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The Application of the Jigsaw Type Cooperative Learning Model to Improve Social Science Learning Outcomes

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Abstract

This research discusses the problem regarding the learning process that has not been achieved. Due to the lack of teachers utilizing varied learning models, it affects student learning outcomes from 22 students who completed 8 students (36.3%) and those who did not complete 14 students (63.6%). The purpose of this research is to find out the improvement of learning outcomes from the use of the jigsaw type learning model in social studies subjects for class IV at MI Muhammadiyah Pekalongan. The researchers used Classroom Action Research (PTK) that is alternative for developing and improving educational practices. PTK uses two cycles consisting of four components, namely planning , action , observation and reflection. By collecting observation data, tests and documentation. The results showed that there was an increase in student learning outcomes for class IV social studies subjects at MI Muhammadiyah Pekalongan, seen in the students' learning mastery at the beginning of 31.8%, the first cycle of the second meeting increased 40.9% and the second cycle of completeness increased to 86.3%.

Keywords: Challenge and Orientation Education, Islamic Education, Education at Border Location

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INTRODUCTION

Learning is a process carried out by individuals to obtain a new change in behavior as a whole[1], as a result of their own experience in interacting with their environment [2]. In the world of education, science and technology are developing rapidly[3], both directly and indirectly influencing the development of education[4]. Therefore, the quality of education needs to be improved, especially in learning models in the learning process. The current

[1] "Human-in-the-Loop Machine Learning: Reconceptualizing the Role of the User in Interactive Approaches," *Internet of Things* 25 (April 1, 2024): 101048, https://doi.org/10.1016/J.IOT.2023.101048.

[2] R. L. Hite, M. G. Jones, and G. M. Childers, "Classifying and Modeling Secondary Students' Active Learning in a Virtual Learning Environment through Generated Questions," *Computers & Education* 208 (January 1, 2024): 104940, https://doi.org/10.1016/J.COMPEDU.2023.104940.

[3] "A Machine Learning Led Investigation to Understand Individual Difference and the Human-Environment Interactive Effect on Classroom Thermal Comfort," *Building and Environment* 236 (May 15, 2023): 110259, https://doi.org/10.1016/J.BUILDENV.2023.110259.

[4] "Factors Influencing College Students' Self-Regulated Learning in Online Learning Environment: A Systematic Review," *Nurse Education Today* 133 (February 1, 2024): 106071, https://doi.org/10.1016/J.NEDT.2023.106071.

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learning process, as is known, is that teachers as providers of material and students as recipients in the classroom learning process still seem boring, so that students whose main goal is to gain knowledge tend to be passive. Teachers should not only provide material to students but also provide fun and interesting learning, where in the learning process the teacher acts as a facilitator, not as a giver of knowledge.[5]

Creating fun[6] and interesting learning requires a learning model[7]. The number of learning models must of course be adapted to their use in the learning process. If the learning model can attract students' attention and is not boring, then students will be active in the learning process. As a result of interviews with several students, it was discovered that teachers still often use the lecture method, which causes some students to chat to themselves and play around while the lesson is taking place. For social studies subjects, teachers do not use the jigsaw learning model in various job materials, which makes students feel bored. Understanding these various problems, the researchers implemented learning solutions which are expected to improve the quality of learning better than before, by using the jigsaw learning model in social studies learning.

This jigsaw type learning model was chosen because it is expected to increase students' understanding[8] and develop students' knowledge[9], skills and abilities[10] so as to create an open and democratic learning atmosphere. Where students not only learn for themselves but students also act as tutors for their peers. This Jigsaw type learning model takes the pattern of how a saw works (*zigzag*), namely students carry out a learning activity by working together with other students to achieve a common goal. This Jigsaw type learning model is a type of cooperative learning where the teacher divides students into small groups consisting of four to six heterogeneous students and students work together in positive interdependence and are responsible independently.

Another reason for using the jigsaw learning model to be implemented is because this learning model, apart from providing a pleasant atmosphere for students, can also encourage students to actively carry out learning activities both individually[11] and in groups[12]. They also have the opportunity to express opinions and process information

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[5] Liang Zhao and Yong Bai, "Data Harvesting in Uncharted Waters: Interactive Learning Empowered Path Planning for USV-Assisted Maritime Data Collection under Fully Unknown Environments," *Ocean Engineering* 287 (November 1, 2023): 115781, https://doi.org/10.1016/J.OCEANENG.2023.115781.

[6] Arantxa Vizcaíno-Verdú and Crystal Abidin, "TeachTok: Teachers of TikTok, Micro-Celebrification, and Fun Learning Communities," *Teaching and Teacher Education* 123 (March 1, 2023): 103978, https://doi.org/10.1016/J.TATE.2022.103978.

[7] "Workplace Fun and Informal Learning: The Mediating Role of Motivation to Learn, Learning Opportunities and Management Support," *Journal of Workplace Learning* 34, no. 3 (November 1, 2021): 229–41, https://doi.org/10.1108/JWL-05-2021-0062.

[8] Yvette Sterbenk, "Exploring Critical Issues in Event Planning through a Group Research and Jigsaw Presentation Project," *Journal of Hospitality, Leisure, Sport & Tourism Education* 31 (November 1, 2022): 100401, https://doi.org/10.1016/J.JHLSTE.2022.100401.

[9] Mª Carmen Cerón-García et al., "Jigsaw Cooperative Learning of Multistage Counter-Current Liquid-Liquid Extraction Using Mathcad®," *Education for Chemical Engineers* 38 (January 1, 2022): 1–13, https://doi.org/10.1016/J.ECE.2021.10.002.

[10] Mengjuan Wang, Mansooreh Alavi, and Siros Izadpanah, "The Impact of Jigsaw Cooperative Learning on Academic Motivation, Academic Hardiness, and Self-Efficacy of English Foreign Language Learners," *Learning and Motivation* 84 (November 1, 2023): 101940, https://doi.org/10.1016/J.LMOT.2023.101940.

[11] Neda Sanaie et al., "Comparing the Effect of Lecture and Jigsaw Teaching Strategies on the Nursing Students' Self-Regulated Learning and Academic Motivation: A Quasi-Experimental Study," *Nurse Education Today* 79 (August 1, 2019): 35–40, https://doi.org/10.1016/J.NEDT.2019.05.022.

[12] Gwendolen T. Buhr et al., "Using the Jigsaw Cooperative Learning Method to Teach Medical Students About Long-Term and Postacute Care," *Journal of the American Medical Directors Association* 15, no. 6 (June 1, 2014): 429–34, https://doi.org/10.1016/J.JAMDA.2014.01.015.

regarding the success of their group[13] and the completeness of the material studied both for and from other groups.

Before conducting classroom action research using the jigsaw type learning model, the class teacher had already done it but experienced difficulties in creating a less conducive atmosphere and some students did not understand what the teacher was saying. Therefore, researchers want to prove that this jigsaw type learning model can improve student learning outcomes. Data on mid-semester test results for class IV students at MI Muhammadiyah Pekalongan, East Lampung. Results of the researcher's pre-survey on September 5 2020, interview with Mr Heriyanto, S.Pd. has obtained data in class IV MI Muhammadiyah Pekalongan East Lampung. "During learning, there are still some students who play around while learning is taking place and don't pay attention to the teacher when delivering the material, so there are still some students who have not reached the KKM." Observation results on September 13 2020 showed that 8 students (36.3%) had completed the social studies learning results of 22 students and 14 students (63.6%) had not completed it, thus the learning outcomes were low.

Table 1
Preliminary Data on Learning Outcomes of Students in Social Sciences Subjects at MI Muhammadiyah Pekalongan, East Lampung

No	No	Mark	MOH	Information
1	Personal Supreme	55	60	Not Completed
2	Aisyah Nur Fadhilah	50	60	Not Completed
3	Alif Ulya Fathma	70	60	Complete
4	Alisya Anggraeni	45	60	Not Completed
5	Azra Salsabila	50	60	Not Completed
6	Dzakhwa Faiqah Yafi	55	60	Not Completed
7	Dzaky Risqullah	45	60	Not Completed
8	Farhan Hamid	50	60	Not Completed
9	Fienty Ghisela Anatasya	75	60	Complete
10	Muhammad Agil Farhan	50	60	Not Completed
11	Muhammad Pandunata Permana	40	60	Not Completed
12	M. Alfin Zidan Kiadi	65	60	Complete
13	Marsya Dwi Anggraini	75	60	Complete
14	Naima Laura Wirawan	75	60	Complete
15	Nicotiyan Firdaus Azzaqi	55	60	Not Completed
16	Nofiansyah	50	60	Not Completed
17	Fitri Nour An'nisa	55	60	Not Completed
18	Rifa Surya Safitri	65	60	Complete
19	Rizky Sufadillah	50	60	Not Completed
20	Sophia Puja Bakti	50	60	Not Completed
21	Tereza Wahyuni Efendi	80	60	Complete
22	Yasmin Athir	80	60	Complete
Number of Students Completed			8 Students	36,3%
Number of Students Who Have Not Completed			14 Students	63,3%

[13] Jennifer A. Wilson et al., "Traditional Lecture versus Jigsaw Learning Method for Teaching Medication Therapy Management (MTM) Core Elements," *Currents in Pharmacy Teaching and Learning* 9, no. 6 (November 1, 2017): 1151–59, https://doi.org/10.1016/J.CPTL.2017.07.028.

Type learning model*jigsaw* designed to increase students' sense of responsibility for their own learning and that of others. Students not only study the material provided, but also must be ready to teach the material to all members of their group. In each learning model, there are advantages and disadvantages.

The advantages of the learning model: 1) Can foster a spirit of cooperation in groups between students 2) Increase motivation, mutual respect between fellow students 3) Develop students' ability to express ideas or ideas, 4) Make the teacher's work easier, because there is already a team of experts who can explain the material to their colleagues 5) In the learning process, students are active in positive interdependence 6) Students can understand the material evenly

Some scholars said that learning outcomes are the realization of a person's potential skills[14] or capacities[15]. A person's mastery of learning outcomes can be seen from his behavior[16]. Both behavior in the form of mastery of knowledge[17], thinking skills[18] and motor skills[19]. Someone has learned is a change in behavior in that person, for example from not knowing to knowing, and from not understanding to understanding. Behavior has subjective elements and motor elements. The subjective element is the spiritual element while the motoric element is the physical element. That someone is thinking can be seen from their facial expressions, we cannot see their spiritual attitude.

METHOD

This research is included in Classroom Action Research (PTK) which uses qualitative and quantitative descriptive methods. Classroom Action Research is an alternative for developing and improving educational practices that are not only academically based[20]. PTK uses two cycles consisting of four components, namely

[14] Ali Dalgıç, Emre Yaşar, and Mahmut Demir, "ChatGPT and Learning Outcomes in Tourism Education: The Role of Digital Literacy and Individualized Learning," *Journal of Hospitality, Leisure, Sport & Tourism Education* 34 (June 1, 2024): 100481, https://doi.org/10.1016/J.JHLSTE.2024.100481.

[15] Daojuan Wang et al., "Cultural Differences and Synergy Realization in Cross-Border Acquisitions: The Moderating Effect of Acquisition Process," *International Business Review* 29, no. 3 (June 1, 2020): 101675, https://doi.org/10.1016/J.IBUSREV.2020.101675.

[16] Tien Hui Chiang, Allen Thurston, and Maria Cockerill, "Examining Basil Bernstein's Rules of Recognition and Realization in the Case of Underachieving Students in Math Tests," *International Journal of Educational Research* 115 (January 1, 2022): 102021, https://doi.org/10.1016/J.IJER.2022.102021.

[17] Marshall Winget and Adam M. Persky, "A Practical Review of Mastery Learning," *American Journal of Pharmaceutical Education* 86, no. 10 (December 1, 2022): ajpe8906, https://doi.org/10.5688/AJPE8906.

[18] Pavel S. Sorokin and Svetlana E. Chernenko, "Skills as Declared Learning Outcomes of Entrepreneurship Training in Higher Education Institutions across the Globe: Classification and Analysis with a Focus on Thinking Skills," *Thinking Skills and Creativity* 46 (December 1, 2022): 101177, https://doi.org/10.1016/J.TSC.2022.101177.

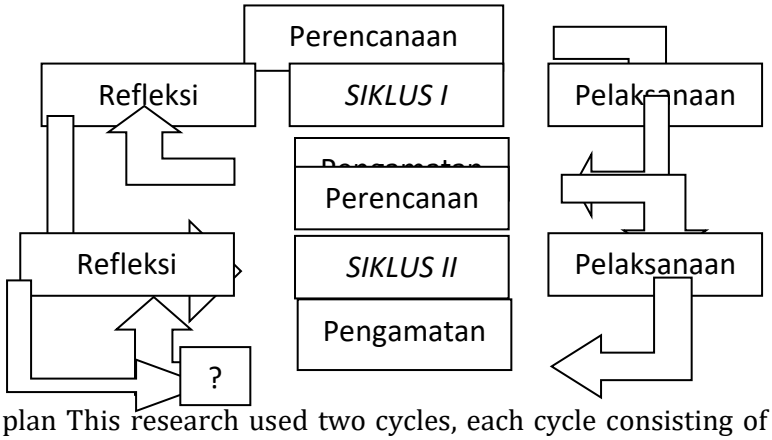
[19] Katharina Loibl and Christian Leukel, "Problem-Solving Prior to Instruction in Learning Motor Skills - Initial Self-Determined Practice Improves Javelin Throwing Performance," *Learning and Instruction* 88 (December 1, 2023): 101828, https://doi.org/10.1016/J.LEARNINSTRUC.2023.101828.

[20] Nipaporn Kunlasomboon, Suwimon Wongwanich, and Siripaarn Suwanmonkha, "Research and Development of Classroom Action Research Process to Enhance School Learning," *Procedia - Social and Behavioral Sciences* 171 (January 16, 2015): 1315–24, https://doi.org/10.1016/J.SBSPRO.2015.01.248.

planning[21], action[22], observation[23] and reflection[24]. Therefore, the meaning of cycle here is a round of activities consisting of these four components. The location of this research is MI Muhammadiyah Pekalongan with a total of 22 students consisting of 8 men and 14 women in the even semester. This research procedure uses two cycles consisting of four components, namely planning, action, observation and reflection. Therefore, the meaning of cycle here is a round of activities consisting of these four components.

Figure 1

The research components can be seen in the following picture:



Action plan This research used two cycles, each cycle consisting of two meetings with four stages in each cycle, including 1) Planning Stage, 2) Implementation Stage, 3) Observation Stage, 4) Reflection.

Data collection techniques were carried out using observation, test and documentation techniques. The observation technique is carried out by researchers by observing and recording the activities being carried out to be able to find out directly about the activities of teachers and students during the learning process and to know the teacher's ability to convey lesson material and to know the level of students' ability to absorb the material by applying the jigsaw type cooperative learning model, getting to know human activities and changes, in addition to knowing or observing the classroom setting, where teaching and learning activities take place. The activities observed were social studies teaching and learning activities, especially understanding human life activities and their changes in each cycle of action. This observation was carried out by the class teacher. The next data collection technique is the test technique. The test is carried out in writing in the form of multiple choices, filling in and describing. This test was carried out to obtain data on student learning outcomes after participating in jigsaw type cooperative learning.Meanwhile, documentation is used to search for data regarding things or variables in the form of notes, transcripts, books, newspapers, papers, agendas, and so on.

The research instruments that can be used include: (1) student observation sheets in the jigsaw learning model, (2) observation sheets for improving students' social studies learning outcomes. The data analysis used is quantitative and qualitative analysis.

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[21] Srisa-ard Boonchom, Luanganggoon Nuchwana, and Malasi Amorn, "The Development of Standards, Factors, and Indicators for Evaluating the Quality of Classroom Action Research," *Procedia - Social and Behavioral Sciences* 69 (December 24, 2012): 220–26, https://doi.org/10.1016/J.SBSPRO.2012.11.402.

[22] F. Nurhasanah et al., "Collaborative Classroom Action Research for Mathematics and Science Teachers in Indonesia," *Journal of Physics: Conference Series* 1613, no. 1 (August 1, 2020): 012024, https://doi.org/10.1088/1742-6596/1613/1/012024.

[23] Juita Haryani, "Digital Literacy: Classroom Action Research for Vocational High School Students'," *Journal Evaluation in Education (JEE)* 4, no. 2 (April 30, 2023): 40–45, https://doi.org/10.37251/JEE.V4I2.315.

[24] Parinya Meesuk, Banleng Sramoon, and Angwara Wongrugsa, "Classroom Action Research-Based Instruction: The Sustainable Teacher Professional Development Strategy," *Journal of Teacher Education for Sustainability* 22, no. 1 (June 1, 2020): 98–110, https://doi.org/10.2478/JTES-2020-0008.

Quantitatively it is used to determine student learning outcomes regarding understanding of the material presented. This quantitative analysis uses the following statistical formula: To calculate the average value

$\underline{X}=\frac{\Sigma x}{N}$

$\underline{X}$ = The mean sought

Σx = Number of existing values

N = number of cases (the number of scores themselves)

To calculate the percentage of learning completeness, the formula is used:

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

Information:

f = the frequency we are looking for and its percentage

N= Number of students

P = Percentage of student completeness

Meanwhile, qualitative data analysis was carried out to analyze data about student activities during the learning process by observation. The results of the observation data are then recorded in an observation sheet.

Implementation of the cooperative type learning model *jigsaw* in class IV at MI Muhammadiyah Pekalongan East Lampung in this study it was declared successful if it met the indicators of research success, namely being marked by achieving the Minimum Completeness Criteria (KKM) for Social Sciences subjects reaching 75% at the end of the cycle.

RESULTS AND DISCUSSION

From the initial findings, it can be seen that only 36.3% of students achieved the minimum completion criteria set by the school. Out of 22 students, only 8 students completed. Meanwhile, 63.3% of students have not achieved completeness in their studies because the scores obtained have not reached the minimum criteria for completeness that have been determined by the school.

Cycle I

The activities carried out by the teacher during the planning stage are: (1) Determining the research class, (2) Determining the subject matter. The subject matter that will be discussed in this research is "Various Jobs", (3) Making lesson plans with learning methods, (4) observation sheets teacher and student.

Oncarry out initial actions on September 20 2021 and September 27 2021 with social studies material for various jobs with a time allocation of 2x35 minutes. Initial activities include saying hello, checking student attendance, preparing students' readiness to carry out learning. This was then continued by the researcher introducing himself and then continuing by providing stimulus to students regarding the material to be taught by giving pretest questions to determine understanding of the material to be studied. The core activity is to apply the steps of the jigsaw learning model, including: 1) Students are grouped into 2 team members. 2) Each person in the team is given a different section of material, 3) Each person in the team is given an assigned section of material, 4) Members from different teams who have studied the same section/sub-chapter meet in a new group (expert group) to discuss their sub-chapters, 5) After completing the discussion as an expert team, each member returns to their original group and takes turns teaching their teammates about the sub-chapters they have mastered and each other member listens seriously, 6) Each expert team presents the results of the discussion, 7) Teacher gives evaluation, 8) Closing. Final Activity The teacher and students draw conclusions on the material they have studied. The teacher gives homework and informs the learning activity plan for the next meeting, then the teacher urges all students to study the next material. So that in future meetings it will be easier for students to understand the material. The teacher closes the lesson by praying together and saying hello.

From the description of the observations of teacher and student activities above, it can be summarized as the results of the pretest and posttest of cycle I reaching 40.9% completion. For student learning outcomes that reached the kkm of 60, there were 9 students and 13 students who had not yet reached the kkm.

Reflection on the implementation of actions in cycle I is that the results show that there is an increase in student learning outcomes from the learning outcome scores in the initial findings in pre-cycle activities. However, classically the percentage of student success has not reached the target, namely 75%, because students have not paid attention and responded in group discussion activities so improvements need to be made in cycle II.

Cycle II

The activities carried out by the teacher during the planning stage are: (1) Determining the research class, (2) Determining the subject matter. The subject matter that will be discussed in this research is "Job Classification", (3) Making lesson plans with learning methods, (4) observation sheets teacher and student.

Oncarry out the actions of cycle II on October 4 2021 and October 11 2021 with social studies material on job classification with a time allocation of 2x35 minutes. Initial activities include saying hello, checking student attendance, preparing students' readiness to carry out learning. This was then continued by the researcher introducing himself and then continuing by providing stimulus to students regarding the material to be taught by giving pretest questions to determine understanding of the material to be studied. The core activity is to apply the steps of the jigsaw learning model, including: 1) Students are grouped into 2 team members. 2) Each person in the team is given a different section of material, 3) Each person in the team is given an assigned section of material, 4) Members from different teams who have studied the same section/sub-chapter meet in a new group (expert group) to discuss their sub-chapters, 5) After completing the discussion as an expert team, each member returns to their original group and takes turns teaching their teammates about the sub-chapters they have mastered and each other member listens seriously, 6) Each expert team presents the results of the discussion, 7) Teacher gives evaluation, 8) Closing. Final Activity The teacher and students draw conclusions on the material they have studied. The teacher gives homework and informs the learning activity plan for the next meeting, then the teacher urges all students to study the next material. So that in future meetings it will be easier for students to understand the material. The teacher closes the lesson by praying together and saying hello.

From the description of observations of teacher and student activities above, it can be summarized as the final results in cycle II reaching 86.3% completeness. It can be said that the learning outcomes of students who reached the kkm of 60 were 19 students and as many as 3 students who had not yet reached the kkm.

Reflection on the implementation of actions in cycle II is that the results show that there is an increase in student learning outcomes from the learning outcome scores in the initial findings in pre-cycle activities. And classically, the percentage of student success has reached the target, namely 70%.

Based on the research results, it shows that social studies learning applies a type of cooperative learning model*jigsaw* has a positive impact in improving student learning outcomes. This can be seen from the students' increasingly solid understanding and mastery of the material presented by the teacher.

Teacher activity during cycles I-II always increases. The results of observations of teacher activities in each cycle have increased. Starting from the results of the implementation of the first cycle, the average value of teacher activity was 70.2% at the first meeting and 74.1% at the second meeting. In the implementation of cycle II, there was an increase from the results of cycle I to 77.1% at meeting I and 81.0% at meeting II, which means that teacher activities have actually reached the specified completeness. This shows that the teacher's activities are through the application of a type of cooperative learning model*jigsaw* in social studies subjects it has increased to reach the very good category because the average percentage reaches more than 70%.

Table 2
Increasing Teacher Activities in Cycle I and Cycle II

	Pert. 1	**Pert. 2**	**Rate-rate**
Cycle I	70,2%	74,1 %	72,15%
Cycle II	77,1%	81,0 %	79,05%

Table 3
Comparison of Average Percentage of Student Learning Activities

No	**Observed student activity indicators**	**Cycle I**	**Cycle II**
1	Students pay attention to the teacher's explanation	67,0%	78,85%
2	Students work together with their respective groups	67,6%	79,15%
3	Students are able to ask questions to the teacher	61,0%	78,40%
4	Students are able to answer questions from other students	66,7%	79,35%
Rate-rate		**65,58%**	**78,94%**

The Student Learning Activity Comparison Table explains that: 1.) Students pay attention to the teacher's explanation. At the beginning of cycle I, they obtained an average percentage of 67.0%. Some students are not yet active in taking lessons and are not ready when asked to come to the front of the class, this is because they are still adjusting to learning conditions that are not usually done. To increase this activity the teacher explains the material. The teacher's attention is focused on all students and helps these students adapt to learning conditions to pay attention to the teacher's explanations. Some students' attention is focused on the future, paying attention to the learning process. Finally, in cycle II the average percentage of student learning activities increased to 78.85%. 2) Students work together with their respective groups. Initially there were still many students who had not worked together with their groups. Many of them still work alone, or don't even want to work at all. So in cycle I the average percentage was still small, namely 67.0%. So in cycle II the teacher made improvements from cycle I, namely the teacher had to be more focused and pay attention to students, and create a pleasant learning atmosphere.

This aims to encourage students to want to work together in their respective groups. And finally, paying attention to the second cycle, the average percentage was obtained with a result of 79.15%. 3) Students were able to ask the teacher. In the aspect of asking, the first cycle obtained an average percentage of 61.0% and in the second cycle it was 78.40% . In this aspect, cycle I and cycle II experienced quite good improvement. This increase is because students have begun to be trained in expressing their curiosity during the learning process. 4) Students are able to answer questions from other students. In the aspect of students being able to answer questions from other students, in cycle I the average percentage was 66.7% and in cycle II it was 79.35%. From these data it can be said that cycles I and II experienced an increase. Improvement in this aspect is because students have the courage to answer questions asked by other students.

CONCLUSSION

Based on the results of classroom action research (PTK) and the discussions that have been presented in each cycle, the conclusions obtained are: The application of this jigsaw type learning model is carried out by providing material to students using the jigsaw learning model, where in the learning process applies cooperation between students, by forming small groups and home groups, in the learning process it is able to increase student

activity in the learning process in order to achieve expected learning outcomes. Learning with this jigsaw type learning model can improve the learning outcomes of class IV students in social studies subjects at MI Muhammadiyah Pekalongan East Lampung, it can be seen from the learning outcomes in the initial condition of the students totaling 22 students who experienced learning completion totaling 7 students (36.3%). After using the jigsaw type learning model, there was an increase in each cycle, namely in the first cycle, 9 students (40.9%) met two out of 22 students and 13 students (59.0%) had not completed it. Then it increased in cycle II from 22 students experiencing complete learning as many as 19 students (86.3%) and 3 students (13.60%) who had not yet completed their learning. Thus, learning using the jigsaw type learning model in social studies subjects can improve the learning outcomes of class IV students at MI Muhammadiyah Pekalongan, East Lampung.

Based on the research and analysis carried out by the author, he therefore provides the following suggestions: 1) For MI Muhammadiyah Pekalongan teachers, efforts are needed to optimize the use of learning models, teachers are expected to be more creative in developing learning models. Teachers are expected to learn how to use the jigsaw learning model properly during learning so that they can make students interested in participating in learning using the jigsaw learning model. 2) For students, even though learning is carried out in groups, each student must still pay attention to the material explained by their friends and teacher, so that jigsaw learning does not only result in groups of experts gaining more knowledge.

REFERENCES

"A Machine Learning Led Investigation to Understand Individual Difference and the Human-Environment Interactive Effect on Classroom Thermal Comfort." *Building and Environment* 236 (May 15, 2023): 110259. https://doi.org/10.1016/J.Buildenv.2023.110259.

Boonchom, Srisa-ard, Luanganggoon Nuchwana, and Malasi Amorn. "The Development of Standards, Factors, and Indicators for Evaluating the Quality of Classroom Action Research." *Procedia - Social and Behavioral Sciences* 69 (December 24, 2012): 220–26. https://doi.org/10.1016/J.SBSPRO.2012.11.402.

Buhr, Gwendolen T., Mitchell T. Heflin, Heidi K. White, and Sandro O. Pinheiro. "Using the Jigsaw Cooperative Learning Method to Teach Medical Students About Long-Term and Postacute Care." *Journal of the American Medical Directors Association* 15, no. 6 (June 1, 2014): 429–34. https://doi.org/10.1016/J.JAMDA.2014.01.015.

Cerón-García, Mª Carmen, Lorenzo López-Rosales, Juan José Gallardo-Rodríguez, Elvira Navarro-López, Asterio Sánchez-Mirón, and Francisco García-Camacho. "Jigsaw Cooperative Learning of Multistage Counter-Current Liquid-Liquid Extraction Using Mathcad®." *Education for Chemical Engineers* 38 (January 1, 2022): 1–13. https://doi.org/10.1016/J.ECE.2021.10.002.

Chiang, Tien Hui, Allen Thurston, and Maria Cockerill. "Examining Basil Bernstein's Rules of Recognition and Realization in the Case of Underachieving Students in Math Tests." *International Journal of Educational Research* 115 (January 1, 2022): 102021. https://doi.org/10.1016/J.IJER.2022.102021.

Dalgıç, Ali, Emre Yaşar, and Mahmut Demir. "ChatGPT and Learning Outcomes in Tourism Education: The Role of Digital Literacy and Individualized Learning." *Journal of Hospitality, Leisure, Sport & Tourism Education* 34 (June 1, 2024): 100481. https://doi.org/10.1016/J.JHLSTE.2024.100481.

"Factors Influencing College Students' Self-Regulated Learning in Online Learning Environment: A Systematic Review." *Nurse Education Today* 133 (February 1, 2024): 106071. https://doi.org/10.1016/J.NEDT.2023.106071.

Haryani, Juita. "Digital Literacy: Classroom Action Research for Vocational High School Students'." *Journal Evaluation in Education (JEE)* 4, no. 2 (April 30, 2023): 40–45. https://doi.org/10.37251/JEE.V4I2.315.

Hite, R. L., M. G. Jones, and G. M. Childers. "Classifying and Modeling Secondary Students'

Active Learning in a Virtual Learning Environment through Generated Questions." *Computers & Education* 208 (January 1, 2024): 104940. https://doi.org/10.1016/J.COMPEDU.2023.104940.

"Human-in-the-Loop Machine Learning: Reconceptualizing the Role of the User in Interactive Approaches." *Internet of Things* 25 (April 1, 2024): 101048. https://doi.org/10.1016/J.IOT.2023.101048.

Kunlasomboon, Nipaporn, Suwimon Wongwanich, and Siripaarn Suwanmonkha. "Research and Development of Classroom Action Research Process to Enhance School Learning." *Procedia - Social and Behavioral Sciences* 171 (January 16, 2015): 1315–24. https://doi.org/10.1016/J.SBSPRO.2015.01.248.

Loibl, Katharina, and Christian Leukel. "Problem-Solving Prior to Instruction in Learning Motor Skills - Initial Self-Determined Practice Improves Javelin Throwing Performance." *Learning and Instruction* 88 (December 1, 2023): 101828. https://doi.org/10.1016/J.LEARNINSTRUC.2023.101828.

Meesuk, Parinya, Banleng Sramoon, and Angwara Wongrugsa. "Classroom Action Research-Based Instruction: The Sustainable Teacher Professional Development Strategy." *Journal of Teacher Education for Sustainability* 22, no. 1 (June 1, 2020): 98–110. https://doi.org/10.2478/JTES-2020-0008.

Nurhasanah, F., U. Sukandi, A. B. Kuncoro, A. Rusilowati, W. S. Hastuti, and A. Prabowo. "Collaborative Classroom Action Research for Mathematics and Science Teachers in Indonesia." *Journal of Physics: Conference Series* 1613, no. 1 (August 1, 2020): 012024. https://doi.org/10.1088/1742-6596/1613/1/012024.

Sanaie, Neda, Parvaneh Vasli, Ladan Sedighi, and Bita Sadeghi. "Comparing the Effect of Lecture and Jigsaw Teaching Strategies on the Nursing Students' Self-Regulated Learning and Academic Motivation: A Quasi-Experimental Study." *Nurse Education Today* 79 (August 1, 2019): 35–40. https://doi.org/10.1016/J.NEDT.2019.05.022.

Sorokin, Pavel S., and Svetlana E. Chernenko. "Skills as Declared Learning Outcomes of Entrepreneurship Training in Higher Education Institutions across the Globe: Classification and Analysis with a Focus on Thinking Skills." *Thinking Skills and Creativity* 46 (December 1, 2022): 101177. https://doi.org/10.1016/J.TSC.2022.101177.

Sterbenk, Yvette. "Exploring Critical Issues in Event Planning through a Group Research and Jigsaw Presentation Project." *Journal of Hospitality, Leisure, Sport & Tourism Education* 31 (November 1, 2022): 100401. https://doi.org/10.1016/J.JHLSTE.2022.100401.

Vizcaíno-Verdú, Arantxa, and Crystal Abidin. "TeachTok: Teachers of TikTok, Micro-Celebrification, and Fun Learning Communities." *Teaching and Teacher Education* 123 (March 1, 2023): 103978. https://doi.org/10.1016/J.TATE.2022.103978.

Wang, Daojuan, Daniel S. Hain, Jorma Larimo, and Li T. Dao. "Cultural Differences and Synergy Realization in Cross-Border Acquisitions: The Moderating Effect of Acquisition Process." *International Business Review* 29, no. 3 (June 1, 2020): 101675. https://doi.org/10.1016/J.IBUSREV.2020.101675.

Wang, Mengjuan, Mansooreh Alavi, and Siros Izadpanah. "The Impact of Jigsaw Cooperative Learning on Academic Motivation, Academic Hardiness, and Self-Efficacy of English Foreign Language Learners." *Learning and Motivation* 84 (November 1, 2023): 101940. https://doi.org/10.1016/J.LMOT.2023.101940.

Wilson, Jennifer A., Angela H. Pegram, Dawn M. Battise, and April M. Robinson. "Traditional Lecture versus Jigsaw Learning Method for Teaching Medication Therapy Management (MTM) Core Elements." *Currents in Pharmacy Teaching and Learning* 9, no. 6 (November 1, 2017): 1151–59. https://doi.org/10.1016/J.CPTL.2017.07.028.

Winget, Marshall, and Adam M. Persky. "A Practical Review of Mastery Learning." *American Journal of Pharmaceutical Education* 86, no. 10 (December 1, 2022): ajpe8906. https://doi.org/10.5688/AJPE8906.

"Workplace Fun and Informal Learning: The Mediating Role of Motivation to Learn, Learning Opportunities and Management Support." *Journal of Workplace Learning* 34,

no. 3 (November 1, 2021): 229–41. https://doi.org/10.1108/JWL-05-2021-0062.
Zhao, Liang, and Yong Bai. "Data Harvesting in Uncharted Waters: Interactive Learning Empowered Path Planning for USV-Assisted Maritime Data Collection under Fully Unknown Environments." *Ocean Engineering* 287 (November 1, 2023): 115781. https://doi.org/10.1016/J.OCEANENG.2023.115781.