

Effort to Improve Social Sciences Learning Outcomes Indonesian Cultural Diversity Material Through the Numbered Heads Together (NHT) Collaborative Learning Model for Fourth-Grade Students of SDN Baran

Prihma Sinta Utami¹, Friska Nur Kusumadewi^{2*}, Tutik Saptiningsih³

¹Pendidikan Sejarah dan Sosiologi, Fakultas Sosial dan Humaniora, Universitas Insan Budi Utomo, Jl. Citandui No.46, Purwantoro, Blimbing, Malang, Jawa Timur, Indonesia

²SDN Baran, Piring, Srihardono, Bantul, DIY, Indonesia

³Direktorat Pendidikan Pemuda dan Olahraga Kabupaten Bantul, Komplek II Kantor Pemda Bantul, Bantul, DIY, Indonesia

*Email corresponding author: prihmasintautami@uibu.ac.id

Article Info

Article history:

Received 28-10-2024

Revised 11-01-2025

Accepted 15-01-2025

Published 16 01 2025

How to cite: Utami, P. S., Kusumadewi, F. N., Saptiningsih, T. (2025). Effort to Improve Social Sciences Learning Outcomes Indonesian Cultural Diversity Material Through the Numbered Heads Together (NHT) Collaborative Learning Model for Fourth-Grade Students of SD N Baran. *Edcomtech: Jurnal Kajian Teknologi Pendidikan*, 9(2), 101–112.

<https://doi.org/10.17977/um039v9i22024p101-112>

© The Author(s)



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Abstrak

Hasil capaian dalam pelajaran IPS khususnya pada siswa kelas 4 SD N Baran masih rendah. Tujuan penelitian ini adalah untuk mendeskripsikan peningkatan hasil belajar IPS melalui pembelajaran kooperatif tipe NHT pada siswa kelas 4 SD N Baran. Penelitian ini merupakan Penelitian Tindakan Kelas. Objek penelitian adalah siswa kelas 4 SD N Baran yang berjumlah 9 orang. Pendekatan penelitian menggunakan pendekatan kualitatif. Metode tes dan non tes berupa observasi digunakan sebagai metode pengumpulan data. Metode analisis data yang digunakan adalah metode kuantitatif dan kualitatif. Penelitian dilaksanakan dalam 2 siklus. Hasil penelitian menunjukkan bahwa rata-rata nilai tes meningkat setiap siklusnya. Pada pra tindakan hasil rata-rata 51,79 meningkat menjadi 12,30 menjadi 64 pada siklus I, dan pada siklus II mean 81 meningkat 17. Pada pra tindakan mencapai 0% meningkat 11% menjadi 22 % pada Siklus I. Pada Siklus II ketuntasan meningkat sebesar 67%, sehingga pencapaian ketuntasan siswa pada Siklus II mencapai 89%. Artinya hasil belajar IPS meningkat dari Siklus I hingga akhir Siklus II. Dapat dikatakan bahwa penerapan model pembelajaran kooperatif tipe NHT dapat meningkatkan hasil belajar siswa.

Kata Kunci: hasil belajar IPS, model NHT, pembelajaran kooperatif

Abstract

The learning achievement in Social Studies, particularly among Grade 4 students at SD N Baran, is still low. The purpose of this study is to describe the improvement in Social Studies learning outcomes through the cooperative learning model of the NHT (Numbered Heads Together) type among Grade 4 students at SD N Baran. This research is a Classroom Action Research. The subject of the research was 9 students in Grade 4 at SD N Baran. The research used a qualitative approach. Data collection methods included both test and non-test techniques, such as observation. The data analysis methods used were quantitative and qualitative. The study was conducted in two cycles. The results

	<p><i>showed that the average test score increased in each cycle. In the pre-action stage, the average score was 51.79, which increased by 12.30 points to 64 in Cycle I, and further rose to 81 in Cycle II with an improvement of 17 points. In the pre-action stage, 0% of students achieved mastery; this increased by 11% to 22% in Cycle I. In Cycle II, mastery increased by 67%, so that student mastery in Cycle II reached 89%. This indicates that Social Studies learning outcomes improved from Cycle I to the end of Cycle II. It can be concluded that the application of the cooperative learning model of the NHT type can improve student learning outcomes.</i></p> <p>Keywords: <i>social studies learning outcomes, Numbered Heads Together model, cooperative learning</i></p>
--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

INTRODUCTION

Teaching activities are the primary key to the implementation of education in schools, and teachers play a major role in this. Teachers are expected to manage the learning process effectively by stimulating students to engage in learning and shaping learning activities that focus on students, rather than relying solely on the teacher (Darling-Hammond et al., 2024). Learning serves as a means to interconnect the elements within an instructional system (Ernawati et al., 2024). The learning process becomes meaningful for students when it is conducted with thorough preparation and planning by the teacher (Alqahtani et al., 2023; Lynch et al., 2021). In addition, teachers must create innovative learning strategies to achieve successful learning outcomes (Fink et al., 2023; Onu et al., 2024).

Based on observations conducted by the researcher in the fourth grade at SD N Baran, it was found that students' social studies learning outcomes were not entirely at a low level. However, based on the daily assessment results, nine students did not meet the Minimum Completeness Criteria (MCC), which is 75. Most students showed a lack of perseverance in completing their tasks. When asked questions, students struggled and tended to ask their peers instead of independently trying to find the correct solution. Students were also not resilient when facing difficulties, as seen when they responded with "I don't understand" without attempting to think or look for answers in their books. Moreover, students lacked the motivation to learn during social studies classes, as many did not pay attention to the teacher's explanation and instead were engaged in conversations with their peers (Rauchfleisch & Kaiser, 2020). There was also a low interest in practicing social studies, indicated by students' low enthusiasm for learning the subject—only two students out of the whole class expressed interest in social studies during interviews (Graham et al., 2020).

Education in the contemporary era faces complex challenges that demand innovation in instructional strategies (Bakar, 2021). The paradigm shift from teacher-centered to student-centered learning has driven the exploration of various cooperative learning models (Soomro et al., 2021). One prominent and widely implemented model is Numbered Heads Together (NHT). Developed by Spencer Kagan, NHT is designed to enhance student interaction, promote individual and group accountability, and ensure every team member masters the material (Almumen et al., 2025). Its main features include forming heterogeneous groups, assigning numbers to each student, engaging in group discussions to reach consensus, and randomly selecting numbered students to present the group's answers—thereby ensuring shared responsibility for collective understanding (Rijal et al., 2021).

The relevance of cooperative learning models such as NHT is growing alongside the need to develop 21st-century skills such as collaboration, communication, critical thinking, and

creativity (Manafe et al., 2022; Rosidi & Indriati, 2021). Recent studies continue to examine the effectiveness and implementation of NHT in various learning contexts. For instance, a 2023 study by Salu and Hardini titled “The Effectiveness of the Teams Games Tournament and Numbered Heads Together Models on Fifth Grade Students’ Social Studies Learning Outcomes” found that both models could serve as alternative strategies to improve student learning. The t-test result was 2.148, and the two-tailed significance value for both classes was around 0.05 (Salu & Hardini, 2023).

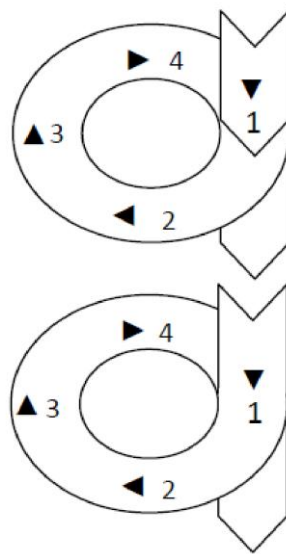
In the context of Social Studies learning, the application of the NHT method has shown positive results. A study by Arnianti et al. (2022) found that implementing the NHT cooperative learning model increased both motivation and academic achievement in social studies for class XI IPS B students at SMA IT Granada Samarinda. Similarly, Yulinova (2023) reported that using the NHT model in fourth grade at SDN 17 Palaluar improved students’ interest and achievement in social studies (Arnianti et al., 2022). Another study conducted by Diah et al. (2023), titled “Improving Learning Outcomes on Theme 8 through the Numbered Heads Together (NHT) Model Assisted by Crossword Media in Fifth Grade at SDN Wirun,” revealed that using crossword puzzles in conjunction with NHT improved learning outcomes, with average scores for Civic Education content reaching 70.62 and Social Studies 65.37 in Cycle I, and rising to 82.37 and 79.87 respectively in Cycle II (Diah et al., 2023).

Beyond improving learning outcomes, the NHT model also contributes to students’ problem-solving abilities. Research by Rahmawati et al. (2021) showed that NHT was more effective than direct instruction. Students with higher problem-solving skills achieved better math learning outcomes compared to those with moderate or low abilities. The study concluded that there is a correlation between the use of the NHT model, problem-solving skills, and student learning outcomes (Rahmawati, 2021).

Based on the description above, selecting an appropriate learning model is key to addressing the issue of low academic achievement, particularly in social studies on the topic of cultural diversity in Indonesia. The Numbered Heads Together (NHT) collaborative learning model is expected to be a potential solution, as it emphasizes active participation, teamwork, and individual accountability within a group. Through this approach, students are expected to better understand the material and simultaneously develop social skills that support competency achievement. Therefore, this study aims to determine the effectiveness of implementing the NHT collaborative learning model in improving social studies learning outcomes on the topic of cultural diversity in Indonesia among fourth-grade elementary students.

METHOD

This study employs a Classroom Action Research (CAR) approach, referring to the spiral model developed by Stephen Kemmis and Robin McTaggart. This model emphasizes a repetitive cycle consisting of four key stages, namely: (1) planning, (2) acting, (3) observing, and (4) reflecting. Each cycle is systematically implemented to identify and resolve problems that occur during the learning process (Góral et al., 2021; Sitorus et al., 2023). The illustration of the research cycle diagram can be seen in the figure below.



Informtion:

Cycle I

1. Planning I
2. Acting I
3. Observing I
4. Reflecting I

Cycle II

1. Planning I
2. Acting I
3. Observing I
4. Reflecting I

Figure 1. Research Cycle Diagram

This study was designed in two cycles, with each cycle consisting of the four mentioned stages. In the planning stage, the researcher prepared a lesson plan using the Numbered Heads Together (NHT) model, designed to improve student learning outcomes on the topic of cultural diversity in Indonesia. The acting stage involved implementing the lesson according to the prepared plan. The observing stage was carried out directly by the researcher and a collaborating teacher to record student activities, engagement, and obstacles encountered during the learning process. The reflecting stage aimed to analyze the results of the actions taken in that cycle as material for evaluation and improvement in the next cycle.

The subject of this study was fourth-grade students at SD Negeri Baran, located in Piring Village, Srihardono Village, Pundong Subdistrict, Bantul Regency, Special Region of Yogyakarta, in the first semester of the 2023/2024 academic year. A total of 9 students were involved in this study. Data were collected through tests and observation techniques. Quantitative data in the form of student test results were analyzed using descriptive quantitative techniques to determine the improvement in learning outcomes from pre-action to each cycle. Meanwhile, qualitative data were analyzed using a descriptive qualitative approach to evaluate student engagement and the effectiveness of implementing the NHT model.

An explanation of data collection techniques and instruments, specifically tests and observations, can be seen as follows.

Test

The learning outcomes of social studies were assessed using the NHT (Numbered Heads Together) method through a learning outcomes test. This test was based on the social studies subject matter, specifically "Cultural Diversity in Indonesia." The test was administered at the end of each meeting and consisted of 2-point essay questions. The explanation of the written test instrument for data collection is as follows.

Written Test Instrument

Table 1: Learning Achievement Test Results Table

Basic Competence	Indicator	Correct Item Type	Number of Questions
3.2 Showing concern for various social, economic, cultural, ethnic, and religious diversity in the local province as part of Indonesia's national identity and its relation to spatial characteristics.	3.2.1 Explaining Indonesia's sociocultural diversity	Essay	2

Observation

The researcher conducted observations by observing and recording the implementation of IPS (Social Studies) learning using the collaborative learning style Numbered Heads Together (NHT), as well as the activities shown by students during the learning process. Observations were carried out based on observation sheets. Further explanation about the data collection instrument in the form of an observation tool can be seen as follows.

Observation Tool

Observation utilizes observation sheets as a guide for conducting observations to achieve the desired results. The observation sheets are intended for obtaining data on the abilities of teachers and students during the teaching and learning process, and are used in this research, specifically for the NHT (Numbered Heads Together) collaborative learning model.

Table 2. Teacher Observation Sheet Blueprint

Variable	Observable Aspects	Parameters	Items	Number of Items
Numbered Heads Together (NHT) Cooperative Learning Model	Teacher's steps in using the "Numbered Heads Together" Cooperative Learning model	Student acquisition	1,2	2
		Material presentation	3,4	2
		Group problem-solving and numbering of each group member	5,6	2
		Guidance during discussion	7	1

	Provide feedback on student perceptions	8	1
	Awards	9	1

Table 3. Grid of Student Observation Sheet

Variable	Observable Aspects	Parameters	Items	Number of Items
Numbered Heads Together (NHT) Cooperative Learning Model	Implementing Steps of the "Numbered Heads Together" Cooperative Learning Model	Student readiness for learning	1,2	2
		Group formation and numbering	3	1
		Discussion	4,5	2
		Presentation	6,7	2
		Providing feedback	8	1
		Receiving awards	9	1
		Concluding the lesson material	10	1

Data Analysis Methodology

Qualitative and quantitative descriptive methods are used for data analysis examination. Qualitative descriptive is used for qualitatively reading the results and conducting classroom action research based on observations of classroom learning.

Quantitative descriptive methods are utilized to consider the average percentage of student test scores at the end of the activity. The formula looks like this:

$$P = \frac{f}{N} \times 100\%$$

P = percentage

f = frequency

N = total frequency / number of students

Data is considered based on various instruments, then the data is summed and the average and percentage are calculated. Row and column tables are frequently used to present data due to their easy and simple layout. A table consists of numbers, values, and predicates.

Table 4. Value Range

No	Sign		Predicate
	Number	Letter	
1.	80-100	A	Excellent
2.	66-79	B	Good
3.	56-65	C	Sufficient

4.	40-45	D	Not sufficient
5.	0-39	E	Failure

Success criteria

This case study can be said to be successful if 75% of students in grade IV of Baran Elementary School are able to achieve a minimum KKM score of 75.

RESULT and DISCUSSION

Initial Condition of Learning Outcomes

In the early semester of the 2023/2024 academic year, the initial learning outcomes of Grade 4 students at SD N Baran in Social Studies (IPS) on the topic of cultural diversity in Indonesia were still far below the Minimum Mastery Criteria (KKM), which is 75. This was evident in the results of the daily test assessments for the Social Studies subject, where all 9 students had not achieved the KKM of 75. Based on the researcher's observations of all students in Grade 4, many students experienced difficulties in learning Social Studies. Generally, students found Social Studies challenging because it requires a lot of memorization and tends to be boring. As a result, students appeared passive and showed little interest during the teaching and learning process.

The lack of student motivation to learn is driven by the way the teacher delivers the lesson material. During the learning process, students are encouraged merely to read books and then discuss the material, with the dominant method being lectures and assignments. This approach has not succeeded in fostering interaction among students, making them passive and bored during classroom learning. Additionally, students show little interest in learning, and when the teacher asks questions, no one responds. Students tend to talk and joke around with their peers instead, paying little attention to the teacher's explanation of the material. This results in low achievement scores in the Social Studies subject.

The results of the Social Studies test before carrying out an activity can be observed in the following list:

Tabel 5. Achievement of Social Studies Test Answers in the Preliminary Stage

No.	Student Name	Number	Information
1	PERI	60	incomplete
2	ZAMAN	40	incomplete
3	FTP	65	incomplete
4	SCFM	70	incomplete
5	MIV	60	incomplete
6	MNAH	30	incomplete
7	MNF	60	incomplete
8	RDS	50	incomplete
9	PDB	60	incomplete
Kuantitas		510	
Skor tertinggi		70	
Nilai terendah		30	

Kelas menengah	56.67
----------------	-------

From the results of the pre-action Social Studies test, the highest score obtained was 70, the lowest was 30, and the class average was 56.67.

Table 6. Student Mastery in Solving Social Studies Questions at the Action Preparation Stage

Criteria	Number of Students	Percentage
Completed	0	0%
Not Completed	9	100%
Total	9	

Based on the table above, the data show that none of the students achieved mastery in Social Studies (0%), and all 9 students (100%) had not yet achieved mastery. Based on this data, it can be concluded that during the Social Studies learning process prior to applying the discussion-based or cooperative learning model (specifically the NHT type), students' achievement needed improvement—particularly among Grade IV students at SD N Baran.

The initial condition of the Grade IV students at SD N Baran before the classroom action showed unsatisfactory Social Studies test results. Several students scored below the minimum mastery criterion (KKM), which is 75. In general, students found Social Studies difficult because it required a lot of memorization and tended to be boring, causing them to be passive and less interested during the learning process (Ishii et al., 2025). In Social Studies lessons, teachers still relied on conventional methods such as lecturing (Kozanitis & Nenciovici, 2023). This teacher-centered approach resulted in low student engagement. Moreover, student interest and enthusiasm in Social Studies were still low, which significantly affected their learning outcomes.

To improve Social Studies learning outcomes for Grade IV students at SD N Baran, an appropriate learning model was needed to increase achievement effectively. The collaborative learning model Numbered Heads Together (NHT) is seen as a solution to enhance Social Studies learning outcomes at SD N Baran. This model helps students develop their potential (Warmansyah et al., 2022). Additionally, students can engage in group discussions to strengthen and deepen their understanding of the subject matter (Dyson et al., 2021).

This intervention was carried out in two cycles, each consisting of two face-to-face sessions, with each session lasting two class periods (70 minutes total). Cycle I was a refinement of Social Studies instruction in Grade IV. Learning outcomes using the NHT collaborative learning model improved after its application. In Cycle I, the learning topic was *“Cultural Diversity in Indonesia,”* focusing on the diversity of ethnic groups and local languages across the country. During Cycle I, the class average increased from 56.67 (pre-action) to 63.88 based on Social Studies test scores. The percentage of students achieving mastery also rose from 0% in the pre-action phase to 22% in Cycle I.

In the first cycle, shortcomings were still found. The discussion process did not run optimally. Most students still had difficulty expressing their opinions. Some students appeared unserious and passive during discussions. In group activities, not all members could perform

well. This led to a lack of collaboration among group members. Students were not actively presenting the results of their discussions. The presentation process was repetitive—only the same students were willing to present and solve questions in front of the class. To improve the research outcomes in Cycle I, a follow-up was required in Cycle II.

In Cycle II, the teacher implemented a group-based learning style using the NHT (Numbered Heads Together) method during Social Studies lessons, addressing the weaknesses found in Cycle I. The material taught in Cycle II was *"Cultural Diversity in Indonesia in Relation to Traditional Houses and Traditional Clothing."* In this second cycle, the teacher enhanced the learning process. Improvements included: using engaging visual aids, giving rewards to students who actively participated in discussions, appointing passive students as group leaders, and assigning scores to students who were willing to speak in front of the class.

The pre-action Social Studies test results showed a highest score of 70, a lowest score of 30, and a class average of 56.67. The test results at the end of Cycle I showed a highest score of 80, a lowest score of 40, and a class average of 63.88. The test results at the end of Cycle II showed a highest score of 90, a lowest score of 70, and a class average of 80.55.

The following table presents the students' mastery in solving Social Studies questions from Cycle I to Cycle II:

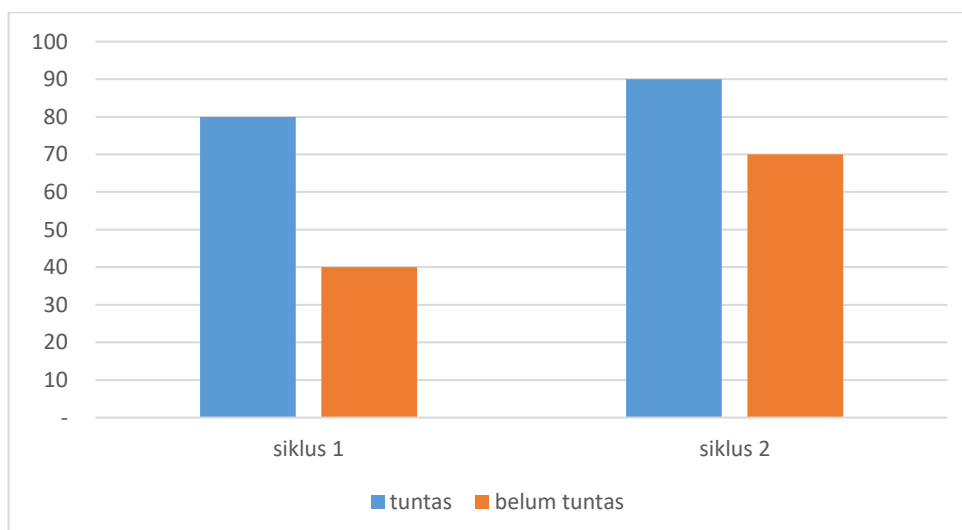


Figure 2. Graph of the percentage of students' completion of social studies questions from Pre-Activity to Cycle II.

Based on the graph, it is clearly evident that during the pre-action stage, no students achieved mastery in answering the Social Studies questions (0%), and 9 students, or 100%, had not succeeded. At the end of Cycle I, the data showed that 2 students had achieved mastery (22%) while 7 students (78%) had not, out of a total of 9 students. In Cycle II, the data showed that 8 students, or 89%, succeeded in completing the Social Studies questions, while 1 student, or 11%, had not, out of a total of 9 students.

The explanation above indicates that the collaborative learning model NHT (Numbered Heads Together) is hypothesized to improve Social Studies learning outcomes for Grade IV students at SD N Baran. After applying the NHT model to students, it was found that they became more interested in participating in learning activities and felt happier during the learning process. Through cooperative learning, students' academic performance can improve, along with their social skills—particularly their ability to work together in groups to understand the lesson (Fernandez-Perez & Martin-Rojas, 2022). From the research results, it

is clear that classroom action research aimed at improving students' abilities in Social Studies using the cooperative learning model (NHT type) for Grade IV students at SD N Baran can be considered successful.

CONCLUSION

Based on the research findings and discussion conducted in Grade IV at SD N Baran, it can be concluded that the use of the cooperative learning model Numbered Heads Together (NHT) is effective in improving students' achievement in Social Studies. This is evidenced by the increase in the average student learning outcomes and the rate of task completion. The average student achievement improved from approximately 57 (Pre-Activity) to 64 (Cycle I) and increased further to 81 (Cycle II). Meanwhile, the student mastery level rose successively from 0% (Pre-Activity) to 22% (Cycle I) and then to 89% (Cycle II).

The responsibility of elementary school teachers to be productive and innovative in learning activities, especially in Social Studies, includes using engaging and appealing teaching models. One such model is the collaborative learning model Numbered Heads Together (NHT). In addition, teachers should encourage students to participate actively and earnestly in the learning process.

Schools are encouraged to promote all activities aimed at improving the quality of education. We hope that other researchers interested in conducting studies using the collaborative learning model NHT (Numbered Heads Together) will carry out further research on other aspects of Social Studies teaching and apply the model to different subjects.

REFERENCES

- Almumen, H. A., Raimondi, S. L., & Maheady, L. J. (2025). The effects of numbered heads together with and without incentives on the ESL quiz performance of second-grade students in a Kuwaiti inclusive classroom. *International Journal of Inclusive Education*, 29(7), 1129–1150. <https://doi.org/10.1080/13603116.2023.2263008>
- Alqahtani, T., Badreldin, H. A., Alrashed, M., Alshaya, A. I., Alghamdi, S. S., Bin Saleh, K., Alowais, S. A., Alshaya, O. A., Rahman, I., & Al Yami, M. S. (2023). The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research. *Research in Social and Administrative Pharmacy*, 19(8), 1236–1242. <https://doi.org/10.1016/j.sapharm.2023.05.016>
- Arnianti, A., Sudarman, S., & Ellyawati, N. (2022). Application of the Numbered Heads Together (NHT) Cooperative Learning Model to Increase Learning Motivation and Learning Outcomes of Class XI IPS B Students at SMA IT Granada Samarinda. *Educational Studies: Conference Series*, 2(2), 318–327. <https://doi.org/10.30872/escs.v2i2.1921>
- Bakar, S. (2021). Investigating the dynamics of contemporary pedagogical approaches in higher education through innovations, challenges, and paradigm shifts. *Social Science Chronicle*, 1(1), 1–19. <https://doi.org/10.56106/ssc.2021.009>
- Darling-Hammond, L., Schachner, A. C. W., Wojcikiewicz, S. K., & Flook, L. (2024). Educating teachers to enact the science of learning and development. *Applied Developmental Science*, 28(1), 1–21. <https://doi.org/10.1080/10888691.2022.2130506>
- Diah, D. E. Y., Rondli, W. S., & Setiadi, G. (2023). Peningkatan Hasil Belajar Tema 8 Melalui Model Pembelajaran Numbered Head Together (Nht) Berbantuan Media Teka-Teki Silang Di Kelas V Sdn Wirun. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 9(2), 5779–5791. <https://doi.org/10.36989/didaktik.v9i2.1372>
- Dyson, B., Howley, D., & Shen, Y. (2021). 'Being a team, working together, and being kind':

- Primary students' perspectives of cooperative learning's contribution to their social and emotional learning. *Physical Education and Sport Pedagogy*, 26(2), 137–154. <https://doi.org/10.1080/17408989.2020.1779683>
- Ernawati, N., Setiyawati, E., Hariyanto, D., & Jalilovna, J. L. (2024). Amplifying Math Comprehension: Harnessing Numbered Heads Together Cooperative Learning. *3rd Annual International Conference on Natural and Social Science Education (ICNSSE 2023)*, 297–309. https://doi.org/10.2991/978-2-38476-242-2_30
- Fernandez-Perez, V., & Martin-Rojas, R. (2022). Emotional competencies as drivers of management students' academic performance: The moderating effects of cooperative learning. *The International Journal of Management Education*, 20(1), 100600. <https://doi.org/10.1016/j.ijme.2022.100600>
- Fink, L. D., Davis, J. R., & Arend, B. D. (2023). *Facilitating seven ways of learning: A resource for more purposeful, effective, and enjoyable college teaching*. Routledge. <https://doi.org/10.4324/9781003444763>
- Góral, A., Jałocha, B., Mazurkiewicz, G., & Zawadzki, M. (2021). *Action research: a handbook for students*.
- Graham, S., Kiuahara, S. A., & MacKay, M. (2020). The effects of writing on learning in science, social studies, and mathematics: A meta-analysis. *Review of Educational Research*, 90(2), 179–226. <https://doi.org/10.3102/0034654320914744>
- Ishii, T., Kawahara, J., Makino, K., & Ono, H. (2025). Reallocation problems with minimum completion time. *Algorithmica*, 1–29. <https://doi.org/10.1007/s00453-025-01320-0>
- Kozanitis, A., & Nenciovici, L. (2023). Effect of active learning versus traditional lecturing on the learning achievement of college students in humanities and social sciences: A meta-analysis. *Higher Education*, 86(6), 1377–1394. <https://doi.org/10.1007/s10734-022-00977-8>
- Lynch, M., Kamovich, U., Longva, K. K., & Steinert, M. (2021). Combining technology and entrepreneurial education through design thinking: Students' reflections on the learning process. *Technological Forecasting and Social Change*, 164, 119689. <https://doi.org/10.1016/j.techfore.2019.06.015>
- Manafe, M. H., Daniel, F., & Taneo, P. N. L. (2022). Prestasi Belajar Matematika Siswa pada Pembelajaran Model Kooperatif Tipe Numbered Heads Together (NHT). *Jurnal Basicedu*, 6(3), 3279–3284. <https://doi.org/10.31004/basicedu.v6i3.2544>
- Onu, P., Pradhan, A., & Mbohwa, C. (2024). Potential to use metaverse for future teaching and learning. *Education and Information Technologies*, 29(7), 8893–8924. <https://doi.org/10.1007/s10639-023-12167-9>
- Rahmawati, N. K. (2021). The experimentation of the TTW and the NHT learning models on polyhedron viewed from the problem solving ability. *Journal of Physics: Conference Series*, 1918(4), 42115. <https://doi.org/10.1088/1742-6596/1918/4/042115>
- Rauchfleisch, A., & Kaiser, J. (2020). The false positive problem of automatic bot detection in social science research. *PloS One*, 15(10), e0241045. <https://doi.org/10.1371/journal.pone.0241045>
- Rijal, M., Mastuti, A. G., Safitri, D., Bachtiar, S., & Samputri, S. (2021). Differences in Learners' Critical Thinking by Ability Level in Conventional, NHT, PBL, and Integrated NHT-PBL Classrooms. *International Journal of Evaluation and Research in Education*, 10(4), 1133–1139. <https://doi.org/10.11591/ijere.v10i4.21408>
- Rosidi, A., & Indriati, D. (2021). NHT-TPS: Experimental Model Based on Scientific Approach Viewed from Learning Activeness. *International Conference of Mathematics and*

- Mathematics Education (I-CMME 2021)*, 1–8.
<https://doi.org/10.2991/assehr.k.211122.001>
- Salu, B. E., & Hardini, A. T. A. (2023). Efektivitas Model Pembelajaran Teams Games Tournament dan Numbered Head Together Terhadap Hasil Belajar IPS Siswa Kelas V Sekolah Dasar. *Jurnal Educatio FKIP UNMA*, 9(3), 1475–1480.
<https://doi.org/10.31949/educatio.v9i3.5158>
- Sitorus, P. J., Putri, E., Bakara, S., & Tambunan, V. (2023). Ancaman Kepunahan Dialek Pulo di Kawasan Wisata Kepulauan Seribu. *Innovative: Journal Of Social Science Research*, 3(3), 7122–7130.
- Soomro, B. A., Mangi, S., & Shah, N. (2021). Strategic factors and significance of organizational innovation and organizational learning in organizational performance. *European Journal of Innovation Management*, 24(2), 481–506. <https://doi.org/10.1108/EJIM-05-2019-0114>
- Warmansyah, J., Sabri, A., Nasution, M., Amalina, A., Safna, A., & Fitri, A. (2022). Early numeracy skills in early childhood: the effect of numbered heads together cooperative learning methods. *Electronic Journal of Education, Social Economics and Technology*, 3(2), 75–82. <https://doi.org/10.33122/ejeset.v3i2.76>
- Yulinova, M. Penggunaan Model Cooperative Learning Tipe Numbered Head Together Untuk Meningkatkan Minat Dan Hasil Belajar IPS Kelas IV SDN 17 Palaluar. In *Social, Humanities, and Educational Studies (SHES): Conference Series* (Vol. 3, No. 4, pp. 1141-1148). <https://doi.org/10.20961/shes.v3i4.55715>