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THE EFFECTIVENESS OF THE STAD AND JIGSAW MODELS IN IMPROVING THE VOLLEYBALL *PASSING* SKILLS OF STUDENTS IN GRADE VIII AT SMPN 3 DARANGDAN PURWAKARTA

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ABSTRACT

One of the efforts in the physical education learning process to improve students' abilities is through volleyball learning by learning basic passing techniques. This study aims to examine the effectiveness of the application of the STAD and Jigsaw cooperative learning models in improving volleyball passing abilities in class VIII students of SMPN 3 Darangdan Purwakarta. The research method used is a quantitative approach with an experimental design. The results of the analysis showed an increase in posttest scores in the class with the STAD learning model, with an average N-Gain score of 0.760 (> 0.7) and an N-Gain percentage of 76.02%, which is classified as effective. Meanwhile, the class with the Jigsaw learning model obtained an average N-Gain score of 0.437 (< 0.7) and an N-Gain percentage of 43.69%, which is included in the fairly effective category. Based on these findings, it can be concluded that both learning models have an effect on improving volleyball passing abilities, with the effectiveness of the STAD model being higher than the Jigsaw model.

INRODUCTION

Education is a learning activity that is one of the stages of learning carried out by students at school in order to develop students' abilities, learning about science and skills that become habits so that students can expand their abilities, and potential that can be motivated to follow the learning process. Education is an effort to realize teaching and learning activities so that students are more active in honing their talents in order to be competent in terms of knowledge, intelligence, control of innate characteristics, and abilities that influence student development (Aprilyanti et al. 2024).

Active learning processes carried out in education, one of which is physical education, are important to be implemented in schools because these learning activities

provide opportunities for students to be directly involved in the learning process in order to help their development and improve their physical fitness as well as enhance their learning abilities. Physical education is a type of education that emphasizes physical movement and transformation, skills, the process of students' interaction with their environment, and improvement in the cognitive, affective, and psychomotor aspects of students.(Putra et al. 2024).

Physical education in schools should shape and improve students' abilities in physical development, knowledge, healthy lifestyle adjustments, physical stability, and motor skills (Arlin Mahendra et al. 2024). Physical education is learning that is carried out through physical activities outside the classroom that are designed to be interesting for students in an effort to improve their knowledge, abilities, physical fitness, motor skills, and active behavior through learning body movements to enhance their growth, physical development, and behavior. Therefore, physical education provides learning related to student abilities and body movement skills that have a positive and very important influence on the physical formation and development of students in terms of their physical, mental, emotional, and social aspects by developing their abilities and movement skills.

Physical education in schools provides learning processes for several sports, including large ball games that are compulsory in education. One of these is volleyball, which is a large ball game played on a court using a ball. It is played by bouncing the ball with the hands and dropping it into the opponent's court by passing it over the net, while protecting the ball so that it does not fall on the court (Fadillah & Hadi 2024). It is understood that volleyball, which is part of the big ball game, is played by using the hands to bounce the ball over the net so that it lands on the opponent's court.

In volleyball lessons, every student can practice basic skills. Passing in sports lessons is a basic technique learned by students, which is done by bouncing the ball using both hands with the aim of passing the ball to a teammate. There are two basic passing techniques learned by students, namely underhand and overhand passing (Subagio et al. 2022). So, it is known that passing is a basic technique learned by students to give, pass, or feed the ball to a teammate using their hands. The techniques they learn are the basic underhand pass and overhand pass (Doby et al. 2023). Volleyball players need to learn the basic skill of passing. Volleyball players pass the ball into the air and then it is received by a teammate (Syaleh et al. 2024).

Learning volleyball should make students more enthusiastic about learning and enable them to understand the basic techniques of volleyball on their own. In this way, students will develop logical and critical thinking skills, making it easier for them to understand the movements involved in passing a volleyball. Ultimately, this will lead to effective learning in terms of passing skills in volleyball (Saputra et al. 2024). Efforts to overcome these difficulties and improve students' abilities in learning basic volleyball techniques involve using appropriate strategies, namely the Student Team Achievement Division type and the jigsaw type, and then determining which of these two learning models is more applicable in improving students' volleyball passing skills.

The cooperative learning model is one of the learning models that is often used in physical education. The cooperative learning model is the application of learning strategies that involve student cooperation in groups so that students help each other in overcoming problems given by the teacher (Ketut et al. 2024). Cooperative learning in the STAD and jigsaw learning models. STAD learning is part of a cooperative learning model that requires cooperation among students in small groups consisting of four to five students, as it allows them to explore their abilities, understand the material and knowledge, and improve their skills during the learning process (Rejeki & Gunawan 2021). The jigsaw learning model is a strategy in which the learning process involves group learning, with the learning process leading to teamwork in groups of five to six people, and each member providing information, experiences, ideas, opinions, and abilities to enhance each other's understanding of learning (Dewi et al. 2024).

This study aims to determine and understand how effective the STAD and Jigsaw models are and to determine the effectiveness of using both models in improving students' volleyball passing skills in class VIII. The effectiveness of the learning process using the STAD (Student Teams-Achievement Division) learning model and the Jigsaw learning model in improving students' abilities in learning passing (underhand passing and overhand passing) in volleyball, and students will be more interested in following the physical education learning process, especially learning volleyball.

RESEARCH METHODS

A research process that uses a number-based analysis method with direct field testing techniques. This method is used when research is conducted to determine the impact of independent variables on dependent variables under controlled conditions (Ph.D. Ummul Aiman et al. 2022). Experimental research is used when conducting

research to find the effect of independent variables on dependent variables under controlled conditions. This research determines the effect of variables through tests aimed at identifying cause and effect in deliberately induced influences. In experimental research, there are several main factors, namely hypotheses, independent variables (treatment) and dependent variables after testing (outcome), as well as the subjects used in the research (Rustamana et al. 2024).

This study is descriptive in nature and does not examine unity in depth. The independent variable is referred to as the causal variable (X), while the dependent variable is referred to as the dependent variable. The research design is a true-experimental design with a pretest-posttest control group design, which is used to test the effectiveness of a treatment.

Table 1. Research Design

R	O_1	O_2
	X	
R	O_3	O_4

The population is the total number of members of a group that is the object of research, including individuals, objects, or events that represent certain characteristics to be observed in the results of the research. The total population in this study consisted of 206 eighth-grade students at SMPN 3 Darangdan Purwakarta.

Table 2. List Of Grade VIII students

No	Class	Gender		Total
		Male	Female	
1	8A	20	20	40
2	8B	20	20	40
3	8C	22	20	42
4	8D	22	20	42
5	8E	21	21	42
Total		105	101	206

Source. Data From SMP Negeri 3 Darangdan For The Academic Year 2025/2026

This study uses sampling techniques, in this case sampling techniques to determine the sample to be used in the study, using probability sampling techniques with cluster random sampling.

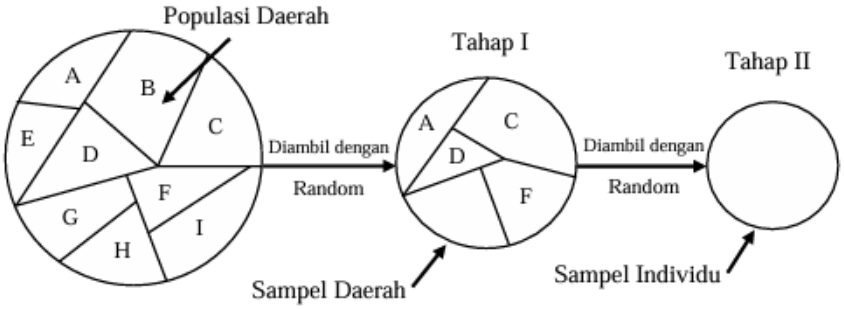

Figure 1. Teknik Cluster Random Sampling
Source: (Sugiyono 2020)

Determine the sample size to be taken from the population using the Slovin formula, with a certain margin of error (e). Using the Slovin formula, two classes were selected as samples, namely class VIII A and class VIII B.

Table 3. Research Sample Class

STAD Model Class	Jigsaw Model Class
Class VIII A (40 students)	Class VIII B (40 students)

Table 4. Volleyball *Passing* Instrument Grid

Indicator	Sub Indicator
Under *Passing*	a. Feet shoulder-width apart. b. Body learning slightly forward. c. Knees slightly bent. d. Arms straight ahead.
Indikator	**Sub Indokator**
Over *Passing*	a. Feet should be shoulder-width apart. b. Body should be learning slightly forward in a ready position. c. Knees should be slightly bent to maintain balance. d. Arms should be bent facing upwards above the head.

Table 5. Evaluation Form

No	Name	Score Under *Passing*	Score Over *Passing*	Total
1.				
2.				
3.				
4.				
5.				

RESULTS AND DISCUSSION

Results

Based on statistical data on volleyball passing skills using the STAD and Jigsaw models in class VIII of SMPN 3 Darangdan Purwakarta, the findings of the research data

were conducted in class eight A using STAD and class eight B using Jigsaw. The results of the descriptive data analysis of the study were intended to describe the data regarding the effectiveness of improving students' volleyball passing skills.

The descriptive statistical data analysis produced data on the mean (average), median, standard deviation, range (difference in results), maximum value, and minimum value. The results of the calculations can be seen in the table:

Table 6. Descriptive Analysis Of *Pretest*

Description	*Pretest* STAD	*Pretest* Jigsaw
Mean	49.26	48.75
Median	50.40	50.00
Std. Deviation	7.596	7.672
Minimum	33	33
Maximum	63	63

The results of this study are presented in the form of a descriptive analysis of the learning model *experiment* with *pretest* and *posttest* results.

Table 7. Descriptive Analysis *Posttest*

Description	*Posttest* STAD	*Posttest* Jigsaw
Mean	85.81	84.34
Median	84.35	84.00
Std. Deviation	8.825	8.575
Minimum	70	60
Maximum	100	96

The results of the frequency distribution table, the effectiveness of the learning model in improving students' volleyball ball handling skills in class VIII of SMPN 3 Darangdan Purwakarta in the 2025/2026 academic year are presented in Table 7. As follows:

Table 8. Results Of The STAD Model *Pretest* Frequancy Test

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	33	1	2.5	2.5	2.5
	38	3	7.5	7.5	10.0
	42	7	17.5	17.5	27.5
	46	5	12.5	12.5	40.0
	50	11	27.5	27.5	67.5
	54	6	15.0	15.0	82.5
	58	3	7.5	7.5	90.0
	63	4	10.0	10.0	100.0
	Total	40	100.0	100.0	

The descriptive results of the pretest frequency of the STAD model class experiment obtained a score of 33-63. The distribution shows scores in the range of 49-51 with the highest frequency of 27.5% for a score of 50 and 15.0% for a score of 54. This is in the low criteria.

Table 9. Results Of The Jigsaw Model *Pretest* Frequancy Test

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	33	3	7.5	7.5	7.5
	42	6	15.0	15.0	22.5
	45	1	2.5	2.5	25.0
	46	5	12.5	12.5	37.5
	50	11	27.5	27.5	65.0
	54	6	15.0	15.0	80.0
	58	3	7.5	7.5	87.5
	60	1	2.5	2.5	90.0
	63	2	5.0	5.0	95.0
	63	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

The descriptive results of the pretest frequency of the Jigsaw model class experiment obtained a score of 33-63. The distribution shows scores in the range of 45-51 with the highest frequency of 12.5% for a score of 46 and 27.5% for a score of 50. This concludes that the category is low.

Table 10. Results Of The Posttest Frequency Distribution Test For STAD Model

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	70	4	10.0	10.0	10.0
	79	3	7.5	7.5	17.5
	83	8	20.0	20.0	37.5
	85	1	2.5	2.5	40.0
	88	7	17.5	17.5	57.5
	92	9	22.5	22.5	80.0
	96	2	5.0	5.0	85.0
	100	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

The posttest frequency results of the STAD class experiment obtained a minimum value of 70 and a maximum value of 100. The distribution of scores in the range of 87-91 had the highest frequency, namely 17.5% for a score of 88 and 22.5% for a score of 92. This concludes that after the treatment was given, there was an increase in effectiveness.

Table 11. Results Of The Posttest Frequency Distribution Test For Jigsaw Model

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	60	1	2.5	2.5	2.5
	71	1	2.5	2.5	5.0
	75	6	15.0	15.0	20.0
	76	1	2.5	2.5	22.5
	79	3	7.5	7.5	30.0
	83	1	2.5	2.5	32.5
	83	7	17.5	17.5	50.0
	85	1	2.5	2.5	52.5
	88	6	15.0	15.0	67.5
	92	5	12.5	12.5	80.0
	96	2	5.0	5.0	85.0
	Total	40	100.0	100.0	

The posttest results of the Jigsaw model experiment obtained scores of 60-96. The distribution of scores showed scores in the range of 87-91 with the highest frequency of 15.0% for a score of 88 and 12.5% for a score of 92. This concludes that students' abilities have increased in effectiveness from the use of the learning model provided.

This study uses a normality test to confirm that the data is normal. The Shapiro-Wilk test is used to check whether the data is normal or abnormal based on the test results.

1. If the significance value p > 0,05 the data population is normal.
2. If the significance value p < 0,05 the data population abnormal.

The normality test results are shown in the table below:

Table 12. STAD Model Normality Test Results

Tests of Normality				
		Shapiro-Wilk		
		Statistic	df	Sig.
Results Ability Passing	Pretest Class Model STAD	.950	40	.078
	Posttest Class Model Jigsaw	.967	40	.241
a. Liliefors Significance Corretion				

From the results of the normality test of the STAD learning model using SPSS 27 for Windows software regarding the data on students' volleyball passing skills, the pretest score was 0.078 and the posttest score was 0.241, so p > 0.05 as shown in the table above, which is normally distributed.

Table 13. Jigsaw Model Normality Test Results

Tests of Normality				
		Shapiro-Wilk		
		Statistic	df	Sig.
Results Ability Passing	Pretest Class Model STAD	.942	40	.058
	Posttest Class Model Jigsaw	.955	40	.141
a. Liliefors Significance Corretion				

Based on the results of the normality test of the Jigsaw learning model using SPSS 27 for Windows software regarding the results of student volleyball passing ability data, the pretest value was 0.058 and the posttest value was 0.141, so p > 0.05 as shown in the table above, which is normally distributed.

The homogeneity test is used to test whether the sample variance taken from the population is uniform or not. Levene's test, available in the one-way ANOVA test procedure, was used. The decision in this test is that if the data score is significant > ∝ 0.05, it can be declared homogeneous, but if the data value is significant < ∝0.05, the data can be said to be non-homogeneous. The test results are as follows:

Table 14. Results Of The STAD Model Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Results Ability Passing	Based on Mean	1.342	1	78	.250
	Based on Median	.925	1	78	.339
	Based on Median and with adjusted df	.925	1	47.560	.341
	Based on trimmed mean	1.028	1	78	.314

The results obtained from using SPSS 27 for Windows show that the significance value based on the mean (sig.) is 0.250 > 0.05, indicating that the data from the pretest and posttest of the STAD learning model are homogeneous.

Table 15. Results Of The Jigsaw Model Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Results Ability Passing	Based on Mean	1.255	1	78	.231
	Based on Median	.729	1	78	.235
	Based on Median and with adjusted df	.729	1	23.028	.236
	Based on trimmed mean	1.009	1	78	.208

The results using SPSS 27 for Windows software show that the significance value based on the mean (sig.) is 0.231 > 0.05, so the data from the pretest and posttest results are homogeneous.

Table 16. *N-Gain* Effectiveness Interpretation Categories

Percentage (%)	Interpretation
< 40%	Ineffective
40% - 55%	Less Effective
56% - 75%	Moderately Effective
> 76%	Effective

Table 17. *N-Gain* Distribution Categories

N-Gain Value	Interpretation
g > 0,7	High
0,3 ≤ g ≤ 0,7	Moderate
g < 0,3	Low

Table 18. Results Of The *N-Gain* Test For The STAD Model

Descriptive Statistics					
	N	Range	Minimum	Maximum	Mean
NGain_Score	40	.54	.46	1.00	.7602
NGain_Persen	40	54.35	46.65	100.00	76.0175
Valid N (listwise)	40				

The results of the n-gain test of the pretest and posttest of the STAD model obtained an n-gain score of 0.760 > 0.7, which means that it is in the high category according to the n-gain category table. The n-gain percentage value is 76.02 or 76%, which means that in the effectiveness interpretation category table, it is classified as effective.

Table 19. Results Of The *N-Gain* Test For The Jigsaw Model

Descriptive Statistics					
	N	Range	Minimum	Maximum	Mean
NGain_Score	40	.61	.08	.69	.4369
NGain_Persen	40	61.02	7.50	68.52	43.6912
Valid N (listwise	40				

The results of the n-gain test of the pretest and posttest of the Jigsaw model obtained an n-gain score of 0.437 < 0.7, which means it is in the moderate category according to the n-gain category table. The n-gain percentage is 43.69 or 44%, which means that in terms of effectiveness, it is classified as less effective.

Discussion

This study aims to examine the effectiveness of the STAD and Jigsaw models in improving students' volleyball skills. The researcher selected two classes as samples, with

class A receiving the STAD learning model treatment and class B receiving the Jigsaw learning model treatment. Based on statistical data analysis, the research shows that the treatment applied to students in class 8 A and class 8 B produced significant results. The research was conducted over 8 meetings, with the first meeting consisting of a pretest given to all students in the research sample. The next 6 meetings were devoted to the treatment, which was designed to improve the technical passing skills of volleyball students at SMPN 3 Darangdan Purwakarta.

When conducting a pretest or ability test before treatment or intervention is given to students. This pretest was conducted using a ball passing technique. The students enjoyed doing it, but their passing technique was still not perfect, and there were errors in their movements.

The results obtained by students when conducting the pretest for class VIII A or the STAD learning model class were a valid N value of 40, a mean value of 49.26, a median of 50.40, a minimum value of 33, a maximum value of 63, and a standard deviation of 7.596. Meanwhile, the results obtained by students when taking the pretest for class VIII B or the Jigsaw learning model class were valid N = 40, mean = 48.75, median = 50.00, mode = 50, minimum = 33, maximum = 63, with a standard deviation of 7.672. This was due to a lack of mastery and implementation of the learning model provided in the learning activities, which caused students to be less enthusiastic about carrying out their learning obligations at school, especially in the basic techniques of passing the volleyball underhand and overhand. Therefore, a treatment was needed to improve the results of the abilities acquired. A good score can be said to have improved, but this was under the condition that the students were undergoing treatment or intervention. It is hoped that students will be active in carrying out.

A treatment or approach was carried out on students using the STAD and Jigsaw learning strategies. The STAD and Jigsaw types are learning approach strategies that emphasize group learning attitudes or behaviors to achieve learning objectives and then help to carry out the learning process in groups, exchange ideas, and help the learning atmosphere become more creative, innovative, and not boring for students.

In each meeting, each group presented the results of their learning about volleyball passing techniques. The learning process had a positive impact on the students' development and abilities. At the beginning of the meeting, the students responded enthusiastically. However, many students still did not fully understand the correct

volleyball passing techniques using this learning model. This was because the students were not accustomed to the group learning process of working together in groups.

In subsequent meetings, group learning became more active and each student contributed to their group's learning. Before moving on to the main material in each meeting, students warmed up with small games that led to the material on underhand and overhand passing techniques in volleyball. This can increase students' enthusiasm for participating in physical education.

The researcher's presence brought innovation to physical education teaching and learning at SMPN 3 Darangdan Purwakarta. The warm-up with small games increased the intensity of physical education activities. In addition, the school provided support by providing a field and supporting equipment for physical education learning activities, making them more interesting and running smoothly.

At the last meeting, a posttest was conducted as part of the final process of the treatment during 7 meetings with the application of this strategy in improving student abilities. The posttest results for class VIII A using the STAD learning model obtained a valid N value = 40, mean = 85.81, median = 84.35, minimum = 70, maximum = 100, with a standard deviation = 8.825, and for the difference (gain), the minimum value = 0, maximum value = 67, range = 30, mean = 24.75, variance = 322.67, with a standard deviation (standard deviation) = 18.53. Meanwhile, the results obtained by students when taking the pretest for class VIII B or the Jigsaw learning model class were N valid = 40, mean = 84.34, median = 84.00, minimum = 60, maximum = 96, with a standard deviation = 8.575.

The next step was to conduct a descriptive statistical analysis, followed by a normality test on the average scores for the STAD and Jigsaw cooperative learning models. The Shapiro Wilk test was used in this test because the sample size was < 50 with a significance level of 0.05. After the data was processed using SPSS 27 for Windows, the results of the data analysis for class VIII A on the STAD model pretest data obtained a sig. value of 0.078, which is sig. > 0.05, while the STAD model posttest data obtained a sig. value of 0.241, which is sig. > 0.05. The difference (gain) obtained a minimum value of 0, a maximum value of 67, a range of 30, a mean value of 38.05, a variance of 515.15, and a standard deviation (standard deviation) of 17.77. For the Jigsaw model pretest data, a sig. value of 0.058 was obtained, which is sig. > 0.05, while for the Jigsaw model posttest data, a sig. value of 0.141 was obtained, which is sig. > 0.05. The difference (gain) obtained a minimum value of 0, a maximum value of 56, a range of 30, a mean of 29.23, a variance of

382.02, and a standard deviation (standard deviation) of 14.69. Therefore, Ho is accepted, or both data or values are normally distributed.

The step after conducting the normality test will be to test homogeneity. It is useful for decision making in the homogeneity test if the sig. p value is > 0.05. Then the test is declared homogeneous, if the sig. p value is < 0.05. Based on the results of the STAD learning model homogeneity test using Levene's test, which is available in the one-way ANOVA test procedure, it can be concluded that the significance value (Sig.) based on the mean is 0.250 > 0.05 because the value (Sig.) based on the mean is > 0.05, and the difference (gain) obtained is 36. while the homogeneity test of the Jigsaw learning model obtained a (Sig.) based on the mean of 0.231 > 0.05 because the (Sig.) value based on the mean was > 0.05, and had a difference (gain) value of = 30. It can be concluded that the variance of the pretest and posttest data for both learning models is homogeneous.

To determine the effectiveness of the STAD and Jigsaw cooperative learning models in improving the passing skills of volleyball players at SMPN 3 Darangdan Purwakarta, an n-gain test was used, which concluded that the application of the learning model was very effective in improving the passing skills of eighth-grade students at SMPN 3 Darangdan Purwakarta. The effectiveness of a learning model was determined using a true-experimental design with a pretest-posttest control group design. The n-gain test analyzed the difference between the pretest and posttest results using SPSS 27 for Windows.

The effectiveness of the learning model with an increase in posttest scores in class VIII A using the STAD learning model obtained a mean n-gain score of 0.760 > 0.7, which means that it falls into the high category according to the n-gain score distribution category. The n-gain percentage results show that the average score is 76.02 or 76%, which is in the effective category according to the n-gain effectiveness interpretation category. For the increase in posttest scores in class VIII B using the Jigsaw learning model, the n-gain score was 0.437 < 0.7, which is in the moderate category according to the n-gain score classification. The results of this calculation show that the average score was 43.69 or 44%, which is in the less effective category according to the n-gain effectiveness interpretation category.

Based on the results of the data collected, it was decided that the STAD and jigsaw cooperative learning models were significantly effective in improving the technical passing skills of junior high school students at SMPN 3 Darangdan Purwakarta. The use and selection of learning models are very effective in achieving the predetermined

learning objectives. However, the analysis of the data shows that the STAD learning model is more effective than the jigsaw learning model, even though there is only a slight difference in the improvement of students' passing skills.

CONCLUSION AND RECOMMENDAATIONS

The results show the effectiveness of the STAD and Jigsaw models in improving the passing skills of students at SMPN 3 Darangdan Purwakarta. Based on the research questions, the author concludes the following:

This study proves that the process of learning basic skills using the STAD learning model for volleyball passing techniques has resulted in an n-gain percentage in the effective category. As for the Jigsaw learning model, an n-gain percentage in the fairly effective category has been found. The researcher can conclude that the effectiveness of the STAD learning model is proven to be more effective than Jigsaw in improving the volleyball passing skills of eighth-grade students at SMPN 3 Darangdan Purwakarta.

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