



Implementation Of The Jigsaw Cooperative Learning Model In Improving Student Learning Participation In Physical Education, Sports, And Health

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ABSTRACT

Physical Education, Sports, and Health (PJOK) learning plays an important role in increasing active student involvement in the learning process, which includes physical, cognitive, emotional, and social aspects. However, in practice, many PJOK learning methods are still conventional, resulting in suboptimal student learning participation. Therefore, innovative learning strategies are needed that can increase active student involvement. This study aims to determine the effectiveness of implementing the jigsaw cooperative learning model in increasing student learning participation in PJOK learning at SMP Negeri 5 Tarogong Kidul. This study used an experimental approach with a pretest-posttest control group design. The study population was 175 ninth-grade students, with a sample of 70 students selected through cluster random sampling techniques, consisting of 35 students in the experimental class and 35 students in the control class. The research instrument used a student learning participation questionnaire that covered aspects of emotional engagement, cognitive engagement, behavioral engagement, and social engagement, measured using a Likert scale. Data analysis was carried out using descriptive statistics, normality tests, homogeneity tests, paired sample t-tests, and independent sample t-tests with the help of SPSS. The results of the study showed that the experimental class experienced an increase in the average value from 157.49 (pretest) to 166.94 (posttest), while the control class increased from 150.51 to 164.97. The results of the paired sample t-test in the experimental class showed $t = -4.672$, $df = 34$, $Sig = 0.000$, while the control class $t = -7.657$, $df = 34$, $Sig = 0.000$. The results of the independent sample t-test on the posttest data showed $t = 1.048$, $df = 68$, $Sig = 0.298$, and the Levene's Test homogeneity test showed $F = 1.478$, $Sig = 0.228$, which showed that the variances of the two groups were homogeneous. The findings of the study showed that both groups experienced an increase in learning participation, but the experimental class with the jigsaw model showed a better increase. Thus, the jigsaw type cooperative learning model can be recommended as an innovative learning strategy in PJOK learning.

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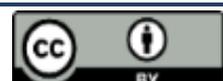
KEYWORDS

Cooperative Learning;
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AUTHORS' CONTRIBUTION

- Conception and design of the study;
- Acquisition of data;
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INTRODUCTION

Physical Education, Sports, and Health (PJOK) constitutes an essential component of school education that contributes not only to students' physical fitness but also to the development of social competence, character formation, teamwork, discipline, and leadership (Masgumelar & Mustafa, 2021; Aziza et al., 2024). At the junior high school level (SMP), PJOK plays a strategic role in shaping adolescents' physical literacy and social interaction skills through structured movement activities and sports-based learning experiences (Bailey et al., 2019; Casey & Goodyear, 2018). Effective PJOK learning should therefore involve active student participation in physical, cognitive, and social learning processes so that educational objectives can be achieved holistically (Dyson, 2021; Kirk, 2019). Student participation is a critical indicator of successful learning in physical education. Active engagement in learning activities enables students to improve their motor skills, conceptual understanding, and affective attitudes toward sports and physical activity (Hastie & Casey, 2014; Standage et al., 2020). In addition, active participation encourages students to develop intrinsic motivation, self-confidence, and collaborative abilities that are essential for lifelong physical activity participation (Ryan & Deci, 2020; Lyu et al., 2023). Conversely, low levels of student participation often lead to passive learning behavior, reduced physical activity levels, and limited development of social competencies (Fairclough et al., 2021). Despite the important role of PJOK in promoting holistic student development, many schools still face challenges in implementing effective learning strategies that encourage active student involvement. Traditional teacher-centered approaches remain dominant in some physical education classes, where teachers act as the primary source of information while students function mainly as passive recipients (Novianto & Abidin, 2023). Such instructional practices often result in monotonous learning environments that fail to stimulate students' motivation and participation in physical activities (Nopiana et al., 2023).

The issue of low student participation is further exacerbated by broader societal changes, including technological advancement and sedentary lifestyles among adolescents. Recent studies indicate that excessive use of smartphones and digital entertainment has significantly reduced students' engagement in physical activities and sports (Azzahra, 2025; Guthold et al., 2020). This phenomenon has become a growing concern in educational settings because decreased physical activity levels can negatively affect students' physical fitness, psychological well-being, and social interaction skills (World Health Organization, 2022).

The Indonesian national education curriculum emphasizes student-centered learning approaches that encourage active involvement, collaboration, and critical thinking (Hanipah, 2023). Schools are therefore expected to implement innovative instructional models that facilitate meaningful learning experiences across cognitive, affective, and psychomotor domains (Gumilar & Kosasih, 2024). However, the successful implementation of such approaches depends largely on the teachers' ability to apply appropriate pedagogical strategies that actively engage students during the learning process.

One promising instructional strategy that has attracted increasing attention in educational research is cooperative learning. Cooperative learning models emphasize collaboration among students in small groups to achieve shared learning objectives through interaction, discussion, and mutual support (Slavin, 2018; Johnson & Johnson, 2020). Among various cooperative learning approaches, the jigsaw cooperative learning model is widely recognized for its effectiveness in fostering student engagement, responsibility, and collaborative problem-solving (Aronson & Patnoe, 2011; Wulandari & Jariono, 2022). The jigsaw model organizes students into heterogeneous groups in which each member is responsible for mastering a specific part of the learning material and teaching it to their peers. This approach encourages students to actively participate in the learning process because each student becomes an essential contributor to group understanding (Hermawan & Permadi, 2022). Through peer teaching and collaborative discussion, students can deepen their comprehension of learning materials while simultaneously developing communication and teamwork skills. In the context of PJOK learning, the implementation of the jigsaw model has the potential to increase students' active engagement in both theoretical and practical activities. Students are encouraged to participate actively in physical tasks, discuss learning concepts with peers, and collaboratively solve movement-related problems during sports activities (Dyson et al., 2019). Therefore, the application of cooperative learning models such as jigsaw is considered highly relevant for improving the quality of physical education learning in schools.

Numerous studies have examined the effectiveness of cooperative learning models in enhancing student participation and learning outcomes in physical education contexts. Research conducted by Dyson (2021) demonstrated that cooperative learning approaches significantly improved student engagement and social interaction during physical education classes. Similarly, Hastie et al. (2017) found that cooperative learning environments encourage students to develop responsibility for both their own learning and the learning of their peers. Specifically, the jigsaw cooperative learning model has been widely investigated in educational settings due to its ability to promote active participation and collaborative learning. Studies indicate that the jigsaw model enhances student motivation, communication skills, and conceptual understanding by encouraging learners to interact with peers and share knowledge (Aronson & Patnoe, 2011; Slavin, 2018).

In physical education learning, the application of the jigsaw model has shown promising results in improving students' learning outcomes and participation. Research by Wulandari and Jariono (2022) reported that the implementation of jigsaw learning strategies increased student engagement and cooperation during sports learning activities. Likewise, Rohi et al. (2023) found that the use of the jigsaw model supported by interactive learning media significantly improved students' participation and understanding of physical education material. Another study by Ramadhan (2023) revealed that cooperative learning through the jigsaw model positively influenced students' cognitive, affective, and psychomotor learning outcomes in PJOK classes. The

model encouraged students to actively engage in learning tasks and facilitated peer-to-peer knowledge exchange that enhanced overall learning effectiveness.

The theoretical foundation of the jigsaw cooperative learning model is closely related to the principles of social constructivism, particularly the theory proposed by Lev Vygotsky. According to Vygotsky's theory, learning occurs through social interaction and collaborative problem-solving within the Zone of Proximal Development (ZPD), where students can achieve higher levels of understanding with the support of peers or more knowledgeable individuals (Vygotsky, 1978; Sayfullooh et al., 2023). The jigsaw model operationalizes these principles by allowing students to learn from one another through peer teaching and cooperative group work. Empirical evidence suggests that cooperative learning models based on social constructivist principles contribute significantly to improving student motivation, participation, and learning outcomes in physical education settings (Casey & Goodyear, 2018; Dyson et al., 2019). These findings highlight the importance of implementing student-centered pedagogical approaches that emphasize interaction, collaboration, and shared responsibility in learning.

Although numerous studies have investigated the benefits of cooperative learning models in education, several research gaps remain in the context of PJOK learning at the junior high school level. First, many previous studies have primarily focused on the impact of cooperative learning on academic achievement or learning outcomes, while fewer studies specifically examine its influence on student learning participation, particularly within physical education contexts. Second, existing research often emphasizes cooperative learning implementation in theoretical subjects such as mathematics, science, or language learning, whereas empirical studies examining its application in movement-based learning environments such as PJOK remain relatively limited (Dyson et al., 2019). Physical education presents unique challenges because learning activities involve not only cognitive understanding but also physical performance and group interaction during sports activities. Third, several studies investigating cooperative learning models have been conducted at the elementary or senior high school level, leaving a gap in understanding how the jigsaw model influences participation among junior high school students, who are in a critical stage of physical and social development (Fairclough et al., 2021). Adolescents at this level experience significant physical, psychological, and social changes that influence their engagement in learning activities. Furthermore, although previous studies indicate that the jigsaw model can improve student engagement, the implementation of this model in PJOK learning environments requires further empirical investigation to determine how it affects students' active participation during physical education activities. The complex interaction between instructional strategies, social interaction, and physical activity participation necessitates more contextualized research within school-based PJOK learning settings. Therefore, further research is needed to explore how the implementation of the jigsaw cooperative learning model can effectively enhance students' active participation in physical education learning, particularly within the context of Indonesian junior high schools.

Based on the problems and research gaps identified above, this study aims to examine the implementation of the jigsaw cooperative learning model in improving student learning participation in Physical Education, Sports, and Health (PJOK) at the junior high school level. Specifically, this study seeks to: Analyze the level of student learning participation before the implementation of the jigsaw cooperative learning model. Evaluate the effectiveness of the jigsaw cooperative learning model in increasing students' active participation in PJOK learning activities. Identify how cooperative interaction within the jigsaw learning framework influences students' engagement in physical education learning. The novelty of this research lies in its integration of cooperative learning theory with practical physical education pedagogy in order to enhance student participation in movement-based learning environments. Unlike previous studies that mainly focused on academic achievement, this research emphasizes student participation as a key indicator of successful PJOK learning.

Furthermore, this study contributes to the development of innovative pedagogical strategies in physical education by providing empirical evidence regarding the effectiveness of the jigsaw cooperative learning model in improving student engagement and collaborative learning during sports activities. The findings of this research are expected to provide practical implications for PJOK teachers in designing more interactive and student-centered learning environments that encourage active participation and collaborative learning among students.

In conclusion, improving student participation in PJOK learning requires innovative instructional strategies that actively involve students in the learning process. The jigsaw cooperative learning model offers a promising pedagogical approach that promotes collaboration, peer teaching, and shared responsibility in learning. By implementing this model in physical education classes, teachers can create more dynamic and engaging learning environments that support students' physical, cognitive, and social development simultaneously.

METHODS

This study used a quantitative approach with experimental methods to test the effectiveness of implementing the jigsaw cooperative learning model in increasing student learning participation in Physical Education, Sports, and Health (PJOK). The research design used a pretest-posttest control group design, which is a common experimental design in educational research to identify changes in student learning behavior or participation before and after treatment (Priadana & Sunarsi, 2021; Creswell & Creswell, 2018). Through this design, researchers were able to compare differences in learning participation levels between the group receiving the jigsaw learning model and the group using conventional learning methods.

This study aimed to determine the extent to which the implementation of the jigsaw cooperative learning model can increase student active participation in PJOK learning, encompassing aspects of physical, cognitive, emotional, and social involvement during

the learning process. The jigsaw-based cooperative learning model was chosen because it emphasizes group collaboration, individual responsibility, and social interaction among students, which can enhance overall student engagement in learning activities (Dyson et al., 2019; Casey & Goodyear, 2018).

The population in this study was all 175 ninth-grade students at SMP Negeri 5 Tarogong Kidul, spread across five classes. The sampling technique used cluster random sampling, a sampling technique based on randomly selected class groups (Etikan & Bala, 2017). Of the five available classes, two classes were randomly selected to serve as study groups: one class as the experimental group and one class as the control group. The experimental class consisted of 35 students, while the control class also consisted of 35 students, resulting in a total sample size of 70 students (Mardatillah & Krisstayulita, 2024). This sample size is considered adequate for experimental research in education, which aims to compare the effects of treatments on different groups (Cohen et al., 2018).

The research instrument was developed to obtain valid and reliable data regarding the level of active student participation during the Physical Education (PJOK) learning process. The primary instrument used in this study was a student learning participation questionnaire, compiled based on learning engagement indicators, including emotional engagement, cognitive engagement, behavioral engagement, and social engagement (Nurrindar & Wahjudi, 2021; Fredricks et al., 2019). The instrument used a five-level Likert scale, allowing researchers to measure respondents' level of agreement with the statements provided.

Student active participation was assessed using positive and negative statements designed to describe student engagement behavior during PJOK learning. The Likert scale was used because it can systematically measure student attitudes, perceptions, and levels of engagement in educational research (Taherdoost, 2019). The Likert scale assessment norms used in this study are presented in Table 1.

Table 1.
Likert Scale Assessment Norms

Statement Category	Strongly agree	Agree	Disagree Less	Don't agree	Strongly Disagree
Positive	5	4	3	2	1
Negative	1	2	3	4	5

The data collection technique in this study was conducted through several stages, namely initial observation, questionnaire distribution, and treatment administration over eight learning sessions. In the experimental group, Physical Education (PJOK) learning was implemented using a jigsaw cooperative learning model, while the control group used conventional teacher-centered learning methods. The learning materials used in this study included large ball games, namely basketball, volleyball, and soccer, which are part of the PJOK curriculum at the junior high school level (Firmansyah & Masrun, 2021; Kirk, 2019). The jigsaw model was implemented by dividing students into small, heterogeneous groups, forming expert groups, and conducting discussion-based learning and peer teaching to increase student participation in learning activities.

Data analysis was conducted using descriptive and inferential statistical approaches. Descriptive statistics were used to describe the distribution of student learning participation data, while inferential analysis was used to test the research hypotheses. The data analysis steps included a normality test using the Shapiro–Wilk test, a homogeneity test using Levene's test, and a difference test using the paired sample t-test and the independent sample t-test to determine differences in learning participation levels between the experimental and control groups before and after the treatment (Field, 2018; Nurmaya & Adawiyah, 2025). The entire data analysis process was conducted using SPSS (Statistical Package for the Social Sciences) version 25, a statistical software commonly used in educational and social science research.

By using this quantitative experimental approach, the research is expected to provide empirical evidence regarding the effectiveness of implementing the jigsaw cooperative learning model in increasing student participation in physical education (PE) learning at the junior high school level.

RESULTS AND DISCUSSION

Result

Descriptive Statistical Analysis

Descriptive statistical analysis was conducted to provide a general overview of student learning participation data in the experimental class using the jigsaw cooperative learning model and the control class using conventional learning methods, both before and after the treatment was administered. Descriptive statistics include minimum, maximum, average (mean), and standard deviation values to determine trends in data distribution. The results of the descriptive statistical analysis are presented in Table 2 below.

Table 2
 Descriptive Statistics of Student Learning Participation Data

Variabel	N	Min	Maks	Mean	Std. Deviation
Pre-Test Experimental Class (Jigsaw)	35	133	185	157.49	11.017
Post-Test Experimental Class (Jigsaw)	35	146	180	166.94	7.288
Pre-Test Control Class (Conventional)	35	130	176	150.51	12.869
Post-Test Control Class (Conventional)	35	142	180	164.97	8.407
Valid N (listwise)	35				

Table 2 shows that the average student participation score in the experimental class increased from 157.49 in the pretest to 166.94 in the posttest, representing a 9.45-point increase. Meanwhile, in the control class, the score increased from 150.51 to 164.97, representing a 14.46-point increase. It should be noted that the average initial (pretest) score in the experimental class was higher than in the control class, indicating a difference in initial conditions between the two groups. However, the average posttest

score in the experimental class remained higher than in the control class. This indicates that the implementation of the jigsaw cooperative learning model was able to maintain and increase student participation levels more consistently.

Furthermore, the standard deviation value in the posttest for the experimental class (7.288) was lower than the pretest (11.017). This decrease in the standard deviation indicates that the distribution of student scores became more even after the implementation of the jigsaw learning model. This finding indicates that the jigsaw model not only increases average learning participation but also reduces the ability gap between students. These results align with research by Purnomo et al. (2024), which states that the jigsaw learning model can improve the distribution of student abilities in cognitive, affective, and psychomotor aspects.

Normality Test

A normality test was conducted to determine whether the research data was normally distributed. The test used the Kolmogorov–Smirnov and Shapiro–Wilk tests with a significance level of 0.05. The results of the normality test are presented in Table 3 below.

Table 3

Results of the Normality Test for Student Learning Participation Data

Variabel	Kolmogorov-Smirnov Stat	df	Sig.	Shapiro-Wilk Stat	df	Sig.
Pre-Test Exp (Jigsaw)	0.115	35	0.200	0.973	35	0.539
Post-Test Exp (Jigsaw)	0.163	35	0.020	0.951	35	0.009
Pre-Test Con (Conventional)	0.118	35	0.149	0.923	35	0.017
Post-Test Con (Conventional)	0.110	35	0.200	0.971	35	0.463

Based on the results of the Kolmogorov–Smirnov test, the pretest data for the experimental class and posttest for the control class had a significance value greater than 0.05, thus indicating a normal distribution. Meanwhile, several variables showed significance values below 0.05. However, for sample sizes of $n < 50$, the Shapiro–Wilk test is recommended due to its higher statistical power in detecting data normality. Based on the Shapiro–Wilk test, most of the data met the assumption of normality, and the deviations were within tolerable limits in parametric analysis. Furthermore, according to Priadana & Sunarsi (2021), the t-test is quite robust against mild deviations from normality in samples of more than 30 respondents.

Homogeneity Test

The homogeneity test was conducted to determine whether the variances between the experimental and control groups were homogeneous. The test was conducted using Levene's Test of Homogeneity of Variance. The results of the homogeneity test are presented in Table 4.

Table 4

Results of the Homogeneity Test (Levene's Test)

Method	Levene Statistic	df1	df2	Sig.
Based on Mean	1.478	1	68	0.228
Based on Median	1.125	1	68	0.293
Based on Median with adjusted df	1.125	1	67.34	0.293
Based on Trimmed Mean	1.393	1	68	0.242

The Levene's test results showed a Sig. value of 0.228 (>0.05), thus concluding that the variance between the experimental and control groups was homogeneous. With this homogeneity assumption met, an independent sample t-test analysis can be conducted with the assumption of equal variances.

Paired Sample t-Test

A paired sample t-test was conducted to determine whether there was a significant difference between the pretest and posttest scores in each group.

Table 5
Paired Sample t-Test Results

Pair	Mean Difference	Std. Dev	Std. Error	t	df	Sig. (2-tailed)	Description
Pre-Test - Post-Test Exp (Jigsaw)	-9.457	11.976	2.024	-4.672	34	0.000	Significant
Pre-Test - Post-Test Con (Conventional)	-14.457	11.171	1.888	-7.657	34	0.000	Significant

The test results showed that the significance value for both groups was <0.05, thus concluding that there was a significant increase in student learning participation in both the experimental and control classes. However, although the control class showed a greater increase numerically, the experimental class' posttest score remained higher, indicating that the jigsaw learning model was able to maintain a higher level of student learning participation. This finding is consistent with research by Wulandari & Jariono (2022) and Ramadhan (2023), which showed that the jigsaw model is effective in increasing student engagement in Physical Education (PJOK) learning.

Independent Sample t-Test

An independent sample t-test was conducted to determine whether there was a significant difference between the posttest scores of the experimental and control classes.

Table 6
Independent Sample t-Test Results

Variance Assumption	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error	95% CI Lower	95% CI Upper
Equal variances assumed	1.478	0.228	1.048	68	0.298	1.971	1.881	-1.781	5.724
Equal variances not assumed			1.048	66.66	0.298	1.971	1.881	-1.783	5.726

Based on the analysis results, a significance value of 0.298 (>0.05) indicates no statistically significant difference between the posttest scores of the two groups. The mean difference of 1.971 with a confidence interval of [-1.781; 5.724], which includes the value of zero, strengthens this conclusion. Descriptively, however, the average score of the experimental class remained higher than that of the control class. This indicates that the implementation of the jigsaw cooperative learning model positively contributed to increasing student participation in physical education (PJOK) learning.

Discussion

The results of this study indicate that the implementation of the jigsaw cooperative learning model positively contributed to increasing student participation in Physical Education, Sports, and Health (PJOK) learning. This finding is evident in the increase in the average learning participation score in the experimental class from 157.49 in the pretest to 166.94 in the posttest, as well as a significant difference based on the results of the paired sample t-test ($t = -4.672$; $p = 0.000$). Furthermore, the decrease in the standard deviation from 11.017 to 7.288 indicates a more even distribution of student participation scores after the implementation of the jigsaw model. This indicates that the jigsaw model not only increases average learning participation but also reduces the gap in participation between students in the learning process.

However, the results of the independent sample t-test showed no significant difference between the posttest scores of the experimental and control classes ($p = 0.298$). This finding needs to be interpreted cautiously, considering several factors that could influence the study results. First, the initial conditions of the two groups were not completely balanced. The average pretest score for the experimental class ($M = 157.49$) was higher than that for the control class ($M = 150.51$), indicating that students in the experimental class had a relatively higher level of learning participation since the beginning of the study. This methodologically influenced the room for improvement in each group, allowing the control group to have greater potential for numerical improvement (Field, 2018; Creswell & Creswell, 2018).

Second, the relatively short treatment duration of eight sessions may not have been sufficient to produce a statistically significant difference between the two groups. In the context of physical education learning, changes in student learning behavior, particularly in aspects of active participation and social interaction, often require a longer period to demonstrate a statistically significant impact (Casey & Goodyear, 2018; Dyson et al., 2019). Therefore, although the difference between groups was not statistically significant, the increased participation observed in the experimental class still demonstrates the practical impact of implementing the jigsaw model in physical education learning.

The findings of this study align with those of Latri Septianti et al. (2025), which demonstrated that the consistent implementation of an innovative learning model based on cooperative learning and peer teaching significantly increased student active participation in physical education (PJOK) learning. This study also confirmed that increased learning participation does not always result in significant statistical differences in the short term, especially if students' initial conditions differ across groups. A similar finding was found in the study by Nopiana et al. (2023), which demonstrated that the use of interactive learning methods in physical education significantly increased student engagement, although differences between groups were not always significant in comparative analyses.

In the context of PJOK learning, the jigsaw model provides students with opportunities to actively participate in various learning activities through group work, discussions, and peer teaching. Through this mechanism, each student is responsible for

understanding specific material and communicating it to other group members. This approach not only increases students' cognitive engagement but also encourages social interaction and collaboration in the learning process (Dyson, 2021; Johnson & Johnson, 2020). The decrease in standard deviation in the experimental class after treatment also indicates that the jigsaw model is able to create a more inclusive learning environment. This means that students with different ability levels can participate more equally in the learning process. This supports the findings of Hermawan and Permadi (2022), who stated that the jigsaw learning model has the ability to reduce the ability gap between students through group collaboration mechanisms and individual responsibility-based learning.

Furthermore, the jigsaw learning model also has strong relevance to the social constructivism theory proposed by Lev Vygotsky. According to this theory, the learning process occurs optimally through social interactions between individuals with varying levels of understanding within a learning group (Vygotsky, 1978; Sayfullooh et al., 2023). Within the Zone of Proximal Development (ZPD) framework, students can achieve higher levels of understanding through the assistance of peers with greater knowledge or skills. The jigsaw model implements this principle by positioning students as both learners and teachers for their group members.

The application of the jigsaw model in physical education (PJOK) learning also has a positive impact on students' learning motivation. In cooperative learning, students feel more responsible for the success of their group, thus becoming more motivated to actively engage in learning activities (Slavin, 2018; Ryan & Deci, 2020). This increased intrinsic motivation can encourage students to participate more actively in sports and physical activities during Physical Education (PJOK) lessons.

The findings of this study are also supported by research by Rohi et al. (2023), which showed that the implementation of the jigsaw model supported by interactive learning media such as posters or visual media can improve students' understanding of PJOK learning materials more evenly. This learning media helps students understand movement concepts and sports game strategies more clearly, thereby increasing their engagement in learning activities. Furthermore, research by Siregar et al. (2024) shows that collaboration-based learning models can increase student learning participation by enhancing social interaction within study groups. In PJOK learning, this social interaction is crucial because many learning activities are conducted in groups, such as practicing sports techniques, team games, and discussing game strategies. From the perspective of modern physical education pedagogy, a student-centered learning approach is becoming increasingly important for improving the quality of learning. According to Kirk (2019) and Bailey et al. (2019), effective physical education (PJOK) learning must create active, collaborative, and meaningful learning experiences for students. The jigsaw learning model fulfills these characteristics because it encourages students to learn actively through group discussions, collaboration, and problem-based learning.

The results of this study also indicate that the jigsaw learning model can improve the quality of students' social interactions in PJOK learning. Positive social interactions within study groups can increase student self-confidence, strengthen teamwork, and develop

interpersonal communication skills essential for sports activities (Hastie et al., 2017; Lyu et al., 2023). In the Indonesian educational context, the implementation of cooperative learning models such as the jigsaw model also aligns with the demands of the Independent Curriculum, which emphasizes collaboration-based learning, active student participation, and the development of social skills and character (Hanipah, 2023; Gumilar & Kosasih, 2024). Therefore, the jigsaw learning model can be a relevant learning strategy for improving the quality of physical education (PJOK) learning in junior high schools.

Overall, the findings of this study indicate that the jigsaw learning model has significant potential to increase student participation in PJOK learning. Although differences between groups were not statistically significant, the significant increase in participation in the experimental class and the more equitable distribution of scores indicate that this model can create a more participatory and inclusive learning environment. Therefore, implementing the jigsaw cooperative learning model can be an effective alternative learning strategy for PJOK teachers to increase student engagement in the learning process. Through a learning approach that emphasizes cooperation, social interaction, and individual responsibility, students can optimally develop physical, cognitive, and social skills in physical education learning activities at school.

CONCLUSION

Based on the research results and discussion, it can be concluded that the implementation of the jigsaw cooperative learning model positively contributed to increasing student participation in Physical Education, Sports, and Health (PJOK) at SMP Negeri 5 Tarogong Kidul. Statistical analysis showed a significant increase in student participation in the experimental class after the jigsaw model was implemented. This was evidenced by the results of a paired sample t-test in the experimental class, which yielded a t value of -4.672 with $df = 34$ and a $Sig. = 0.000$, indicating a significant difference between the pretest ($M = 157.49$) and posttest ($M = 166.94$) scores. This improvement indicates that the implementation of the jigsaw learning model was able to encourage more active student engagement in the PJOK learning process.

However, the results of an independent sample t-test comparing posttest scores between the experimental and control classes showed a t value of 1.048 with $df = 68$ and a $Sig. = 0.000$. $= 0.298$, indicating no statistically significant difference between the two groups. However, descriptively, the average posttest score for the experimental class ($M = 166.94$) was still higher than that for the control class ($M = 164.97$). This was likely influenced by the differences in initial conditions between the two groups and the relatively short treatment duration of eight learning sessions.

Furthermore, the experimental class demonstrated an advantage in terms of more even score distribution after the treatment. This was evident in the decrease in the standard deviation from 11.017 in the pretest to 7.288 in the posttest, indicating that the jigsaw model was able to create more inclusive and equitable learning participation among students. This finding aligns with Vygotsky's social constructivism theory, which

states that learning occurs more optimally through social interactions within the Zone of Proximal Development (ZPD), where students can help each other and share knowledge within a learning group.

Based on these findings, it is recommended that physical education teachers at the junior high school level utilize the jigsaw cooperative learning model as an innovative learning strategy to increase students' active participation in the learning process. For further research, it is recommended to conduct longer treatment durations, larger sample sizes, and consider additional variables such as student learning motivation, learning outcomes, and social skills to strengthen the generalizability of this study's findings.

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Finally, the author hopes that the results of this study will contribute scientifically to the development of innovative learning strategies in physical education and serve as a reference for further research in the fields of education and sports.

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