Artikel Meta

by Martha Christianti

Children's Alphabetical Knowledge in Kindergarten Age: A Meta-Analysis Study

Abstract

Alphabetic skills were one of the early literacy skills. Several studies on alphabetic skills have been conducted in Indonesia. Meta-analysis was used to describe the children's alphabet skills aged 3 to 6 years as an aggregate. The maximum likelihood estimation method and random effect design were performed to aggregate children's alphabetic skills that can be generalized in Indonesia. The articles were obtained from research published between 2014 and 2021. Those were accessed and collected through a collection of bachelor's thesis on Google Scholar and university digital libraries. The meta-analysis was carried out with JASP. The results showed that the ability to recognize letters among children aged 3 to 6 years in Indonesia was 50.16 (scale 0-100). The results of this study indicate that children's ability to recognize letters in Indonesia is still low. These results encourage to improve the quality of kindergartens in Indonesia.
Keywords: *alphabetic skills; meta-analysis; kindergarten*.

Introduction

Adolescent children's reading potential, particularly when they are young, has an impact on their ability to read. The study revealed that young children's reading abilities predict their future literacy abilities (Catts et al., 2001; Goo et al., 2020; Harlaar et al., 2008; Juel, 1988; Munger & Blachman, 2013). To obtain the highest beginning literacy development, it is necessary to maximize early literacy in children. Phonemic awareness (to sound), vocabulary mastery, comprehension capacity, and alphabetic ability are all necessary for early literacy development (Invernizzi et al., 2004; Joensuu et al., 2021; L. M. Justice et al., 2002; O'Callaghan et al., 2016). The child's capacity to determinate between language sounds is known as phonemic awareness (Bonifacci et al., 2016; Can et al., 2013). Vocabulary mastery is the child's ability to master vocabulary; the greater the child's mastery of vocabulary, the faster the child reads, and then the reading literacy ability is better (Andrews & Baker, 2019; L. M. Justice, 2001). The child's capacity for comprehension is their capacity to comprehend the text they read (Boyle et al., 2019; Kaminski et al., 2014). The capacity to recognize letters, including their names and sound, is known as alphabetic ability (Harper & Pelletier, 2008; Hassett, 2006; L. Justice et al., 2015).

Early reading skills in children include their understanding of the names, shapes, and sounds of the letters in the alphabet (MacK D. Burke et al., 2009; Gandolfi et al., 2021; Lonigan et al., 1998). Additionally, alphabet knowledge-knowing the names and sounds of the letters-was found to be one of the main predictors of reading achievement (MacK D. Burke et al., 2009; Catts et al., 2001; Denton et al., 2006; Elliott et al., 2001; Schmitt et al., 2018; Scott et al., 2019; Vehkavuori et al., 2021) and the best indicator of children's future abilities to read and spell (Rohde, 2015; Schatschneider et al., 2004; Wackerle-Hollman et al., 2020). Additionally, data indicates that children develop conscious knowledge of phonemes when they create correct representations of the alphabet (Bishop & Adams, 1990; Manten et al., 2020). Additional research revealed that preschoolers and kindergarteners with weak alphabetic skills frequently struggle with reading and do not belong to the group of kids who have reading impairments (Hassett, 2006; Muter et al., 2004; van Tilborg et al., 2014).

According to Torgesen et al. (2007), letter-sound recall was a more accurate predictor of literacy for first-graders, whereas letter name correctness was a more sensitive predictor for kindergarteners (Mack D. Burke & Hagan-Burke, 2007; Schmitt et al., 2018). The development of letter-naming abilities came before letter pronunciation, according to a study on letter names and sounds (Clemens et al., 2012; Hecht & Close, 2002). Another study revealed that children's proficiency in producing letter sounds served as a proxy for alphabet knowledge (Duncan & Seymour, 2000; Wackerle-Hollman et al., 2020). In addition to knowing the names of the letters and their sounds, a youngster should also be able to identify the letters in both upper- and lowercase (Bishop & Adams, 1990; Foulin, 2005; Purpura et al., 2011; Xu & De Arment, 2017). Knowledge of letter names emerged as the sole and best predictor in a study on preschool reading predictors (Catts et al., 2001; Dodd & Carr, 2016; Duncan & Seymour, 2000). The findings of this study are supported by a favorable longitudinal link among kids who are more proficient with letter names and scores that are fairly high. Secondly, reading proficiency in first grade and capitalization in kindergarten are both assessed. According to Schmitt et al. (2018), understanding letter names is the second best predictor of reading achievement after phoneme segmentation at the kindergarten level and the best individual predictor of reading achievement overall after the first grade (Schmitt et al., 2018).

So, in schools that combine the knowledge of letters and letter names into an assessment of letter knowledge, there is a significant correlation between children's proficiency with letter names and their reading abilities (Dodd & Carr, 2016; Duncan & Seymour, 2000; Foulin, 2005; Westerveld et al., 2015). When kids first start school, their knowledge of letter names I typically more advanced and diverse than their knowledge of letter sounds. This skill has become a more accurate indicator of learning to read. The kid next gains knowledge of letter sounds, which takes over as a better predictor of reading performance once the child's knowledge of letter names reaches its peak.

Evidence suggests that letter sound knowledge was present earlier. According to normative data from the Phonology Awareness Test (PAT) (Muter et al., 2004) and the Preschool & Primary Inventory of Phonological Awareness (PIPA) (Dodd & Carr, 2016), a developing child between the ages of 5:0 (years: months) and 5:6 can typically pronounce about 20 letters (remembering the sounds of the letters), but can only phonetically segment three of twelve words. The PAT norms also demonstrate that children of the same age who are still developing typically do poorly when erasing the beginning and ending sounds of words but are able to recognize 22 of the 26 letters by sound or name. The study ultimately invited researchers to explore the alphabet knowledge of children aged 3-7 years in several regions in Indonesia. So far, research on recognizing letters in kindergarten children has been carried out in several schools in every province and district. For this reason, this meta-analytic study needs to be carried out to generalize portraits of literacy in children from kindergarten in Indonesia. It is hoped that the results of this study can determine standard policies for achieving early childhood literacy in the curriculum.

Methodology

Research Design

Meta-analysis quantitative research design constitutes the methodology. A statistical method called meta-analysis integrates two or more related research to produce a quantitative synthesis of data. Insofar as the researcher recapitulates the data without engaging in experimental modification, the meta-analysis can be seen from the process as a retrospective observational study. By performing operations on variables, effect sizes, meta-analysis focuses on data rather than the conclusions drawn from numerous research. Statistical meta-analyses employ the findings from related studies, such as impact size or effect size, to summarize the study literature.

Sample and Data Collection

The research data were obtained from various literature and searched from databases through Google Scholar and university digital libraries from 2014 to 2020 (last seven years), including bachelor's degree theses and articles from national journals. Titles and keywords were recognition of letters, vowels, and consonants, literacy, recognizing initial syllables, ability to recognize words, and initial reading. All data contained the indicators of alphabet knowledge, including the letter name and sounds, as some research in early reading contains these skills. The first set of research was 4,580 references, then narrowed down through the following selection criteria, namely, (a) thesis results published in articles, (b) containing samples of early childhood 0 to 7 years, (c) quantitative, experimental, or quasi-experimental research designs, and classroom action research that have pretest data on children's alphabetic abilities, and (d) published in the Indonesian context. In addition, the information needed in this study relates to the ability to recognize letters in children in Indonesia. These basic requirements were met by 100 studies, which were then used for the thorough review. Then, additional conditions were taken into account, including (a) having an alphabetical measuring score at the pretests and (b) having enough data to determine the effect magnitude. The tasks created by the various researchers, which comprised letter name recognition, letter sounds, letter writing, and other indications that emerged from the development of the study instrument, were used to identify the assessment of alphabet knowledge. Moreover, only one study from a sample that was used in numerous investigations was included in the meta-analysis. The search turned up 35 studies that matched all the requirements.

Analyzing of Data

The data analysis procedure was through meta-analysis. The first step was coding the research studies and adapting them to the criteria. The coding results are presented in appendix A. Next, it calculated the effect size. The research we conducted used different measurements, which resulted in different numerical values and only meaningful ones relating to the particular operationalization and scale.

For this reason, the quantitative findings in the studies were coded in a way that allowed them to be combined and compared statistically using effect sizes. The coding in the findings of meta-analysis quantitative research was based on standardization. The effect size statistic produces a standardization of findings so that the result of numerical values can be interpreted consistently across all variables and measurements. This study used an effect size based on the mean of the pretest score. The scores of the analyzed research results were not on the same scale. Then, it needs to conduct standardization first. The standardized mean difference (d and g) converts all effect sizes into a general matrix and allows the inclusion of different outcome measurements in the same synthesis (Goodrich et al., 2019; Mcgaw & Glass, 1980). The following formula performed standardization of mean differences.

$$X_2 = \left[(X_1 - Min_1)\left(\frac{Max_2 - Min_2}{Max_2 - Min_1}\right)\right] + Min_2$$

Similarly, the standard deviation of each study was transformed, so it had the same standard. The following formula was used for standardizing the standard deviation (Mcgaw & Glass, 1980).

$$S_2 = (\frac{Max_2 - Min_2}{Max_1 - Min_2})S_1$$

The next step was to calculate the standard effect size with the following formula (Mcgaw & Glass, 1980; Sterne & Harbord, 2004);

$$SE_X = \frac{S_2}{\sqrt{n}}$$

X_2 is the standardized mean score with the same scale. The score of X_2 is transformed into an effect size value. X_1 is the pure of study mean score. Min_1 is the minimum score of the results. Max_1 is the maximum score of the results. Min_2 is the standard of the minimum score and is equalized. Max_2 is the standard of maximum score and equalized. $S_2$is the transformation of standard deviation. S_1 is pure of the standard deviation of the results. The quantity of samples in each study is n. Table 1 displays the computation results for each study. After calculating the effect size, the next step was calculating the effect size of the aggregation, which was called the summary effect.

Table 1. Mean of Weighted Effect Size and Relevant Statistic

Study	n	ES	S_2	SE	w	w.ES	Lower Bound	Upper Bound
Sukma, Kurnia, Febrialismanto (2020)	16	50.30	12.00	3.00	0.11	5.59	44.42	56.18
Pertiwi, Suyanto (2016)	69	91.74	17.48	2.10	0.23	20.72	87.62	95.86
Rahmadani, Suryana, Hartati (2019)	20	57.50	6.03	1.35	0.55	31.68	54.85	60.14
Khosibah (2019)	18	29.69	22.00	5.19	0.04	1.10	19.53	39.86
Anjarwati, Syamsudin (2019)	5	91.00	29.85	13.35	0.01	0.51	64.84	117.16
Kusumawardani, Hayati (2019)	11	81.00	21.08	6.36	0.02	2.00	68.54	93.46
Saputri (2019)	160	74.33	31.33	2.48	0.16	12.11	69.48	79.19
Isnaini, Rolina, Fatimaningrum (2015)	46	37.69	38.81	5.72	0.03	1.15	26.47	48.90
Baroroh, Sungkono(2017)	14	48.67	22.00	5.88	0.03	1.41	37.14	60.19
Sumardiyatun, Syamsudin, Maryatun (2015)	11	54.54	31.33	9.45	0.01	0.61	36.03	73.05
Wulandari, F., Sungkono, Hayati (2017)	15	32.56	28.89	7.46	0.02	0.59	17.94	47.18
Yuliasih C, Sudaryanti, Cholimah (2017)	21	31.67	24.67	5.38	0.03	1.09	21.12	42.22
Haryati, Suparno (2015)	19	26.33	28.66	6.58	0.02	0.61	13.44	39.22

Sari, RO., Ishartiwi (2015)	14	78.50	14.13	3.78	0.07	5.51	71.10	85.90
Laila, Rosyid, Wulandari (2015)	188	71.00	26.00	1.90	0.28	19.75	67.28	74.72
Febriana, Syamsudin (2013)	22	43.08	17.67	3.77	0.07	3.04	35.70	50.47
Handayani, Suyanto (2020)	26	61.54	17.73	3.48	0.08	5.09	54.72	68.35
Koirunisa (2020)	17	26.46	16.62	4.03	0.06	1.63	18.56	34.36
Uswatun, Syamsudin, Maryatun (2017)	183	14.25	12.33	0.91	1.20	17.14	12.46	16.04
Nurani (2018)	20	15.00	17.00	3.80	0.07	1.04	7.55	22.45
Anggraeni, Sungkono, Rolina (2015)	19	36.67	45.67	10.48	0.01	0.33	16.13	57.20
Prabawati, Ishartiwi (2014)	19	50.67	39.00	8.95	0.01	0.63	33.13	68.20
Fadhilah, Isminiati, Suyatiningsih (2014)	44	64.67	27.67	4.17	0.06	3.72	56.49	72.84
Trisniwati, Ishartiwi, Sungkono (2014)	25	30.67	35.83	7.17	0.02	0.60	16.62	44.71
Arief, Munir, Rafikah (2014)	15	65.80	17.52	4.52	0.05	3.22	56.93	74.67
Wahyuningtias, Fauziyah, Mulyadi (2015)	10	43.31	8.22	2.60	0.15	6.41	38.22	48.40
Lestari, Parmadi, Wulandari (2015)	16	32.81	11.96	2.99	0.11	3.67	26.95	38.67
Karoma, Dwijono, Aziz (2018)	21	55.35	22.55	4.92	0.04	2.29	45.71	64.99
Aminati, Budianto, Sari (2016)	20	40.00	23.00	5.14	0.04	1.51	29.92	50.08
Hariyati, Khutobah, Latif (2017)	12	64.78	22.11	6.38	0.02	1.59	52.27	77.29
Windarti, Suparno (2015)	20	60.50	29.00	6.48	0.02	1.44	47.79	73.21
Nurrochma, Aulina (2018)	30	50.67	0.81	0.15	45.72	2316.64	50.38	50.95
Amalia, Ulum (2020)	13	62.22	16.31	4.52	0.05	3.04	53.36	71.09
Siti Hadidan Rena (2019)	20	31.67	34.67	7.75	0.02	0.53	16.47	46.86
Viveronika (2019)	31	73.67	16.00	2.87	0.12	8.92	68.03	79.30

Study of Coding

In the particular study, codes were given extensively relating to outcomes, indicators, methodology/design, participants' age, characteristics, and region/area where data were collected from participants. The moderator analysis used additional information on methodology/design, participant age, participant features, and participant domicile in addition to the coding of the alphabet recognition indicators, which was necessary for the proper classification of earlier research to examine. Table 2 lists the codes used in the meta-analysis.

Table 2. Description of the Primary Coding and Moderator in the Study

Coding	Sub coding	Descriptions
Indicators of alphabet knowledge	Knowledge of letter name	An assessment involves timeless recognition of letter names, such as pointing and mentioning the name of letters and grouping letters.
	Knowledge of letter sounds	An assessment involves a timeless introduction or production of the letter sound, such as asking the child to mention the letter's name and saying the word according to the sound's sound.
	Writing the letter	Assessment involves writing letters in response to spoken instructions or the alphabet, such as writing names or dictated letters.
	Phonemic Awareness	Assessments require awareness or manipulation of speech sounds, including rhyming, combining phonemes, matching, and combining that have the same sound.
	Reading	Assessment involves reading pictures and simple words (KV, KVK, KVKV, KVKVK).
Method/Design	Quantitative	The research was carried out with experimental, non-experimental, and classroom action research with a score of alphabet knowledge.
Characteristics of participants	Age	Age of 3-6 years involved in the category of preschool and kindergarten categories
Area/Region	Research site	The selected samples lived in urban and rural areas

Findings and Discussion

The study used the model of summary effect size (random effect; RE). RE was used, which means that the RE model assumes a diversity of actual effects in each study. The calculation of summary effect size used JASP Software, free download on the internet. The results are presented in table 3.

Table 3. Fixed and Random Effects

	Q	df	p
Omnibus test of Model Coefficients	218.184	1	< .001

Test of Residual Heterogeneity	2640.054	34	< .001

Note. p-values are approximate.

The Q value was used to test the heterogeneous effect size of each study. Table 3 shows the results of the analyzed studies' heterogeneous 35 effect sizes (Q = 2640,054; p < .001). Thus, the random-effects model was used to estimate the mean effect size of the 35 analyzed studies.

Table 4. Coefficients

					95% Confidence Interval	
	Estimate	**Standard Error**	**z**	**p**	**Lower**	**Upper**
intercept	50.779	3.438	14.771	< .001	44.041	57.517

Note. Wald test.

The analysis results using the random effect model showed that the children's alphabet knowledge aged 4-6 years was in a low category because the estimated value was 50,779 compared to the ideal score of 76 (referring to PIPA; Dodd et al., 2016). In conducting a meta-analysis, to understand the summary effect size, also referred to as the effect size of the aggregation, a forest plot was presented in Figure 1.

For this reason, before calculating the M value, it first calculates the variance of the true effect size (τ^2) from all studies. τ^2 was estimated because it did not have information about the true effect size in the analyzed studies. Calculation of the value of (τ^2) using the DerSimonian and Laird method with the formula (Henmi & Copas, 2010).

$$\tau^2 = \frac{Q - df}{C}$$

Q is the weighted sum square (WSS), or the sum of the weighted squares, and df is the degrees of freedom. The calculation results of the true effect size are presented in table 5.

Table 5. Residual Heterogeneity Estimates

		95% Confidence Interval	
	Estimate	**Lower**	**Upper**
τ^2	383.557	240.804	678.657
τ	19.585	15.518	26.051
I^2 (%)	98.801	98.104	99.319
H^2	83.434	52.754	146.857

The results of the calculation obtained the value of τ^2 = 383,557 with a confidence interval at a significance level of 95% > 0. Thus, it concluded that the effect size of each study used in this meta-analysis was heterogeneous.

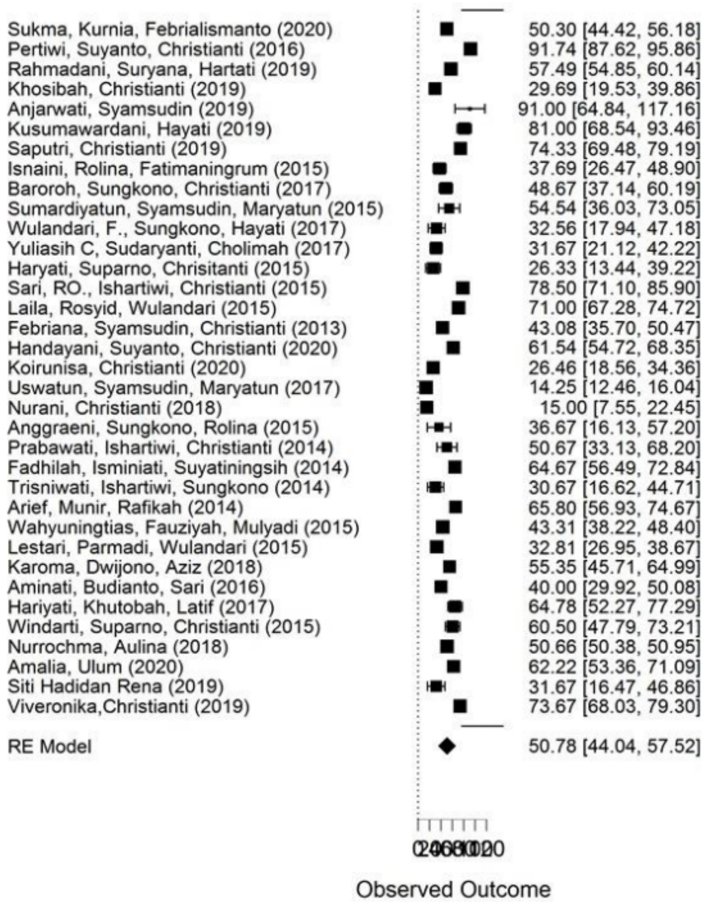

Figure 1. Forest Plot of Summary Effect Size

It showed the bias of publications analysis results. The stage of bias publication analysis was aimed to see the mapping of possible research results according to the determined criteria, even though they may not be found. There was a possibility that the studies in the meta-analysis over the true effect size score based on the biased sample of the study's target population. The impact of the biased publication was that the results and information might be inaccurate because the published literature may not represent the research on a particular topic. Published literature should include positively significant research (tends to produce or show a more substantial summary effect than not significant results), or significant but negative must also be considered or included (Mcgaw & Glass, 1980). The problem was solved by comparing the effect size in formal published research and in unpublished research, but the step was challenging. The article performed biased publications through the JASP software on the analyzed data. The checking results of bias publication are presented in table 6.

Table 6. Rank Correlation Test for Funnel Plot Asymmetry

	Kendall's τ	p
Rank test	-0.200	0.094

In table 6, Kendall's T column was the correlation coefficient score between effect size and variance. To test the relationship, the p-value was compared with the value of $\alpha = 0.05$. If the p-value > α= 0.05, the conclusion was that the funnel plot was asymmetric, or in other words, no indication of biased publication. See figure 2.

Table 7. Regression Test for Funnel Plot Asymmetry ("Egger's Test")

	z	p
sei	-0.114	.910

The table of regression tests for funnel plot asymmetry also showed no biased publication. Column Z is the score of the regression coefficient. To test it, the *p*-value was compared with the value of $\alpha = 0.05$. If p-value > α= 0.05, the conclusion was that the funnel plot was asymmetric, or in other words, no indication of biased publication.

Table 8. File Drawer Analysis

	Fail-safe N	Target Significance	Observed Significance
Rosenthal	237960.000	0.050	< .001

In the file drawer analysis table, the fail-safe N column represented the number of studies with a mean of effect size equal to 0, which must be added to the research sample (meta-analysis context), aiming for no bias publication on conclusions. The target significance column was the limit value of one-tail p = .05. The observed significance column was the score of observed significance that will be compared with the observed significance value.

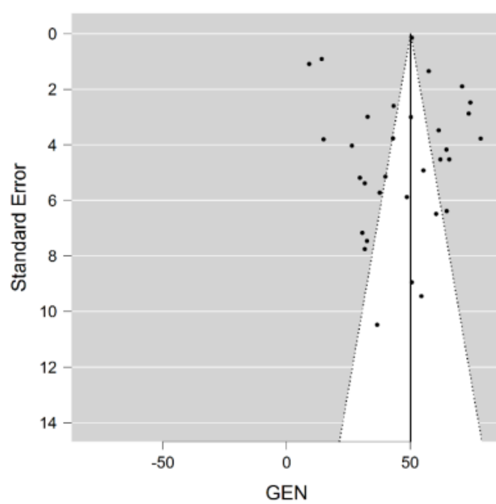

Figure 2. Funnel Plot

The results of the Funnel Plot using the Trim and Fill method showed that there were no open circles in the funnel plot of the random-effects model. It means there was no or no missing research (unpublished). Also, Figure 2 shows the symmetrical model. The conclusion was that the studied alphabet knowledge was free from the potential of biased publication. The result becomes valid because there were no differences in the forest plot summary effect and the random effect model before using trim and Fill and after applying the Trim and Fill method.

The study indicated that alphabet knowledge, the subject of this study, leads to knowledge of letter names, letter sounds, letter writing, phonemic awareness, reading, and fluency. The indicators were the children's ability to pronounce the sounds of letters, pointing the letters to read, writing the letters A-Z, writing their names, pronouncing letter sounds, spelling letter sounds, spelling open syllables, closed syllables and double syllables, recognizing words, letter pronunciation, intonation, sound fluency, sound clarity, sound accuracy, spelling the name of objects that have the same letter sound, grouping similar/same words, and telling stories/reading about the provided pictures. The results of the study show that alphabet knowledge is also followed by other skills, namely phonology, spoken language, and written language skills which support early reading literacy and lead to independent reading skills (Cummings et al., 2011; Foulin, 2005; Hassett, 2006; Juel, 1988). Dodd (2016) stated that knowing letters is the initial step to reaching phonological awareness and the adult literacy stage (Dodd & Carr, 2016).

The results of the second analysis discussed the differences in effect size between students in rural and urban areas. As a result, the differences were not too significant. The mean of students' effect size in rural areas aged 4 to 5 years in alphabet knowledge was 50.42, with SD 16.29 and SE 4.07. meanwhile, the mean of students' effect size in urban areas aged 4 to 5 years in alphabet knowledge was 40.00 with SD 16.91 and SE 4.476. The study showed that the alphabetic knowledge of urban children was lower than that of rural children aged 4 to 5 years. The analysis showed that children who live in rural areas have teacher knowledge conditions that focus children on reading, writing, and arithmetic, and those support children to recognize letters and support them to read faster and have more reading. However, the exciting thing was that the mean of students' effect size in rural areas over five years, such as ages 5:1 to 6 years, was 2 points lower than children in urban areas. The ES of rural students was 52.79, SD = 27.53, and SE = 6.26, while the ES of urban students was 54.06, SD = 21.14, and SE = 4.082. The findings implied that the development of children's alphabet knowledge in urban areas at the age of 5-6 years grew more rapidly, although these children may have a late at the age of 4-5 years. We concluded that children aged 4-5 years and those aged 5-6 years who live in rural and urban areas experience the development of alphabet knowledge, although the development varies widely. We found out that age affects alphabet knowledge and skills—the more mature the child age, the higher their awareness of written language. The fact is like preparation that they need to face the wider community. But, it needs further research on the economic status of children in rural and urban areas (Carta et al., 2015), as well as the intensity of instruction provided by parents (families) and support to literacy (Borisova et al., 2017; Morrow et al., 2006) because the available data does not provide this information. The need for children aged 5-6 years to read is the most potent encouragement for children to have alphabet knowledge (Oncu & Unluer, 2015).

Based on the mean of alphabet knowledge at age 4 to 6 years, the alphabetical skills of Indonesian children were low (in this case, it obtained samples of research results from the provinces of Yogyakarta, Kalimantan, East Java, Riau, Bengkulu, Central Java, and Makassar). The score was below the standardized score of letter mastery, about 76 percent of the whole alphabet, and must be mastered by children at preschool age. At the same time, this study subject was children aged 4 to 6 years. The low mastery of the alphabet must be improved among children aged 4 to 5. One study that we managed to be mapped in preschoolers by age 3 to 4 years showed an ES score of 55.35, SD = 22.55, and SE = 4.9. These results are the same: the condition was below the standardized target for preschool-age children's alphabetical mastery (Dodd & Carr, 2016; Muter et al., 2004).

Some estimates of the low ability to recognize letters in children are due to several paradigm findings of kindergarten teachers that they are not allowed to teach children to read, write and count. In 2008 the government issued a letter advising that children in kindergarten should not be taught to read, write, count. However, based on the original letter, it found that the decision was understood in a limited way so that it was mistranslated. The decision should have read "kindergarten children may not be taught to read, write, count in a fragmented manner, but must be taught by playing." From this study, empirical evidence was obtained that a child's low knowledge of letters can also have an impact on early literacy skills. Early literacy skills are very influential on adult literacy. As we know, Indonesia has a literacy score below the world average based on the PISA and PIRLS tests. The results of this meta-analysis research can be used as evidence of the need to improve the quality of Indonesian children's learning in kindergartens to improve Indonesian children's literacy achievements. In addition, the curriculum for early childhood needs to be improved so that the target of mastering the alphabet of 76 percent in childhood can become a standard for the level of achievement of child development in the applicable curriculum.

Then, we seek the condition of children's alphabet mastery in the Yogyakarta area compared to other areas classified as low. However, the note was that the collected data for other regions was not as much as that from Yogyakarta with n = 1027 samples. Here, information on the alphabet knowledge among children of the same age, which we studied, needs to be added and conducted in other regions in Indonesia. Based on the number of samples in this study showed the research samples represent the number of samples at each level, both large, medium, and small samples, so there was no bias publication, proved by the no open circle in the funnel plot after bias publication analysis (Sterne & Harbord, 2004).

Conclusion

The results showed the children's alphabet knowledge was 50.16 with a lower limit of 43.15 and an upper limit of 57.23. This result was still below the standardized target of children's alphabet knowledge at preschool age 76. The findings in this study indicate that children's knowledge of letters in kindergarten needs to be improved. This knowledge is needed to prepare children to enter the stage of reading and writing independently. Then, this study suggests that policy makers improve the PAUD curriculum on literacy mastery in early childhood, starting with literacy at the age of 4-6 years.

This article recommends kindergarten teachers to design letter recognition learning strategies for children to improve their alphabet knowledge. Suggestions for further research can also be made. Similar research needs to be conducted in provinces and regions in Indonesia and complemented by demographic factors as factors inhibiting the growth of the ability to recognize the alphabet and literacy in children in regions in Indonesia. Other research topics that are similar in children's literacy knowledge can also be researched. The results of this research can be published internationally.

This research is limited to the ability of children to recognize the letters of the alphabet, which is part of the initial reading ability which many people study. In fact, in the initial reading ability research, not all research results provide specific data about the ability to recognize letters. For this reason, this research is limited to articles and research reports that present quantitative data to be analyzed because not all researchers present the data in their research results.

References

Andrews, J. F., & Baker, S. (2019). ASL nursery rhymes: Exploring a support for early language and emergent literacy skills for signing deaf children. *Sign Language Studies*, *20*(1), 5–40. https://doi.org/10.1353/sls.2019.0007

Bishop, D. V. M., & Adams, C. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *Journal of Child Psychology and Psychiatry*, *31*(7), 1027–1050. https://doi.org/10.1111/j.1469-7610.1990.tb00844.x

Bonifacci, P., Tobia, V., Bernabini, L., & Marzocchi, G. M. (2016). Early literacy and numeracy skills in bilingual minority children: Toward a relative independence of linguistic and numerical processing. *Frontiers in Psychology*, *7*, 1–14. https://doi.org/10.3389/fpsyg.2016.01020

Borisova, I., Pisani, L., Dowd, A. J., & Lin, H.-C. (2017). Effective interventions to strengthen early language and literacy skills in low-income countries: comparison of a family-focused approach and a pre-primary programme in Ethiopia. *Early Child Development and Care*, *187*(3–4), 655–671. https://doi.org/10.1080/03004430.2016.1255607

Boyle, S. A., McNaughton, D., & Chapin, S. E. (2019). Effects of shared reading on the early language and literacy skills of children with autism spectrum disorders: A systematic review. *Focus on Autism and Other Developmental Disabilities*, *34*(4), 205–214. https://doi.org/10.1177/1088357619838276

Burke, Mack D., & Hagan-Burke, S. (2007). Concurrent criterion-related validity of early literacy indicators for middle of first grade. *Assessment for Effective Intervention*, *32*(2), 66–77. https://doi.org/10.1177/15345084070320020401

Burke, MacK D., Hagan-Burke, S., Kwok, O., & Parker, R. (2009). Predictive validity of early literacy indicators from the middle of kindergarten to second grade gnet. *Journal of Special Education*, *42*(4), 209–226. https://doi.org/10.1177/0022466907313347

Can, D. D., Ginsburg-Block, M., Golinkoff, R. M., & Hirsh-Pasek, K. (2013). A long-term predictive validity study: Can the CDI short form be used to predict language and early literacy skills four years later? *Journal of Child Language*, *40*(4), 821–835. https://doi.org/10.1017/S030500091200030X

Carta, J. J., Greenwood, C. R., Atwater, J., McConnell, S. R., Goldstein, H., & Kaminski, R. A. (2015). Identifying preschool children for higher tiers of language and early literacy instruction within a response to intervention framework. *Journal of Early Intervention*, *36*(4), 281–291. https://doi.org/10.1177/1053815115579937

Catts, H. W., Fey, M. E., Zhang, X., & Tomblin, J. B. (2001). Estimating the risk of future reading difficulties in kindergarten children: A research-based model and its clinical implementation. *Language, Speech, and Hearing Services in Schools*, *32*(1), 38–50. https://doi.org/10.1044/0161-1461(2001/004)

Clemens, N. H., Hilt-Panahon, A., Shapiro, E. S., & Yoon, M. (2012). Tracing student responsiveness to intervention with early literacy skills indicators: Do they reflect growth toward text reading outcomes? *Reading Psychology*, *33*(1–2), 47–77. https://doi.org/10.1080/02702711.2011.630608

Cummings, K. D., Kaminski, R. A., Good, R. H., & O'Neil, M. (2011). Assessing phonemic awareness in preschool and kindergarten: Development and initial validation of first sound fluency. *Assessment for Effective Intervention*, *36*(2), 94–106. https://doi.org/10.1177/1534508410392209

Denton, C. A., Ciancio, D. J., & Fletcher, J. M. (2006). Validity, reliability, and utility of the

Observation Survey of Early Literacy Achievement. *Reading Research Quarterly*, *41*(1), 8–34. https://doi.org/10.1598/rrq.41.1.1

Dodd, B., & Carr, A. (2016). Young children's letter-sound knowledge. *American Journal of Speech-Language Pathology*, *34*(2), 128–137. https://doi.org/https://doi.org/10.1044/0161-1461(2003/011)

Duncan, L. G., & Seymour, P. H. K. (2000). Socio-economic differences in foundation-level literacy. *British Journal of Educational Psychology*, *91*, 145–166. https://doi.org/https://doi.org/10.1348/000712600161736

Elliott, J., Lee, S. W., & Tollefson, N. (2001). A reliability and validity study of the dynamic indicators of basic early literacy skills. *School Psychology Review*, *30*(1), 33–51. https://doi.org/10.1080/02796015.2001.12086099

Foulin, J. N. (2005). Why is letter-name knowledge such a good predictor of learning to read? *Reading and Writing*, *18*(2), 129–155. https://doi.org/10.1007/s11145-004-5892-2

Gandolfi, E., Traverso, L., Zanobini, M., Usai, M. C., & Viterbori, P. (2021). The longitudinal relationship between early inhibitory control skills and emergent literacy in preschool children. *Reading and Writing*, *34*(8), 1985–2009. https://doi.org/10.1007/s11145-021-10131-y

Goo, M., Myers, D., Maurer, A. L., & Serwetz, R. (2020). Effects of using an iPad to teach early literacy skills to elementary students with intellectual disability. *Intellectual and Developmental Disabilities*, *58*(1), 34–48. https://doi.org/10.1352/1934-9556-58.1.34

Harlaar, N., Hayiou-Thomas, M. E., Dale, P. S., & Plomin, R. (2008). Why do preschool language abilities correlate with later reading? A twin study. *Journal of Speech, Language, and Hearing Research*, *51*, 688–705. https://doi.org/10.1044/1092-4388(2008/049)

Harper, S. N., & Pelletier, J. P. (2008). Gender and language issues in assessing early literacy: group differences in children's performance on the test of early reading ability. *Journal of Psychoeducational Assessment*, *26*(2), 185–194. https://doi.org/10.1177/0734282908314105

Hassett, D. D. (2006). Signs of the times: The governance of alphabetic print over 'appropriate'' and "natural'' reading development."' *Journal of Early Childhood Literacy*, *6*(1), 77–103. https://doi.org/10.1177/1468798406062176

Hecht, S. A., & Close, L. (2002). Emergent literacy skills and training time uniquely predict variability in responses to phonemic awareness training in disadvantaged kindergartners. *Journal of Experimental Child Psychology*, *82*(2), 93–115. https://doi.org/10.1016/S0022-0965(02)00001-2

Henmi, M., & Copas, J. B. (2010). Confidence intervals for random effects meta-analysis and robustness to publication bias. *Statistics in Medicine*, *29*(29), 2969–2983. https://doi.org/10.1002/sim.4029

Invernizzi, M., Justice, L., Landrum, T. J., & Booker, K. (2004). Early Literacy Screening in Kindergarten: Widespread Implementation in Virginia. *Journal of Literacy Research*, *36*(4), 479–500. https://doi.org/10.1207/s15548430jlr3604_3

Joensuu, E., Munck, P., Setänen, S., Lipsanen, J., Huhtala, M., Lapinleimu, H., & Stolt, S. K. J. (2021). Associations between language at 2 years and literacy skills at 7 years in preterm children born at very early gestational age and/or with very low birth weight. *Children*, *8*(6), 510. https://doi.org/10.3390/children8060510

Juel, C. (1988). Learning to Read and Write: A Longitudinal Study of 54 Children From First Through Fourth Grades. *Journal of Educational Psychology*, *80*(4), 437–447. https://doi.org/10.1037/0022-0663.80.4.437

Justice, L., Logan, J., Kaderavek, J., Schmitt, M. B., Tompkins, V., & Bartlett, C. (2015).

Empirically based profiles of the early literacy skills of children with language impairment in early childhood special education. *Journal of Learning Disabilities*, *48*(5), 482–494. https://doi.org/10.1177/0022219413510179

Justice, L. M. (2001). Written Language Awareness in Preschool Children from Low-Income Households: A Descriptive Analysis. *Communication Disorders Quarterly*, *22*(3), 123–134. https://doi.org/10.1177/152574010102200302

Justice, L. M., Invernizzi, M. A., & Meier, J. D. (2002). Designing and implementing an early literacy screening protocol: Suggestions for the speech-language pathologist. *Language, Speech, and Hearing Services in Schools*, *33*(2), 84–101. https://doi.org/10.1044/0161-1461(2002/007)

Kaminski, R. A., Abbott, M., Bravo Aguayo, K., Latimer, R., & Good, R. H. (2014). The preschool early literacy indicators: Validity and benchmark goals. *Topics in Early Childhood Special Education*, *34*(2), 71–82. https://doi.org/10.1177/0271121414527003

Lonigan, C. J., Burgess, S. R., Anthony, J. L., & Barker, T. A. (1998). Development of phonological sensitivity in 2- to 5-year-old children. *Journal of Educational Psychology*, *90*(2), 294–311. https://doi.org/10.1037/0022-0663.90.2.294

Manten, A., le Roux, M., Geertsema, S., & Graham, M. (2020). An investigation into the early literacy skills of English second language learners in South Africa. *Australasian Journal of Early Childhood*, *45*(2), 142–154. https://doi.org/10.1177/1836939120918504

Mcgaw, B., & Glass, G. V. (1980). Choice of the metric for effect size in meta-analysis. *Amercan Educational Research Journal*, *17*(3), 325–337. https://doi.org/https://doi.org/10.3102/00028312017003325

Morrow, L. M., Kuhn, M. R., & Schwanenflugel, P. J. (2006). The family fluency program. *The Reading Teacher*, *60*(4), 322–333. https://doi.org/10.1598/rt.60.4.2

Munger, K. A., & Blachman, B. A. (2013). Taking a "simple view" of the dynamic indicators of basic early literacy skills as a predictor of multiple measures of third-grade reading comprehension. *Psychology in the Schools*, *50*(7), 722–737. https://doi.org/10.1002/pits.21699

Muter, V., Hulme, C., Snowling, M. J., & Stevenson, J. (2004). Phonemes, rimes, vocabulary, and grammatical skills as foundations of early reading development: Evidence from a longitudinal study. *Developmental Psychology*, *40*(5), 665–681. https://doi.org/10.1037/0012-1649.40.5.665

O'Callaghan, P., McIvor, A., McVeigh, C., & Rushe, T. (2016). A randomized controlled trial of an early-intervention, computer-based literacy program to boost phonological skills in 4- to 6-year-old children. *British Journal of Educational Psychology*, *86*(4), 546–558. https://doi.org/10.1111/bjep.12122

Oncu, E. C., & Unluer, E. (2015). Examination of preschool teachers' approaches to early literacy. *Procedia-Social and Behavioral Sciences*, *191*, 1043–1047. https://doi.org/10.1016/j.sbspro.2015.04.656

Purpura, D. J., Hume, L. E., Sims, D. M., & Lonigan, C. J. (2011). Early literacy and early numeracy: The value of including early literacy skills in the prediction of numeracy development. *Journal of Experimental Child Psychology*, *110*(4), 647–658. https://doi.org/10.1016/j.jecp.2011.07.004

Rohde, L. (2015). The comprehensive emergent literacy model : Early literacy in context. *SAGE Open*, *January-March*, 1–11. https://doi.org/10.1177/2158244015577664

Schatschneider, C., Fletcher, J. M., Francis, D. J., Carlson, C. D., & Foorman, B. R. (2004). Kindergarten prediction of reading skills: A longitudinal comparative analysis. *Journal of*

Educational Psychology, *96*(2), 265–282. https://doi.org/10.1037/0022-0663.96.2.265
Schmitt, K. L., Hurwitz, L. B., Sheridan Duel, L., & Nichols Linebarger, D. L. (2018). Learning through play: The impact of web-based games on early literacy development. *Computers in Human Behavior*, *81*, 378–389. https://doi.org/10.1016/j.chb.2017.12.036
Scott, J. A., Goldberg, H., Connor, C. M., & Lederberg, A. R. (2019). Schooling effects on early literacy skills of young deaf and hard of hearing children. *American Annals of the Deaf*, *163*(5), 596–618. https://doi.org/10.1353/aad.2019.0005
Sterne, J. A. C., & Harbord, R. M. (2004). Funnel plots in meta-analysis. *The Strata Journal*, *4*(2), 127–141. https://doi.org/https://doi.org/10.1177/1536867X0400400204
van Tilborg, A., Segers, E., van Balkom, H., & Verhoeven, L. (2014). Predictors of early literacy skills in children with intellectual disabilities: A clinical perspective. *Research in Developmental Disabilities*, *35*(7), 1674–1685. https://doi.org/10.1016/j.ridd.2014.03.025
Vehkavuori, S.-M., Kämäräinen, M., & Stolt, S. (2021). Early receptive and expressive lexicons and language and pre-literacy skills at 5;0 years – A longitudinal study. *Early Human Development*, *156*, 105345. https://doi.org/10.1016/j.earlhumdev.2021.105345
Wackerle-Hollman, A. K., Durán, L. K., & Miranda, A. (2020). Early literacy skill growth in spanish-speaking children with and at risk for disabilities in early childhood. *Topics in Early Childhood Special Education*, *40*(1), 24–38. https://doi.org/10.1177/0271121420906469
Westerveld, M. F., Gillon, G. T., van Bysterveldt, A. K., & Boyd, L. (2015). The emergent literacy skills of four-year-old children receiving free kindergarten early childhood education in New Zealand. *International Journal of Early Years Education*, *23*(4), 339–351. https://doi.org/10.1080/09669760.2015.1033617
Xu, Y., & De Arment, S. (2017). The effects of summer school on early literacy skills of children from low-income families. *Early Child Development and Care*, *187*(1), 89–98. https://doi.org/10.1080/03004430.2016.1151419

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