Indonesian students' reading literacy ability in the cooperative integrated reading and composition learning: A meta-analysis

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Article Info

ABSTRACT

A few of meta-analysis studies regarding the intervention of cooperative learning have been conducted. However, it has not been performed on the studies related to the intervention of cooperative integrated reading and composition (CIRC) learning for Indonesian students' reading literacy. This study aims to approximate and examine the effect of CIRC learning on students' reading literacy ability across group size of intervention, educational level, and geographical location. A meta-analysis was performed to conduct this study. The search of document using the database of Google Scholar found 97 documents. The selection of document established 10 documents published from 2015–2021 consisting of one conference paper and nine journal articles. Hedges' equation was employed to measure the effect size. The data analysis used the Z test and Q Cochrane test. The results revealed that the CIRC learning had a strong positive effect (g=2.041; p<0.05) on students' reading literacy ability. It indicates that the CIRC learning is effective for enhancing students' reading literacy ability. Furthermore, some moderating factors such as group size of intervention, educational level, and geographical location did not affect students' heterogeneous reading literacy ability. This study suggests language teachers to use the CIRC learning in enhancing students' reading literacy ability.

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1. INTRODUCTION

Every student obtains a piece of knowledge by learning. Reading is one of the ways for students to learn because reading can provide many experiences and knowledges for themselves [1]–[4]. At the moment, however, students' reading interest decreases, especially in elementary school. As a consequence, students' reading literacy ability is low [5]–[10]. To enhance reading literacy ability, cooperative integrated reading and composition (CIRC) learning is one of the alternative learning that can be implemented because it can pressure students to read comprehensively [11].

Reading literacy is obtained by a habituation process repeatedly. Putrawan, Sudana, and Tastra [6] also argued that reading literacy ability is related to the habituation in reading and appreciating literature work. It is the main tool for every student to obtain information or knowledge, so reading activity in the education field is extremely important because most of sciences are obtained by reading activity. In addition, reading literacy is a medium for students to interact with their social environment, so it is related to writing

ability in the social environment [6]. It means that the reading literacy ability of students affects the insight that they have because the process of reading literacy aims to understand a text [7], [12]–[16]. Therefore, students' reading literacy ability has to be enhanced by a learning process that can support it.

CIRC learning is a comprehensive program to teach students in reading and writing. A few of the literatures stated that it is more suitable to be applied in language sciences, such as Indonesia and English [5]–[7]. Putrawan, Sudana, and Tastra [6] stated that there are several advantages of this learning. Firstly, every activity in this learning is more meaningful for students, so students learning outcome undergoes an enhancement. Secondly, it can cultivate the critical thinking skills of students. Thirdly, it presents a pragmatical and beneficial activity that is suitable to the problems which often are faced by students. Lastly, it can cultivate students' motivation to learn dynamically, optimally, and beneficially. In addition, some experts also argued that CIRC learning aims to enhance students' ability in understanding the meaning of the text and solving problems because it requires students to analyze reading sources carefully [5], [6]. This indicates that it is so possible to enhance students' reading literacy ability.

Some previous studies regarding the implementation of CIRC learning in language learning have been conducted extensively. Some studies reported that the CIRC learning had a strong positive effect on students' reading literacy ability [5], [7], [17]–[21]. Some studies, however, reported that the CIRC learning had a moderate positive effect on students' reading literacy ability [6], [10], [22]. These reports indicate that there is an inconsistent effect of CIRC learning on students' reading literacy ability. In addition, the reports indicate students' heterogeneous reading literacy ability. It means that there is a different reading literacy ability among students. On the other side, the precise and clear information regarding the effect of CIRC learning to enhance students' reading literacy ability is important for language teachers.

A meta-analysis is a way that can support in synthesizing some relevant studies about the effect of CIRC learning on students' reading literacy ability. Borenstein et al. [23] argued that it is a series of statistical methods approximating and examining some relevant quantitative studies to present approximation and justification of intervention effect using the unit of effect size. A few of meta-analysis studies regarding the intervention of cooperative learning or reading strategy have been performed [24]–[26]. Nurmaya [24] studied related to the intervention of cooperative learning in English language learning. Puzio and Colby [25] also studied the intervention of cooperative learning for literacy outcomes. Meanwhile, Okkinga et al. [26] studied related to the intervention of reading strategy for comprehensive reading.

This study, however, focuses on the intervention of CIRC learning for reading literacy ability. Therefore, this current study aims to approximate and examine the effect of CIRC learning on students' reading literacy ability across group size of intervention, educational level, and geographical location. The following research questions are directed to the aim of this study: i) What is the overall effect size of CIRC learning intervention on students' reading literacy ability? Does the intervention of CIRC learning enhance students' reading literacy ability?; ii) What is the effect size of CIRC learning intervention on students' reading literacy ability across group size of intervention, educational level, and geographical location? Do the moderating factors such as group size of intervention, educational level, and geographical location affect students' heterogeneous reading literacy ability in the CIRC learning?

2. RESEARCH METHOD

A meta-analysis was performed to conduct this study [23], [27]–[30]. To approximate the effect size, the random effect model was selected because there were some considerations such as different instrument and educational level, and various geographical locations and group size of interventions [31], [32]. Some sources stated that there were seven stages to conduct meta-analysis as presented in Figure 1.
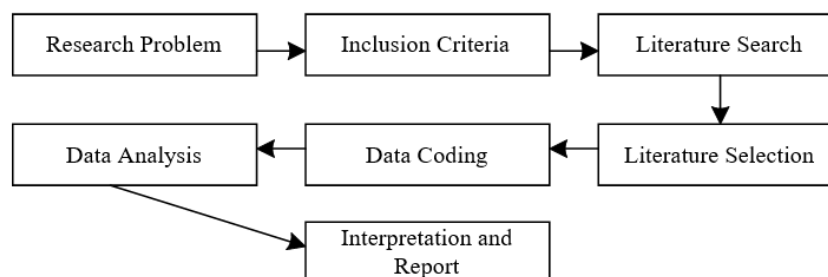

Figure 1. The stages of meta-analysis [33], [34]

2.1. Inclusion criteria

Some inclusion criteria were established to limit the problem breadth of this study. Some inclusion criteria of this study were such as: i) CIRC learning was the intervention; ii) The population was a kindergarten and elementary students in Indonesia; iii) Reading literacy ability was the learning outcome; iv) Conventional learning was the comparator; v) Study design was quasi-experiment research; vi) Each document reported the sufficient statistical data to compute the effect size; and vii) Every document was journal article or conference paper published in the period of 2015–2021.

2.2. Literature search and selection

Google Scholar was used to search documents. Some combinational keywords such as "cooperative integrated reading and composition", "comprehensive reading", and "reading literacy ability" were also employed to ease the search process of the document. In the final search of documents, 97 documents from the Google Scholar database were found by using these combinational keywords. Then, these documents were selected by referring to the steps in Moher *et al.* [35]. The selection process of the document is presented in Figure 2.
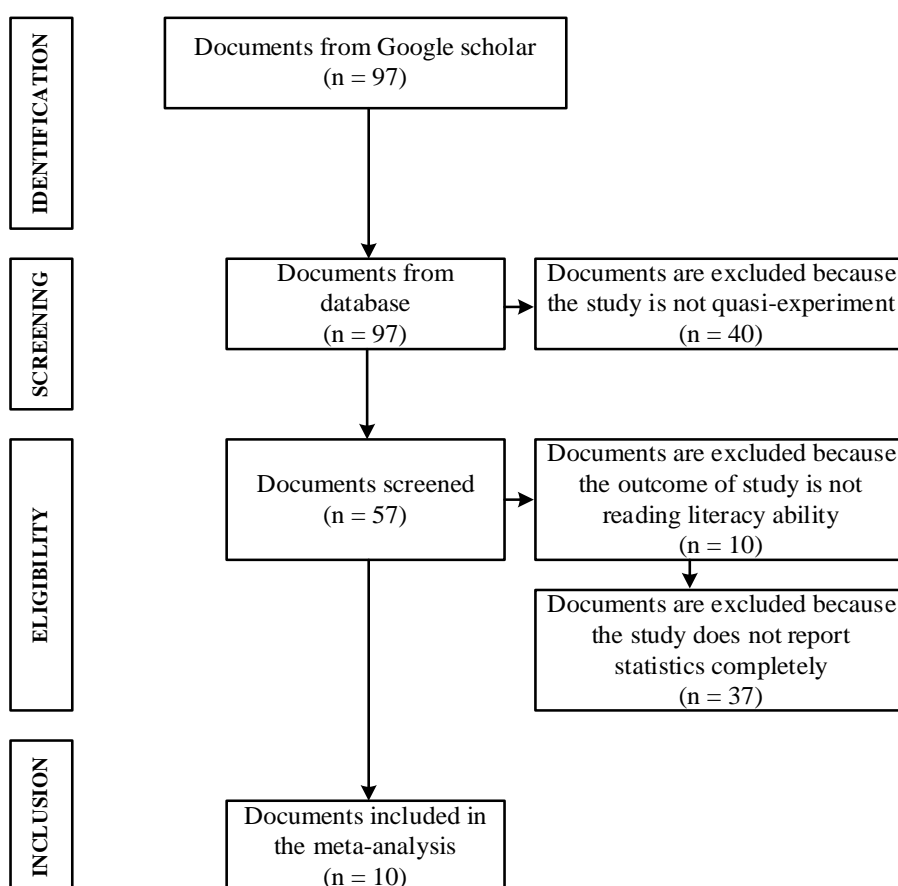

Figure 2. The selection process of document

2.3. Data extraction

A few of information such as authors, statistical data, educational level, group size of intervention, geographical location, publication year and document type were extracted to the coding sheet. The distribution of document by educational level, group size of intervention, geographical location, publication year, and document type is shown in Table 1. Additionally, the communication via email was performed to few authors in completing the missing data. Two coders who were statistics lecturers were involved to justify that the information in the coding sheet was valid [36].

Table 1. Document distribution

Items	Groups	Frequency	Percentage
Educational level	Kindergarten	2	20.00
	Elementary school	8	80.00
Group size of intervention	≤ 30 (Small group)	8	80.00
	≥ 31 (Large group)	2	20.00
Geographical location	Rural area	8	80.00
	Urban area	2	20.00
	2015	1	10.00
	2016	1	10.00
	2017	2	20.00
Publication year	2018	2	20.00
	2019	1	10.00
	2020	2	20,00
	2021	1	10.00
Document type	Journal article	9	90.00
	Conference paper	1	10.00

2.4. Data analysis

Hedges' equation was performed to compute the effect size. Borenstein *et al.* [23] mentioned that Hedge's equation was formulated as (1):

$$g = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}}} \times \left(1 - \frac{3}{4df-1}\right) \tag{1}$$

Cohen, Manion, and Morrison [37] categorized the effect size as: g >1.00 (strong); g =0.51–1.00 (moderate); g=0.21–0.50 (modest); and g=0.00–0.20 (weak). Furthermore, to examine the effect of CIRC learning on students' reading literacy ability, the Z test was used [23]. The Q Cochrane test was employed to examine educational level, group size of intervention, and geographical location in affecting students' heterogeneous reading literacy ability [38].

Several documents published had an opportunity to become the publication bias [39]–[43]. As a consequence, the fill and trim test and the funnel plot analysis were performed to analyze publication bias [44]. Figure 3 reveals that the data distribution in the funnel plot was symmetrical. To justify it, the fill and trim test was performed as shown in Table 2. The table shows that the there was no data that had to be trimmed in which it means that the data distribution in the funnel plot is symmetrical [43], [45]–[50]. As a consequence, the data distribution from ten documents is resistant to the publication bias.
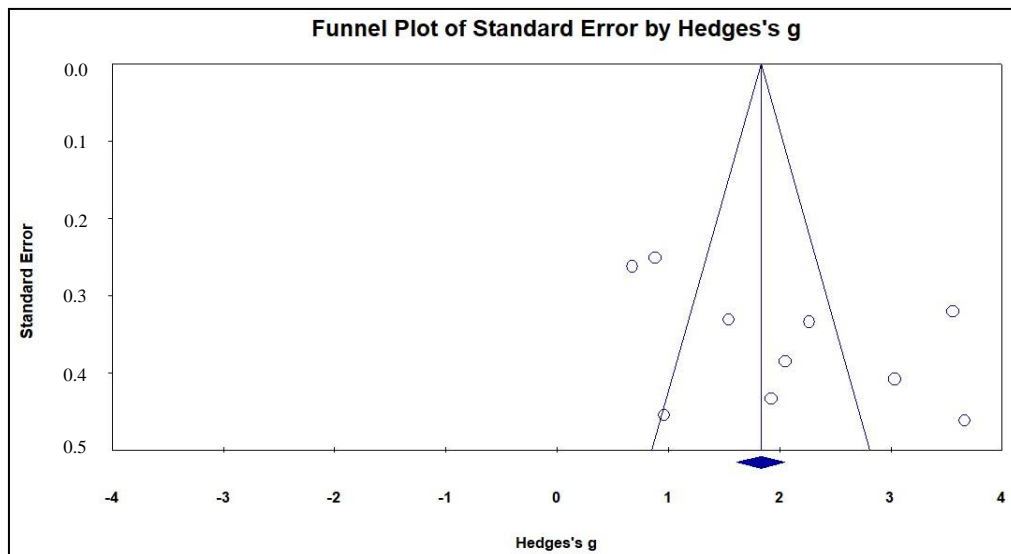

Figure 3. The funnel plot of effect size in Hedges's g unit

Table 2. The fill and trim test

	Studies trimmed	Effect size (g)	Lower limit	Upper limit	Q-value
Observed values		2.041	1.346	2.735	93.654
Adjusted values	0	2.041	1.346	2.735	93.654

3. RESULTS AND DISCUSSION

3.1. Overall effect size

Overall, the effect size of CIRC learning on students' reading literacy ability is presented in Table 3. Table 3 shows that there was eight documents reporting that CIRC learning had a strong positive effect on the students' reading literacy ability [5], [7], [17]–[22]. Meanwhile, there were two documents revealing that CIRC learning had a moderate positive effect on the students' reading literacy ability [6], [10]. From 10 documents, the range of effect size was from 0.679 to 3.666. Moreover, the 95% CI around this average effect size (2.735; 5.758) did not include zero. As a consequence, the overall effect size of CIRC learning on the students' reading literacy ability was g=2.041 and it was categorized as a strong positive effect.

This finding is line to Nurmaya [24] revealing that the average effect size of cooperative learning intervention on students' English academic outcome was g=1.200 and it can be classified as a strong effect. This finding provides strong evidence that CIRC learning had a strong positive effect on students' reading literacy ability. In contrary, Puzio and Colby [25] revealed that the overall effect size of cooperative learning intervention on reading comprehension skills was g =0.200 in which the range of effect size was from -0.070 to 0.510. It shows that the intervention of cooperative learning has a weak effect on students' reading comprehension skills. In addition, Okkinga et al. [26] also reported that the overall effect size of reading strategy intervention on language academic outcome was g=0.186 and it is categorized as a weak effect in which the 95% CI around this weighted effect size (0.132; 0.240) does not include zero. It shows that the intervention of CIRC learning on students' reading literacy ability is more effective than the intervention of cooperative learning or reading strategy on students' reading comprehension skills or language academic outcome.

Table 3. The effect size of every study in the Hedges's g

Study	Effect size	Lower limit	Upper limit	Z-value	p-value
Ekayani, Arini, and Jayanta [5]	2.053	1.297	2.809	5.323	0.000
Putrawan, Sudana, and Tastra [6]	0.883	0.390	1.375	3.510	0.000
Wirandari and Kristiantari [7]	2.270	1.615	2.925	6.797	0.000
Ekawati, Dantes, and Marhaeni [10]	0.679	0.165	1.193	2.588	0.010
Antari, Suwatra, and Antari [17]	3.037	2.237	3.837	7.438	0.000
Asriyani Rati, and Murda [18]	1.543	0.894	2.191	4.663	0.000
Pramujiono, Saputra, and Rachmadtullah [19]	3.559	2.931	4.187	11.104	0.000
Rangkan, Jampel, and Antara [20]	3.666	2.761	4.571	7.943	0.000
Winarti and Suryana [21]	1.926	1.076	2.776	4.441	0.000
Anggraini, Luthfi, and Rizal [22]	0.961	0.070	1.852	2.115	0.034
Overall	2.041	1.346	2.735	5.758	0.000

Furthermore, Table 3 also shows that the overall significant value of the Z test was less than 0.05. It indicates that the intervention of CIRC learning significantly enhances students' reading literacy ability. Puzio and Colby [25] also revealed that cooperative learning intervention significantly improves students' reading comprehension skills. Likewise, Okkinga et al. [26] stated that significantly, the intervention of reading strategy enhances students' language academic outcomes. In addition, a few of empirical studies reported that CIRC learning positively affect students' academic achievement of Indonesian language learning [5]–[7]. These reports strengthen that the CIRC learning is effective learning to enhance students' reading literacy ability. Moreover, it can support students to get a great academic achievement in Indonesian language learning. In literature, Putrawan, Sudana, and Tastra [6] argued that CIRC learning creates a learning situation focusing on students so that it can facilitate to improve their reading skills. In addition, in the learning process, the student can give their opinions to other students so that the transformation process of knowledge can be carried out. It is so possible for every student to obtain more knowledge from this learning process. Wirandari and Kristiantari [7] also revealed that CIRC learning is aimed at students' reading literacy skills in which they are motivated by interesting learning because the selected problems came from students' environment. As a consequence, they will achieve the purpose of Indonesia language learning optimally. The use of CIRC learning creates students to read a text comprehensively so that the pieces of knowledge obtained by them were more meaningful [5]. Thus, CIRC learning can be decided as an alternative solution to enhance students' reading literacy ability in Indonesian language learning.

3.2. Analysis of moderating factor

The results of the heterogeneity analysis of some moderating factors such as educational level, group size of intervention, and geographical location are shown in Table 4. The table shows that the p-value of the Q statistic for every moderating factor was more than 0.05. These results interpret that educational level, geographical location, and group size of intervention are not significant factors in affecting students' heterogeneous reading literacy ability. Nurmaya [24] also reported that the factor of educational level does not affect students' heterogeneous English academic outcome of English language learning.

In addition, other reports also revealed that some moderating factors such as group size of intervention and geographical location significantly do not affect the heterogeneity of students' reading comprehension skills and language academic outcome [25], [26]. These findings provide strong evidence that the difference in the level of students' reading literacy ability is not affected by several factors such as educational level, group size of intervention, and geographical location. It means that other moderating factors predicted in affecting the difference in the level of students' mathematical academic outcome should be investigated and examined by researchers in further research.

Table 4. Analysis of heterogeneity

Moderating factors	Groups	Studies number	Effect size in g unit	The Q Cochrane Test		
				Q-value	df(Q)	P-value
Educational level	Kindergarten	2	2.788	1.067	1	0.302
	Elementary school	8	1.865			
Group size of intervention	≤ 30 (Small group)	8	2.002	0.045	1	0.833
	≥ 31 (Large group)	2	2.202			
Geographical location	Rural area	8	0.957	1.067	1	0.302
	Urban area	2	0.359			

The variation of students' reading literacy ability viewed by educational level showed that there was no significant difference in reading literacy ability between kindergarten students and elementary students in the CIRC learning. A similar report also revealed that English academic outcome between middle school students and high school students who learn using cooperative learning is not different [24]. It also can be seen that the intervention of CIRC learning has a strong positive effect on students' reading literacy skills in kindergarten and elementary school although descriptively, the effect size of CIRC learning on kindergarten students' reading literacy skills is sharply higher than the effect size of CIRC learning on elementary students' reading literacy skills. It indicates that to enhance reading literacy skills, the intervention of CIRC learning in kindergarten is more effective than the intervention of CIRC learning in elementary school.

On the other hand, students' reading literacy ability viewed by group size of intervention revealed that reading literacy skills between students who learn using the CIRC learning in the small class and students who learn using the CIRC learning in the large class are not different significantly. Okkinga *et al.* [26] also reported that there is no significant difference of language academic outcome between students who learn in the small class and students who learn in the large class. Even though descriptively, the effect size of CIRC learning on students' reading literacy ability in the large class is slightly higher than the effect size of CIRC learning on students' reading literacy ability in the large class in which the two effect sizes are classified as a strong effect. It only indicates that for enhancing reading literacy skills, the intervention of CIRC learning in the large class is slightly more effective than the intervention of CIRC learning in the small class. As a consequence, the intervention of CIRC learning has a strong positive effect both on students' reading literacy skills in the small class and large class.

Furthermore, students' reading literacy skills viewed by geographical location showed that there is no significant difference of reading literacy skills between rural students and urban students who learn using the CIRC learning. Puzio and Colby [25] also stated that reading comprehension skills between urban students and rural students who learn using the cooperative learning are not different. The intervention of CIRC learning in urban area has a modest positive effect on students' reading literacy skills. Meanwhile, the intervention of CIRC learning in a rural area has a moderate positive effect on students' reading literacy skills. It can be seen that the effect size of CIRC learning on rural students' reading literacy ability is higher than the effect size of CIRC learning on urban students' reading literacy ability. In addition, it interprets that the intervention of CIRC learning in rural areas is more effective to enhance students' reading literacy skills than the intervention of CIRC learning in an urban area.

4.   CONCLUSION

This study provides clear and precise information that the CIRC learning is effective to enhance students' reading literacy ability. Moreover, CIRC learning had a strong positive effect on the students' reading literacy ability. This study implies that Indonesian language teachers should use the CIRC learning to enhance students' reading literacy ability because it supports students to interest in reading. As a consequence, they can develop reading ability comprehensively. Furthermore, some moderating factors such as educational level, group size of intervention, and geographical location do not affect the difference in the level of students' reading literacy ability. It means that there are some moderating factors that have not been explored in which these factors may have the opportunity to affect the difference in the level of students' reading literacy ability. As a consequence, for further relevant study of meta-analysis, researchers should examine other moderating factors in affecting students' heterogeneous reading literacy ability such as intervention duration and Indonesia language content.

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