (HOTS)

Schools	n	Measures of Central Tendency			Measures of Dispersion		
		Average	Me	Mo	Max	Min	s
SMPN 2 NGLAMES	97	44,28	16,48	50,52	0,11	0,55	2,41
SMPN 2 WUNGU	95	40,14	20,30	49,48	-0,11	0,45	2,41

Table 3 shows the marginal means of the HOTS scores. NHT produced an average score of 48.354, higher than TSTS (34.838). Among the AQ types, Quitters recorded the highest score (43), followed by Climbers (41.954) and Campers (41.596).

Table 3 - Descriptive Statistics of Adversity Quotient (AQ)

Group	Adversity Quotients			Total of Students
	Climbers	Campers	Quitter s	
NHT	66	62	64	194
TSTS	61	65	63	189

The normality test confirmed that the NHT and TSTS data were normally distributed ($L < L_{table}$, $p > 0.05$). The homogeneity test indicated equal variances for the learning models ($\mathcal{X}^2_{table} < \mathcal{X}^2$, $p > 0.05$) in Table 4, and the Homogeneity Test in Table 5 confirmed that the data used in this study were homogeneous ($F > F_{table}$, $p > 0.05$).

Table 4 - Normality Test Results for the Higher-Order Thinking Skills (HOTS)

Learning Models	N	L_{obs}	L_{table}	Conclusion
NHT	97	0,112	0,137	Normally distributed
TSTS	95	0,055	0,139	Normally distributed

Table 5 - Homogeneity Test Results for Higher-Order Thinking Skills (HOTS)

Group	$\mathcal{X}obs$	$\mathcal{X}^2_{0,05;2}$	Decision
Learning Models	0,712	3,841	H_0 Acceptance

For the Numbered Heads Together (NHT) and Two Stay Two Stray (TSTS) learning models, the analysis results in Table 6 show that the F-value is smaller than the critical F-value at the 0.05 significance level. Therefore, the null hypothesis (H_0) is accepted, meaning there is no significant difference in the effectiveness of the two learning models on students' higher-order thinking skills (HOTS).

For the Adversity Quotient (AQ) variable, with the categories Climbers, Campers, and Quitters, the F-value is greater than the critical F-value at the 0.05 significance level; thus, the null hypothesis (H_0) is rejected. This indicates a significant difference in the effect of AQ on students' higher-order thinking skills (HOTS). For the interaction between the learning model and AQ, the F-value exceeds the critical F-value at the 0.05 significance level; thus, the null hypothesis (H_0) is rejected. This indicates a significant interaction between the learning model and AQ on students' higher-order thinking skills (HOTS). Given this significant interaction, a Scheffé post hoc test was conducted to further analyze the relationship and address the research hypotheses.

Table 6 - Results of One-Way Analysis of Variance

Sources	JK	DK	F_{obs}	F_{table}	Decision
Learning Model (A)	0,03	1	0,004	3,89	H_0 Accepted
Adversity Quotients (B)	149,97	2	9,271	3,04	H_0 Rejected
Interaction (AB)	266,26	2	16,460	3,04	H_0 Rejected
Error (Residual)	1504,41	186			-
Total	1920,67	191			-

Before proceeding to the deeper analysis results, it is important to note the marginal means for all variables. Table 7 explains the marginal means; the Numbered Heads Together learning model yielded better results for students' higher-order thinking skills than the Two Stay Two Stray learning model. Furthermore, students in the Quitters group demonstrated better results in higher-order thinking skills than students in the Climbers and Campers groups.

Table 7 - Means of Cell and Marginal for Higher-Order Thinking Skills (HOTS)

Learning Models	Adversity Quotients			Means of Marginal
	Climbers	Campers	Quitters	
NHT	3,75	8,76	4,469	48,35
TSTS	3,75	8,76	4,469	34,83
Means of Marginal	41,95	41,59	43,00	-

Table 8 compares students' problem-solving abilities using the Numbered Heads Together (NHT) and Two Stay Two Stray (TSTS) learning models. The test results showed an F-value of 20.389, which is greater than the critical F-value of 3.891 with a p-value of 0.0000112. Thus, the null hypothesis was rejected, indicating a significant difference in the effects of NHT and TSTS on students' problem-solving abilities. Based on the marginal means, students with NHT had an average score of 48.354, while those with TSTS had an average score of 34.838. Therefore, it can be concluded that students with the NHT model have higher problem-solving abilities than those with the TSTS model.

Table 8 - Results of the Row-wise Mean Comparison for Thinking Ability

H_0	F_{obs}	F_{table}	P_{value}	Decision
$\mu_1 = \mu_2$	20,389	3,891	0,0000112	H_0 Rejected

Furthermore, Table 9 provides a more detailed explanation for the findings in Table 8 (where the comparison test was rejected). However, after conducting a follow-up analysis comparing rows within the same column, it was found that for students with AQ types Campers, Climbers, and Quitters, there was no significant difference in problem-solving abilities between those using the NHT and TSTS learning models. This was because the respective F-values of 10.967 (Campers), 11.309 (Climbers), and 1.310 (Quitters) were smaller than the critical F-value of 11.313; thus, the null hypothesis was accepted. However, the F-values for Campers and Climbers, which were close to the critical value, indicate a potential difference that was not yet statistically significant, whereas for Quitters, the difference was clearly not significant.

Table 9 - Results of the Column-wise Mean Comparison for Thinking Ability

H_0	F_{obs}	F_{table}	P_{value}	Decision
$\mu_{11} = \mu_{21}$	20,389	3,891	0,0000112	H_0 Accepted
$\mu_{12} = \mu_{22}$	11,309	11,313	0,0000000015	H_0 Accepted
$\mu_{13} = \mu_{23}$	1,310	11,313	0,261	H_0 Accepted

The comparison results in Table 10 showed that there was no significant difference in problem-solving abilities among students with Adversity Quotient (AQ) types Campers, Climbers, and Quitters. This was because the respective F-values of 0.518 (Campers vs. Climbers, p=0.596), 0.262 (Climbers vs. Quitters, p=0.769), and 1.486 (Campers vs. Quitters, p=0.228) were less than the critical F-value of 6.089; thus, the null hypothesis was accepted. Based on the marginal means in Table 29, the scores for Campers (41.596), Climbers (41.954), and Quitters (43) indicate that these three AQ types were similarly effective in improving students' problem-solving abilities.

Subsequently, Table 11 presents a follow-up analysis for Table 10, which confirms that among students following the NHT learning model, there were no significant differences in problem-solving abilities between students with AQ types Campers and Climbers, Campers and Quitters, and Climbers and Quitters, because the F-values were smaller than the critical F-value, thus the null hypothesis (H0) was accepted. Similarly, for students following the TSTS learning model, there were no significant differences between Campers and Climbers, or between Climbers and Quitters, as the F-values were smaller than the critical F-value; thus, H0 was accepted. However, there was a significant difference between Campers and Quitters, as the F-value exceeded the critical F-value and the p-value was less than 0.05; thus, H0 was rejected, and further investigation of the test scores is needed to determine which student type has better problem-solving abilities.

Table 10 - Results of the Cell-wise Mean Comparison Test for Thinking Ability

H_0	F_{obs}	F_{table}	P_{value}	Decision
$\mu_1 = \mu_2$	0,158	6,089	0,596	H_0 Accepted
$\mu_2 = \mu_3$	0,262	6,089	0,769	H_0 Accepted
$\mu_1 = \mu_3$	1,486	6,089	0,228	H_0 Accepted

Table 11 - Results of the Cell-wise Mean Comparison for Thinking Ability

H_0	F_{obs}	F_{table}	P_{value}	Decision
$\mu_{11} = \mu_{21}$	0,190	11,313	0,965	H_0 Rejected
$\mu_{11} = \mu_{13}$	0,057	11,313	0,997	H_0 Rejected
$\mu_{12} = \mu_{13}$	0,468	11,313	0,799	H_0 Rejected
$\mu_{21} = \mu_{22}$	0,231	11,313	0,948	H_0 Rejected
$\mu_{21} = \mu_{23}$	3,854	11,313	0,002	H_0 Rejected
$\mu_{22} = \mu_{23}$	2,231	11,313	0,052	H_0 Rejected

This study found that the Numbered Heads Together (NHT) learning model produced better problem-solving abilities (mean score = 48.354) compared to TSTS (mean score = 34.838). This difference was significant (F > F_critical, p=0.0000112); therefore, the null hypothesis for the First Hypothesis was rejected.

However, for the Second Hypothesis, there was no significant difference in problem-solving abilities among the AQ groups: Campers (41.596), Climbers (41.954), and Quitters (43). The F-values were always smaller than the F_critical value (p>0.05), so the null hypothesis was accepted. Similarly, for the Third Hypothesis, no significant differences were found between NHT and TSTS within each specific AQ group (Campers: F=10.967; Climbers: F=11.309; Quitters: F=1.310; all p>0.05). This held true even as the results for Campers and Climbers approached significance, though any potential minor difference detected was not statistically significant.

The Fourth Hypothesis, the analysis showed no significant differences among the AQ groups within each learning model. Despite this, there was a tendency toward a differential relationship between the learning models and AQ, which might be influenced by contextual factors such as teaching quality, student motivation, and social support, suggesting the need for further research to uncover more complex interactions.

3.2 Discussion

3.2.1 Comparative Effectiveness of Cooperative Learning Models (NHT vs. TSTS) on HOTS

Based on the descriptive analysis, students in the Numbered Heads Together (NHT) group achieved a higher average HOTS score (Mean = 48.35) than those in the Two Stay Two Stray (TSTS) group (Mean = 34.84). Although the main effect analysis in Table 6 indicates that the difference in effectiveness between the two models was not statistically significant relative to the interaction effect, the descriptive superiority of NHT suggests its potential for structuring mathematical thinking. This aligns with findings by Sari & Surya (2017), who emphasized that NHT effectively improves learning outcomes by enforcing individual accountability through the "number calling" mechanism, which compels students to be ready to answer. Furthermore, Yenni (2016) highlights that NHT in mathematics learning encourages students to process information more deeply before sharing it with their group.

However, the TSTS model also contributed positively, particularly in communication. While its average score was lower than NHT in this specific study on number patterns, TSTS facilitates active information exchange. As noted by Suwangsih et al. (2019) the "straying" phase in TSTS is crucial for enhancing students' mathematical communication skills, allowing them to verify their understanding with other groups. Arif et al. (2016) adds that TSTS can enhance self-efficacy and social outcomes, suggesting that while NHT may be slightly more rigorous for individual cognitive tasks (HOTS), TSTS builds the necessary social confidence for learning. The use of both models reflects the constructivist approach, where knowledge is built through social interaction, as supported by Arends (2012), who states that innovative models must be student-centered and oriented towards knowledge construction.

3.2.2 The Role of Adversity Quotient (AQ) in Mathematics Learning

An interesting finding in this study is the performance of students with the "Quitters" AQ profile, who achieved the highest descriptive average (Mean = 43.00), surpassing Climbers (41.95) and Campers (41.59). This challenges the general assumption that Climbers always outperform others. In the context of cooperative learning, this phenomenon can be explained by the motivational support provided by the group structure. Sardiman (2008) argues that motivation and interaction are inseparable in the teaching-learning process; when low-resilience students (Quitters) are placed in a supportive cooperative environment, their external motivation is boosted.

Furthermore, Hudoyo (2005) asserts that learning mathematics requires a readiness to engage with abstract concepts. The cooperative setting may have lowered the anxiety barrier for Quitters, enabling them to engage more effectively than in a conventional setting. However, the statistical analysis showed no significant pairwise differences among the AQ types, suggesting that when cooperative learning strategies are applied, the gap between high-resilience (Climbers) and low-resilience (Quitters) students can be bridged.

3.2.3 Interaction Between Learning Models and Adversity Quotient

The significant interaction found in this study (F_{obs} = 16.460, $p < 0.05$) confirms that the effectiveness of a learning model depends on students' psychological profiles. The findings suggest NHT is more beneficial for Climbers and Campers, while TSTS is surprisingly effective for Quitters. NHT requires high individual readiness. Rahayu & Cahyadi (2019) compared NHT with other models and found it requires students to be independently prepared to represent their group. This pressure serves as a positive challenge for Climbers and Campers who, according to Lie (2002), thrive in cooperative settings that offer structured challenges and clear accountability.

Conversely, TSTS provides a mechanism for movement and visiting other groups, which may reduce the monotony and pressure of being "put on the spot" for Quitters. Sudrajat et al. (2018) found that TSTS significantly improves interest in learning. For Quitters, who tend to give up easily, the physical movement and the opportunity to "stray" and hear explanations from peers in other groups act as a scaffold, providing alternative explanations without the intense pressure of the NHT call-out. This aligns with Suherman (2003), who emphasized that contemporary mathematics strategies must accommodate diverse student characteristics to be effective. Therefore, educators must be adaptive, as suggested by Aris Shoimin (2014), implementing innovative learning models requires sensitivity to the psychological dynamics of the classroom to maximize Higher-Order Thinking Skills (HOTS).

4. Conclusions

This study concludes that the Numbered Heads Together (NHT) learning model produced higher-order thinking skills (HOTS) (mean = 48.354) than the Two Stay Two Stray (TSTS) (mean = 34.838) on the topic of number patterns, although the difference was not statistically significant. Meanwhile, students with the Quitters Adversity Quotient (AQ) type showed superior HOTS (mean = 43) compared to Campers (41.596) and Climbers (41.954), with a significant difference, although post-hoc tests showed no significant differences between the AQ groups. NHT tended to be more effective for Campers and Climbers, while TSTS was more beneficial for Quitters, with a significant interaction found between the learning models and AQ.

Therefore, teachers are advised to prioritize NHT to improve HOTS, especially for Climbers and Campers, and utilize TSTS to support Quitters. This should be done while also identifying students' AQ types, integrating HOTS problems into the curriculum, and training teachers to implement cooperative learning models and manage students' AQ to create more effective and inclusive learning.

Conflict of Interest

The author declares that there were no conflicts of interest related to the study.

References

Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy for Learning, Teaching, and Assessing*. Pearson.

Arends, R. I. (2012). *Learning to teach* (9 th). Mcgraw-Hill.

Arif, N., Eko Soetjipto, B., & Nyoman Sudana Degeng, I. (2016). The Implementation of Carousel Feedback and Two Stay Two Stray Learning Models to Enhance Students' Self-Efficacy and Social Studies Learning Outcomes. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS*, *21*(5), 99–104. https://doi.org/10.9790/0837-21050399104

Aris Shoimin. (2014). *68 model pembelajaran inovatif dalam kurikulum 2013*. Ar-Ruzz

Media.

Brookhart, S. M. . (2011). *How to Assess Higher-Order Thinking Skills in Your Classroom*. Hawker Brownlow Education.

Diana, N. (2008). *Studi Deskriptif Adversity Quotient pada Siswa Akselerasi pada SMU I Negeri Malang*. Universitas Islam Indonesia.

Gunawan, A. W. (2004). *Genius Learning Strategy: Petunjuk Praktis untuk Menerapkan Accelerated Learning* (2 nd). Gramedia Pustaka Utama.

Hudoyo, H. (2005). *Teori belajar untuk pengajaran matematika*. Depdikbud.

Ibnu Badar Al-Tabany, T. (2017). *Mendesain Model Pembelajaran Inovatif, Progresif, Dan Konteksual*. Prenada Media.

Irawan, A., Mardiyana, & Sari Saputro, D. R. (2017). Experimentation of cooperative learning model Numbered Heads Together (NHT) type by concept maps and Teams Games Tournament (TGT) by concept maps in terms of students' logical mathematical intelligence. *Journal of Physics: Conference Series*, *855*, 012019. https://doi.org/10.1088/1742-6596/855/1/012019

Isjoni H. (2009). *Cooperative Learning: Efektivitas Pembelajaran Kelompok*. Alfabeta.

Johnson, D. W., & Johnson, R. T. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, *38*(5), 365–379. https://doi.org/10.3102/0013189X09339057

Kaharuddin, A., & Hajeniati, N. (2020). The effect of the combination of numbered heads together and the two-stray learning model on mathematical learning outcomes and the activeness of senior high students. *International Journal of Educational Best Practices (IJEBP)*, *4*(2). https://doi.org/10.32581/ijebp.v4n2.p78-87

Kemendikbudristek. (2022). *Keputusan Menteri Pendidikan, Kebudayaan, Riset, dan Teknologi Nomor 56/M/2022 tentang Pedoman Penerapan Kurikulum dalam Rangka Pemulihan Pembelajaran*.

Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory Into Practice*, *41*(4), 212–218. https://doi.org/10.1207/s15430421tip4104_2

Lie, A. (2002). *Cooperative learning*. Grasindo.

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and Standards - National Council of Teachers of Mathematics*. https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/

OECD. (2014). *PISA 2012 Results: What Students Know and Can Do – Student Performance in Mathematics, Reading and Science*.

Parvathy, D. U., & M, P. (2014). Relationship between Adversity Quotient and Academic Problems among Student Teachers. *IOSR Journal of Humanities and Social Science*, *19*(11), 23–26. https://doi.org/10.9790/0837-191172326

Phoolka, E. S., & Kaur, N. (2012). Adversity Quotient: A new paradigm in Management to explore. *International Journal of Contemporary Business Studies*, *3*(4), 67–78.

Purwanto. (2003). *Strategi Belajar Mengajar Matematika*. UNS Press.

Puspendik. (2022). *Laporan Hasil Ujian Nasional Berbasis Komputer (UNBK) SMP Tahun 2014-2019*.

Rahayu, S., & Cahyadi, R. (2019). Experimentation of NHT And TPS Learning Model Using CTL Approach Towards Mathematics Learning Outcomes Viewed from Student Learning Styles. *International Journal of Trends in Mathematics Education Research*, *2*(4), 215–218. https://doi.org/10.33122/ijtmer.v2i4.140

Rofiah, E., Aminah, N. S., & Ekawati, E. Y. (2013). Penyusunan Instrumen Tes Kemampuan Berpikir Tingkat Tinggi Fisika Pada Siswa SMP. *Jurnal Pendidikan Fisika*, *1*(2), 120699.

Safitri, A. N., Juniati, D., & Masriyah. (2018). Students' Relational Understanding in Quadrilateral Problem Solving Based on Adversity Quotient. *Journal of Physics:*

Conference Series, *947*, 012039. https://doi.org/10.1088/1742-6596/947/1/012039

Sardiman. (2008). *Interaksi & Motivasi Belajar Mengajar*. PT Raja Grafindo.

Sari, M., & Surya, E. (2017). Improving the Learning Outcomes of Students using Numbered Heads Together Model in the Subjects of Mathematics. *International Journal of Sciences: Basic and Applied Research*, *33*(3), 311–319.

Slavin, R. E. . (2012). *Educational psychology : theory and practice*. Pearson Education.

Stoltz, P. Gordon. (2007). *Adversity quotient : turning obstacles into opportunities = Adversity quotient : mengubah hambatan menjadi peluang*. Grasindo.

Sudrajat, A., Iasha, V., & Femayati, F. (2018). The Influence of the Use of Cooperative Learning Model Jigsaw & Two Stay Two Stray and the Learning Interest Result on 5 th Grade Social Science. *Prosiding Konferensi Internasional Pertama Tentang Penilaian Dan Kebijakan Pendidikan*, *2*, 28–33.

Suherman, E. (2003). *Strategi pembelajaran matematika kontemporer*. JICA - UPI.

Sukmawati, I., Purwaningsih, W. I., & Yuzianah, D. (2023). Analisis berpikir kritis siswa dalam pemecahan masalah matematika ditinjau dari gaya kognitif. *JUMLAHKU: Jurnal Matematika Ilmiah STKIP Muhammadiyah Kuningan*, *8*(2), 97–111. https://doi.org/10.33222/jumlahku.v8i2.2412

Suprijono, A. (2012). *Cooperatif Learning: Teori dan Aplikasi PAIKEM*. Pustaka Pelajar.

Sutama. (2010). *Metode Penelitian Pendidikan: Kuantitatif, Kualitatif, PTK, dan R&D*. Fairuz Media.

Suwangsih, E., Budiarti, M. R., Ruskandi, K., Hendawati, Y., & Majid, N. W. A. (2019). Two-stay two-stray model on improving mathematical communication skill of elementary school students. *Journal of Physics: Conference Series*, *1318*(1). https://doi.org/10.1088/1742-6596/1318/1/012127

Yenni, R. F. (2016). *Penggunaan Metode Numbered Head Together (NHT) dalam Pembelajaran Matematika*. https://doi.org/http://doi.org/10.30870/jppm.v9i2.1006.