CHAPTER IV
FINDINGS AND DISCUSION

This chapter contains a description or explanation related to the article data used in meta-analysis, the results of statistical analysis in the form of data effect size, summary effect, as well as the presence or absence of publishing indications related to the results of the meta-analysis of the articles about the use of the learning model Cooperative in English lessons on student learning outcomes.

A. Data Description

In this study, researchers used the meta-analysis of group comparisons because the data used was obtained from research articles that compare treatment or treatment in two groups. To obtain the research data needed in the process of analyzing meta-analysis statistics, articles are searched using the keyword "cooperative learning in ELT or EFL" on Google Scholar. Furthermore, filtering is done to select research articles that meet the data needed for meta-analysis, which is carried out based on the predetermined inclusion and exclusion criteria. The amount of data on the results of the management research articles obtained from the database is presented in the following table:

Table.4. 1 list of research and the data

CODE	STUDY	EXPERIMENTAL GROUP			CONTROL GROUP		
		N	MEAN	SD	*N*	MEAN	SD
R1.1	Namaziandost (2020)	24	11,54	1,92	24	12,08	1,99
R1.2	Namaziandost (2020)	24	11,89	2,38	24	12,08	1,99
R2	Namusoke (2022)	91	9	2,8	89	3,93	2,72
R3	Altun et al (2020)	24	57,5	1,59	24	87,2	1,41
R4	Al Yaseen WS (2020)	20	4	0,582	20	2.521	1.324
R5	Ehsanifard (2020)	30	6,28	57	30	5,63	41
R6	Munawa S (2019)	34	23,29	5,89	34	14,7	5,28

R7.1	Moosa (2022)	18	78,73	9,89	18	78,3	9,65
R7.2	Moosa (2022)	18	71,73	60,81	18	71,78	66,34
R8	Afzalimir A (2021)	30	-1,83	60	30	-65	1,16
R9	Abtew (2022)	49	13,64	2,47	51	1212,63	2,47
R10.1	Fakkilifard (2019)	30	133,11	285,2	30	200,5	996
R10.2	Fakkilifard (2019)	30	133,15	851,1	30	200,5	996
R10.3	Fakkilifard (2019)	30	114,333	0,884	30	200,5	996
R11	Chen (2021)	36	1,81	668	35	1,77	690
R12	Razaq Y (2022)	25	55,44	10,025	23	57,3	8,562
R13	WT Ali (2019)	86	9,7	1,75	86	9,54	2,11
R14.1	Shamsooden et all (2020)	20	18	1,62	20	13,95	2,87
R14.2	Shamsooden et all (2020)	20	17,8	1,43	20	14,6	2,5
R15	Kumari (2020)	30	4	0,54	30	0,76	0,77
R16	Haryanti D U et al (2021)	32	72	92	32	52	72
R17	Siddique GK et al (2020)	30	82,96	5,61	30	70,29	6,18
R18	Ismail N (2019)	40	72,5	18,65	40	52,02	15,94
R19	Hashmi et al (2020)	30	21,75	9,68	30	15,28	6,52
R20	zhang et al (2019)	27	8,1	1,55	28	2,1	1,47
R21	Alijani Tori A et al (2021)	30	17,57	2,78	30	16,31	2,44
R22	Msuur T (2021)	35	17,46	4,05	28	11,64	4,99
R23	Fathi et al (2020)	25	25,72	10,05	23	36,11	9,84

R24	Al-Shihri AK (2019)	23	13,83	2,22	22	10,23	2,181
R25.1	Zin O K et al (2020)	53	29,43	3,59	53	24,28	8,23
R25.2	Zin O K et al (2020)	64	30,86	3,56	61	27,43	7,17
R26	Lin (2022)	55	12,92	0,68	51	11,89	0,7
R27	Takko et al (2020)	91	54,41	12,04	91	38,36	8,04
R28	Bouchair Y (2021)	26	12,4	1,51	25	11	1,94
R29	Matere (2022)	34	35,62	7,471	34	35,32	6,27
R30	Raissi (2020)	33	16,6364	1,19421	33	17,8182	1,28585
R31	Mohammadian (2021)	25	15	2,103	25	13,74	1,939
R32	Pusparini et al (2020)	31	70,32	5,76	29	60,17	7,49
R33	Madani (2021)	14	11,89	4,05	12	9,63	3,43
R34	Afida et al (2021)	33	71,15	9,026	33	57,21	9,082
R35	Nazari (2022)	75	17,73	1,56	66	13,44	3,44
R36	Cheng Lo Et al (2021)	34	60,74	17,619	34	58,29	15,6
R37.1	Aliyu (2019)	18	32,67	10,32	21	19,2	7,52
R37.2	Aliyu (2019)	24	41,53	14,39	25	21,03	10,41
R37.3	Aliyu (2019)	16	52,42	53,31	18	23,54	12,01
R38	Phuntsho (2020)	34	15,17	2,23	32	11,89	2,46
R39	Chaya (2020)	32	4,02	0,364	30	3,35	0,817
R40	Rad (2021)	24	16,16	2,01	17	13,47	2,43

R41.1	Montafej (2022)	18	10,33	6,37	22	1	0
R41.2	Montafej (2022)	20	4,7	2,9	22	1	0
R42	Sapan (2022)	13	3,71	0,58	11	2,85	1,26
R43	Esmaeili (2020)	30	24,1	2,83269	30	20,9	2,76867
R44	Ali NMA (2022)	30	84,17	1,117	30	55,87	4,321
R45	Dincer et al (2022)	19	60,42	11,34	18	49,72	8,55
R46.1	Fardin et al (2021)	30	16,33	0,83	30	10	0,55
R46.2	Fardin et al (2021)	30	17,33	0,55	30	12,9	0,41
R47	Ritonga et al (2022)	30	190,6	34,57	30	143,93	39,55
R48	Aghayani et al (2019)	14	15	20	14	13	19
R49	Agussatriana (2020)	30	84,44	6,39	30	63,11	1,18
R50	Mohammadi (2021)	16	13	1,5	16	11,875	1,0237
R51	Rashed et al (2022)	20	15,95	2,14	20	12,2	2,35
R52	Hakim (2020)	30	71,67	6,875	30	60,03	7,318
R53	Shahani(2022)	40	5,0119	0,63228	40	3,7969	0,63228
R54	Mohammed HA et al (2022)	20	14,25	1,54	20	11,98	1,272
R55	Afzali et al (2020)	100	116,84	6,46	100	90,77	9,77
R56	Sugiyati et al (2022)	28	75	100	28	70	95
R57	Rad (2021)	33	35,47	3,46	33	20,22	3,41
R58	Naskah (2022)	22	99,09	7,24	20	99,3	7,4
R59	Chen (2020)	54	8,45	1,60	39	6,9	1,319

				3			
R60	Qisthi et al (2020)	22	82,68	37,42	28	79,61	3,583

B. Research Result

As for the approach used, this study is a reduction of the standardized mean difference because the data used in table 4.1 showed that the scale used was different, some used a scale of 0-10 and some were using scales of 0-100. Therefore, to calculate the effect size use the equation described in the previous chapter. At this stage the value of effect size, variance of effect size and standard error of the effect size is obtained. Further this research uses the size category effect size according to Cohen like the following on the table below.

Table.4. 2 category effect by Cohen

Effect size *(d)*	Descriptions
$0.01 \leq d < 0.2$	Very small effect
$0.2 \leq d < 0.5$	Small effect
$0.5 \leq d < 0.8$	Medium effect
$0.8 \leq d < 1.2$	Large effect
$1.2 \leq d < 2.0$	Very large effect
$d \geq 2.0$	Extremely large effect

As for the results of the results of the calculation values of the Effect Size, Variance and Standard Error in Table 4.1 are as follows.

Table.4. 3 result of effect size, variance, and standard error of effect size

Research Code	g = effect size	Vg	SE g	Category
R1.1	-0,27	0,08	0,29	Very small
R1.2	-0,09	0,08	0,29	Very small
R2	1,83	0,03	0,18	Very Large
R3	-2,64	0,19	0,43	Very small
R4	0,01	0,07	0,26	Very small
R5	1,52	0,08	0,27	Very Large
R6.1	0,04	0,11	0,33	Very small
R6.2	0,00	0,11	0,33	Very small

R7	1,47	0,08	0,29	Very Large
R8.1	-0,09	0,07	0,26	Very small
R8.2	-0,07	0,07	0,26	Very small
R8.3	-0,12	0,07	0,26	Very small
R9	0,00	0,06	0,24	Very small
R10	-0,20	0,08	0,29	Very small
R11	0,08	0,02	0,15	Very small
R12.1	1,70	0,14	0,37	Very Large
R12.2	1,54	0,13	0,36	Very Large
R13	4,81	0,26	0,51	Extremely Large
R14	0,24	0,06	0,25	Small
R15	2,12	0,10	0,32	Extremely Large
R16	1,17	0,06	0,24	Large
R17	0,77	0,07	0,27	Medium
R18	3,92	0,21	0,46	Extremely Large
R19	0,48	0,07	0,26	Small
R20	1,28	0,08	0,28	Very Large
R21	-1,03	0,09	0,31	Very small
R22	1,61	0,12	0,34	Very Large
R23.1	0,81	0,04	0,20	Large
R23.2	0,61	0,03	0,18	Medium
R24	1,48	0,05	0,22	Very Large
R25	1,56	0,03	0,17	Very Large
R26	0,79	0,08	0,29	Medium
R27	0,04	0,06	0,24	Very small
R28	-0,94	0,07	0,26	Very small
R29	0,61	0,08	0,29	Medium
R30	1,51	0,09	0,29	Very Large
R31	0,58	0,16	0,40	Medium
R32	1,63	0,04	0,19	Very Large
R33	0,15	0,06	0,24	Very small
R34.1	1,48	0,13	0,36	Very Large

R34.2	1,61	0,11	0,33	Very Large
R34.3	0,75	0,12	0,35	Medium
R35	1,38	0,07	0,27	Very Large
R36	1,06	0,07	0,27	Large
R37	1,20	0,12	0,34	Very Large
R38.1	2,15	0,16	0,40	Extremely Large
R38.2	1,82	0,13	0,37	Very Large
R39	0,87	0,18	0,42	Large
R40	1,13	0,08	0,28	Large
R41	8,85	0,73	0,85	Extremely Large
R42	1,04	0,12	0,35	Large
R43.1	8,87	0,73	0,85	Extremely Large
R43.2	9,01	0,75	0,87	Extremely Large
R44	1,24	0,08	0,28	Very Large
R45	0,10	0,14	0,37	Very small
R46	4,58	0,24	0,49	Extremely Large
R47	0,85	0,13	0,37	Large
R48	1,64	0,13	0,36	Very Large
R49	1,62	0,09	0,30	Very Large
R50	1,90	0,07	0,27	Very Large
R51	1,58	0,13	0,36	Very Large
R52	3,14	0,04	0,21	Extremely Large
R53	0,05	0,07	0,27	Very small
R54	4,39	0,21	0,46	Extremely Large
R55	-0,03	0,09	0,31	Very small
R56	1,03	0,05	0,22	Large
R57	0,12	0,08	0,28	Very small
R58	0,34	0,05	0,22	Small
R59	0,58	0,02	0,15	Medium
R60	2,29	0,11	0,34	Extremely Large

After obtaining the results of the effect size of each research article, the analysis procedure is followed by calculating the

summary effect. Summary Effect is a summary of the effects or effects of the average of various studies. There are two distinct statistics models used to calculate summary effects: Fixed Effect Models and Random Effects Models.

This study will utilize JASP Software to Derive a Summary Effect Value, Heterogeneity Assess, Generate Forest Plots, and Conduct Publication Bias Analysis. The input data for JASP Program Consists of Effect Size (ES) and Standard Error of Effect Size (SE) derived from counts using Microsoft Excel. These values are presented in table 4.3.

The analysis yielded the following results when importing data into the JASP software:

Table.4. 4 heterogeneity test

Fixed and Random Effects

	Q	df	p
Omnibus test of Model Coefficients	35.507	1	< .001
Test of Residual Heterogeneity	1164.592	69	< .001

Note. *p* -values are approximate.

Note. The model was estimated using Restricted ML method.

The analysis results in table 4.4 show that the 60 effect sizes of each article analyzed are heterogeneous (Q = 1164.592; p < 0.001). Thus, the random effect model is more suitable for estimating the average effect size of the 60 articles analyzed. The results of this analysis also indicate that there is potential to investigate moderator variables.

Table.4. 5 summary effect / mean effect size

Coefficients

					95% Confidence Interval	
	Estimate	Standard Error	Z	p	Lower	Upper
intercept	1.304	0.219	5.959	< .001	0.875	1.734

Note. Wald test.

The results of the analysis in table 4.5 using the random effect model show that there is a significant positive effect of using the cooperative learning model in improving student learning outcomes in English lessons (z = 0,219; p < 0.001; 95%CI [0.875; 1.734]). The influence of the cooperative learning model on student learning outcomes is in the large category (M = 1,304).

Figure.4. 1 forest plot

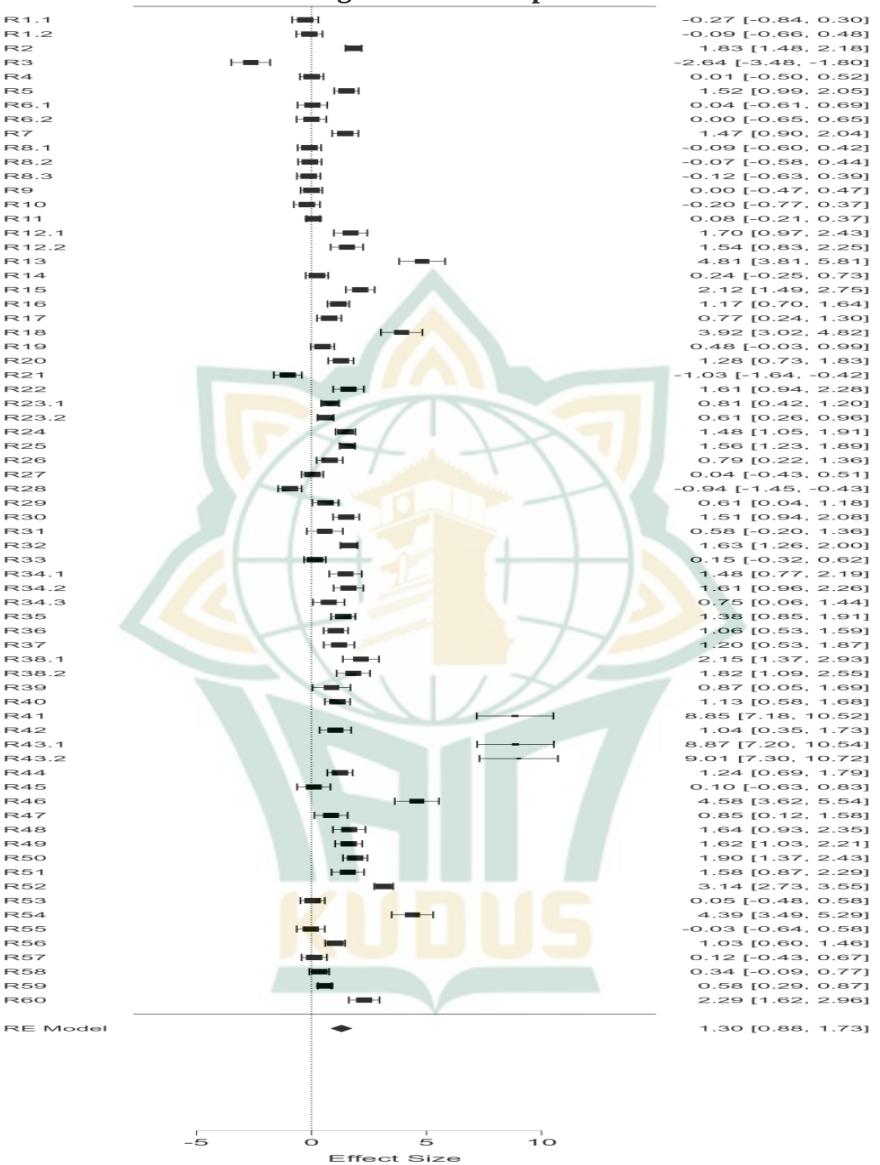


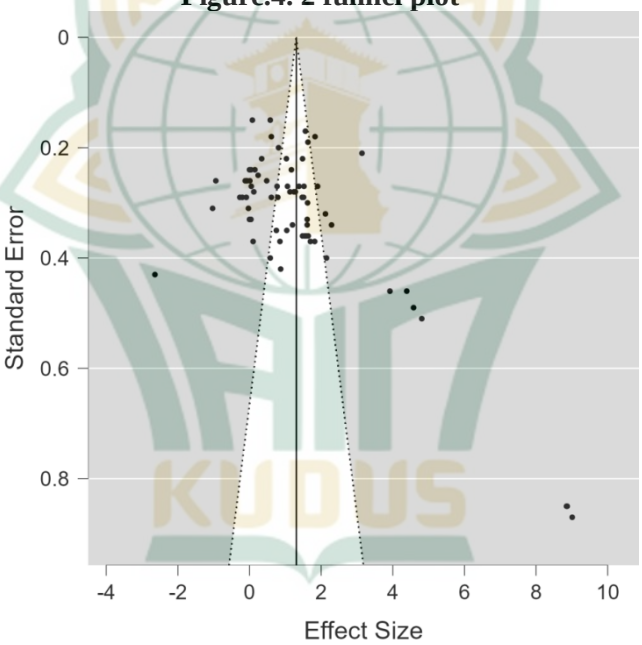
Figure 1 displays the forest plot, which summarizes the results of the meta-analysis we conducted. It includes the effect sizes, confidence intervals, and summary effect of each article. From the forest plot, it can be shown that the effect size results of each analyzed article vary, ranging from -2.64 to 9.01.

After calculating and obtaining the summary effect, the next step is to conduct Publication Bias Analysis. There are several methods that can be used to detect publication bias from the obtained results of a meta-analysis;

1. Funnel plot.

   The funnel plot results can serve as a guide to determine if the research findings indicate publication bias or not by examining whether the funnel plot exhibits symmetrical or asymmetrical shape. However, it is difficult to conclude whether the funnels plot results are symmetrical, thus requiring the assistance of other methods such as the Egger test and rank correlation. The resulting funnel plot is shown in figure 2 below.

Figure.4. 2 funnel plot



2. Egger test

Table.4. 6 egger test

Regression test for Funnel plot asymmetry ("Egger's test")

	z	P
sei	9.267	< .001

The analysis results in table 4.7 indicate that the p-value obtained from the Egger test is greater than the threshold value (0.5). Therefore, it can be concluded that the funnel plot formed by the random effect model is symmetrical, or in other words, there is no evidence of publication bias.

3. Fail-safe N

Table.4. 7 file-safe N

File Drawer Analysis

	Fail-safe N	Target Significance	Observed Significance
Rosenthal	24305.000	0.050	< .001

The analysis results in table 4.6 indicate that the fail-safe N value is 24305.000, suggesting that there are around 24305 studies or publications with biased results, leading to their non-publication. Subsequently, the fail-safe value N will be compared to the value of 5K + 10. Given that K=60, we have 5(60) + 10 = 310. Furthermore, it is known that the fail-safe value N is 2498 with a target significance of 0.05 and p>0.01, indicating that the fail-safe value N > 5n+1. Therefore, we can conclude that there is no publication bias issue in the results of the meta-analysis.

C. Discussion

Interpretation Research related to the use of the cooperative learning model in the ELT has been a lot done by the authors to improve student learning outcomes. However, there are not many people who do advanced research using the research facility, while the research results related to the cooperative learning model require Advanced Research to evaluate and evaluate the results of the research so that it can assess and strengthen the results. Therefore, this study aims to find out the magnitude of the impact of the use of cooperative learning models in elt using meta-analysis methods.

To determine the impact of the learning process using the cooperative learning model, it is necessary to calculate the magnitude of the impact so that it can be traced and analyzed.

Effect size is a quantitative index used to summarize meta-analysis results that reflect the magnitude of the relationship

between variables. By determining the effect size of the research then the overall can be found and determined how great the impact of a treatment. Here is an interpretation of some of the meta-analysis outputs performed using the application JASP 0.13.1.0 1.

1. Interpretation
   a. Interpretation of summary effects

      Based on the results of the heterogeneity test using Q-statistic obtained a value of Q > df (1164.592 > 60) with a p value < α so that it can be concluded that the effect size results of 25 articles analyzed differ in the population type. Therefore, the random effect model method is more accurately used to draw conclusions from the summary effect results compared to the fixed-effect model because this model assumes that the entire research in the meta-analysis gives the same population effect size, i.e. a single effect size. The Q-statistic results also indicate that there is a potential to investigate the moderator variable, which is the factors that are assumed to influence the magnitude of the effect throughout the study.

      The results of the summary effect calculation obtained from the application of JASP on the table showed the results of summary effects using the method of random-effect model obtaining a result of 1.304 with a confidence interval of 95% ranging from 0.875 to 1.734. Since the interval of confidence contains 1, there is strong evidence that there is a positive influence of the treatment of the cooperative learning model given to students to improve the learning results of students in t English language lessons. This is also reinforced by the result of the null hypothesis (H0=0) where we have to reject the hypotheses due to the Z value of the summary effect of 5.959 with a p value smaller than the value of α (0.05), in this case the true effect size is not equal to 0 so it can be concluded that there is a significant positive influence of the use of cooperative learning models against the students learning outcome in English class. It is seen from the summary effect value or combination effect (= 1.304) indicating the magnitude of the effect that belongs to the large. As

for the conclusion that can be drawn from the random-effect model is that there is a significant positive influence of the cooperative learning model of 1,304 on student learning outcomes in English Language Learning.

b. Interpretation of forest plot based on random effect model

Forest plot is a graphic display of the estimates of a number of articles used in meta-analysis to understand summary effects or also called the effect size of the aggregation. Forest plot consists of various elements including the size of each article, a vertical line in the middle of which contains squares of different sizes whose widths indicate the magnitude of the weighing and its position indicates the location of the effect sizes of each study, then each line represents the confidence interval of estimation of the point of the study using a certain degree of significance determined by the researcher. If using a level of significance of 5%, then the interval of confidence presented is 95%. Furthermore, forest plot also presents the summary effect or effect size result of the aggregation which is located at the bottom of the shape of a diamond whose breadth indicated the amount of the width of the total weight of every study and the position expresses the height of the summarized effect.

In Figure 1, the results of summary effects are shown with the label RE Model. As for the summary effect value of 1.304 it can be understood that the result of the students taught using the cooperative learning model is very large. if the summary effect is 0 then it is possible to understand that there is no difference in influence on the two groups in improving the learning results of students, if the Summary Effect is greater than 0 then the conclusion can be drawn that the Cooperative Learning Model influences the learning outcomes and if the summary effect is less than 0, then it may be interpreted that there are no influences of the use of the cooperatively learning model in enhancing the student learning outcome. The other information that can be obtained

from the forest plot in Figure 1 is about the consistency of the effect size of the 60 articles and the cause of the summary effect becoming significant i.e. there are 41 research articles that have effect size that falls at intervals so that the results of summary effects are significant with large categories.

c. Publication bias

A Funnel plot is a visual tool used to investigate bias in publication in a meta-analysis of the plot spread of the expected treatment effect of an individual study against the size of the study. In Figure 4.2, the X axis indicates the size range of the effect size while the Y axis shows the standard error value and the middle line shows the size of the summary effect. Based on the plot results, the scattered dots at the top of the graph show research with a larger sample size, whereas the dispersed dots at the bottom of the chart show studies with smaller sample sizes because studies with a smaller sampling size have larger standard errors in effect size. If the meta-analysis research performed is not biased in publication, then the research in the plot funnel will be distributed symmetrically in relation to the summary effect because the sample error is random (Random). On the contrary, if the results of meta-analysis research indicated biased publication then would form an asymmetrical plot, some research lost in the middle, and more research lost at the bottom. In this study, the plot funnel was created using JASP software version 0.13.1.0 to evaluate whether conclusions about the impact of the use of cooperative learning models threatened biased publication or not.

As for the plot funnel results with the random effect model formed in Figure 4.2, most of the research articles that are sampled in the meta-analysis are studies with relatively moderate sample sizes that are visible from the scattered points in the center. If noted, 60 studies are distributed symmetrically that can be understood that there is no potential publication bias related to the conclusion of the results of the meta-analysis. However, such visual interpretation or judgment cannot be used as a strong

basis of evidence to say that the plot's funnel is symmetrical or asymmetric and requires a statistical approach to test such symmetry using egger tests.

Regression method results for statistical testing of the plot funnel using JASP 0.13.1.0 software are presented in table 4.6 which indicates that the p-value value is greater than the α value (0.05) so that it can be concluded that the plot Funnel formed from the random effect model is symmetrical or can be said that no evidence of bias publication has been found. In addition, a positive rank correlation value (0,001) indicates that the studies included in the meta-analysis are more dominated by large sample size studies than small sample sized studies. As for the regression coefficient, it shows the coefficient of an estimated bias (9,267) so that the regressive coefficient has more power to be used as a method to detect bias than rank correlation.

The analysis results in table 4.6 indicate that the fail-safe N value is 24305.000, suggesting that there are around 24305 studies or publications with biased results, leading to their non-publication. Subsequently, the fail-safe value N will be compared to the value of 5K + 10. Given that K=60, we have 5(60) + 10 = 310. Furthermore, it is known that the fail-safe value N is 2498 with a target significance of 0.05 and p>0.01, indicating that the failed-safe value N > 5n+1. Therefore, we can conclude that there is no publication bias issue in the results of the meta-analysis.

2. The effect size of Cooperative Learning based on the school level

Data analysis trials have been carried out using JASP software in groups based on educational level starting from elementary level to college level, to determine the effect of cooperative learning on student learning outcomes in learning English based on educational level.

Table.4. 8 effect size based on the school level

Level	Q_R	N	Coefficient	ES	Category	P-Rank Test
Elementary School	17.902	2	2,712	2.832	Extremely Large	0,007
Junior High School	337.884	18	3,829	1,661	Large	0,334
Senior High School	138,712	13	2,590	0,822	Medium	0,041
College	548,725	34	3,545	1,225	Large	0,011

Figure.4. 3 funnels plot elementary school

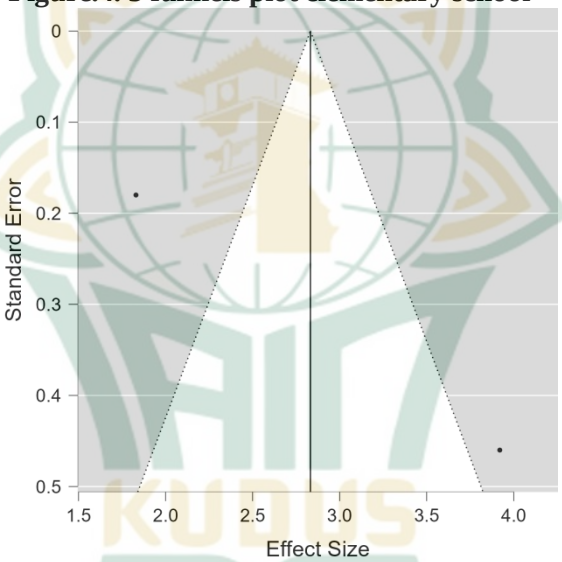


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Figure.4. 4 funnels plot junior high school

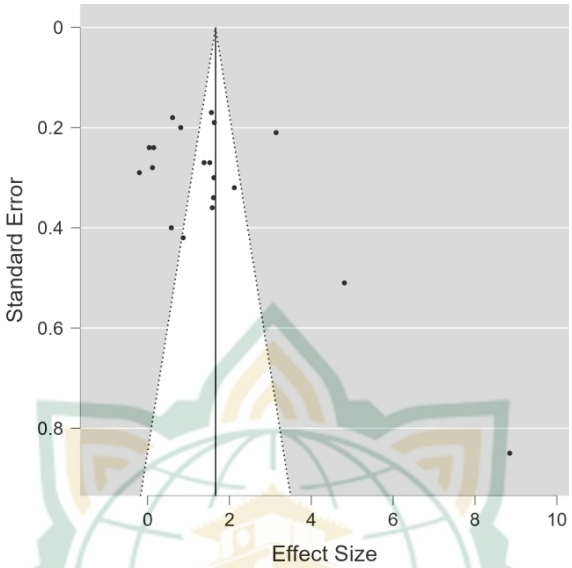


Figure.4. 5 funnels plot senior high school

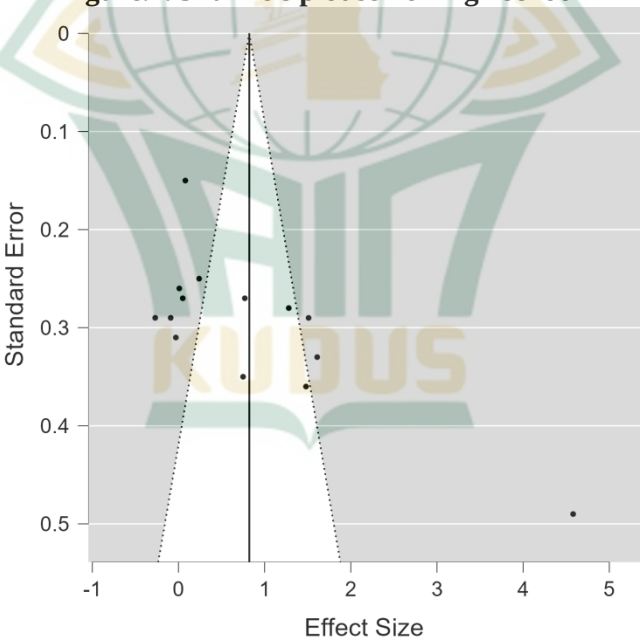
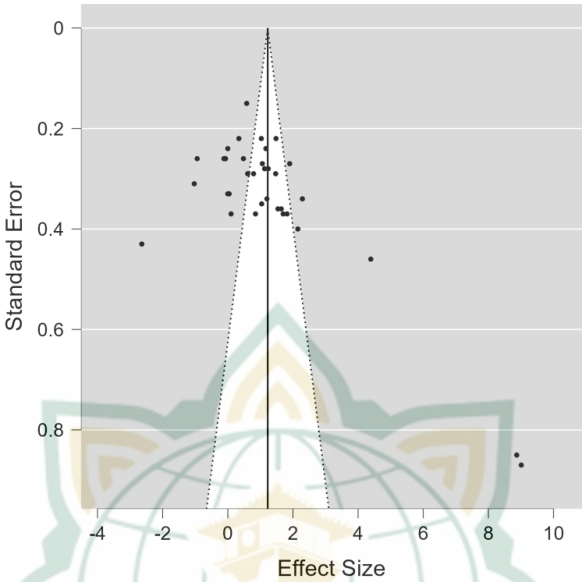


Figure.4. 6 funnels Plot College



Based on the data, it can be concluded that cooperative learning in English language learning is not suitable to be applied to senior high students.

3. The effect size of Cooperative Learning based on the region

Data analysis trials have been carried out using JASP software in groups based on region from the settings of the research, to determine the effect of cooperative learning on student learning outcomes in learning English based on the region. Research that has collected as many as 60 articles has been grouped into 2 regional sections based on continents. It was found that 10 studies were set in countries on the African continent, and 50 from countries on the Asian continent.

Table.4. 9 effect size based on the region

Region	Q_R	N	Coefficient	ES	Category	P-rank test
ASIA	977.221	50	5.227	1,227	Large	0.014
AFRICA	186.055	10	2.770	1.693	Large	0.243

Based on the data above, it can be concluded that cooperative learning is significantly effective in improving student learning outcomes in English language learning.

Both Asia and Africa have the same size category (large). However, it can be seen that Africa has greater value.

Figure.4. 7 Funnels plot Asia

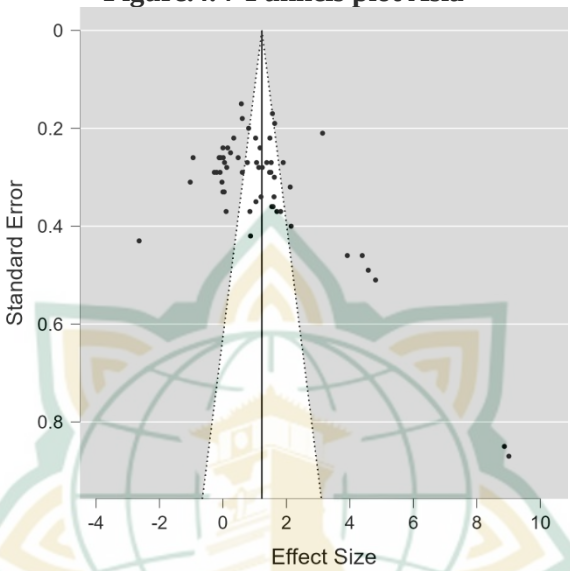


Figure.4. 8 funnels plot Africa