

## Local wisdom-infused experiential learning and its effects on reading literacy: a meta-analysis

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### ABSTRACT

Numerous meta-analysis studies have been undertaken on the topic of culturally embedded learning. Insufficient study has been undertaken on culturally integrated learning as a means to enhance reading abilities. The objective of this study is to assess and evaluate the impact of learning enriched by local culture on reading proficiency. This research was conducted using meta-analysis. The document search conducted using Google Scholar yielded 14 document papers published between 2019 and 2023. The research design included a contrast group with random effects model, incorporating a corrected effect size. The investigation employed Jeffreys's Amazing Statistics Program (JASP) software to compute means aggregate errors, generate forest plots, and assess publication bias. The research reported a statistically significant difference ( $SE=2.091$ ) between the groups that used local knowledge and standard methods in the learning process. The findings also indicated that incorporating local culture has a significant and favorable impact (with a p value of less than 0.05, namely 0.001) on reading proficiency. This demonstrates that incorporating local culture into the learning process is successful in enhancing students' reading proficiency. Therefore, this study recommends that teachers incorporate local culture as a subject in their teaching to enhance students' reading proficiency.

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## 1. INTRODUCTION

Values have a crucial part in forming the character of pupils in the realm of education. Education is meant to impart ideals that serve as a moral compass for pupils, influencing their conduct and actions. Value education is a deliberate and organized endeavor within the educational journey that molds the principles, ethics, and personality of learners as individuals who own values and self-worth [1]. Value functions as the standard by which society evaluates the moral quality of events or actions [2], [3]. It is essential to inculcate the significance of learning from an early age through the combined efforts of parents and educators, ensuring it becomes ingrained as a personal trait and is reflected in daily activities. Value education plays a crucial role in guiding students' behavior and actions throughout society. In classroom learning, it is important to align the values taught with the cultural values of the students. In order to acquire values in

education, students must have proficient reading skills [4]–[7]. Value education plays a crucial part in shaping pupils' character [8]. In order to achieve sustainable pleasure and success, individuals must align their lives with both universal and local values [9]. Character qualities can be instilled by everyday habituation or imparted through educational resources that incorporate local culture, poetry, and literature [8], [10]–[23]. Several more studies have documented the incorporation of value teaching using traditional games [24], local puppet figures [25], school parks [26], local folklore [27]–[30], and various elements from the students' daily environment [31]. Utilizing the surrounding environment or local culture as an educational tool can effectively impart positive values to students. In order to facilitate students' comprehension of the inherent values within it [32]. Acquiring values from educational resources undoubtedly necessitates proficiency in reading.

Reading is the act of acquiring messages or information [33], [34]. Through the act of reading, individuals can acquire information [35], [36]. Reading is a crucial cognitive requirement for children's academic achievement and their future success in society [37]. By engaging in reading, individuals can acquire proficiency in various other abilities [38]. Reading is an essential skill that must be acquired and is vital for life and overall well-being [39]–[42]. Thus, it is anticipated that by developing proficient reading abilities and utilizing the local culture and environment as educational tools, not only will reading proficiency improve, but also children will have a deeper understanding and appreciation of their local culture.

Currently, extensive study is being conducted on the impact of local culture on literacy. However, there is a scarcity of research that particularly examines how local culture can enhance reading proficiency. Prior studies have investigated the effect of incorporating local cultural elements on enhancing reading proficiency [43]–[48]. However, there is limited evidence on the efficacy of incorporating local culture into learning as opposed to traditional generic learning methods. This study investigates the impact of incorporating local culture on the process of learning to read. This research objectives to analyze, and evaluate the impact of incorporating local culture into the learning process on reading proficiency, specifically comparing it to standard learning methods. The aim of this meta-analysis research is to provide a comprehensive summary that may be utilized to develop educational strategies that enhance students' reading abilities in a learning environment that closely aligns with their everyday lives, particularly their local culture.

## 2. METHOD

The present work is a meta-analysis that consolidates the results of research identified from the Google Scholar database and presents a comprehensive global conclusion [49]–[53]. The focus of this study is the influence of acquiring knowledge about the local culture on one's reading abilities. According to the author's research on the Google Scholar database, there are a total of 14 studies that specifically examine the correlation between local culture and reading proficiency. Each of the 14 articles was further modified to meet the required inclusion criteria: i) the manuscript was selected from journals published from 2019 to 2023; ii) the article investigates the influence of local culture on reading proficiency within the learning environment; iii) the article underwent quantitative analysis; iv) the data was presented in the form of average, standard deviation, and sample size; and v) the article is published in Google Scholar indexed journal.

Papers that did not adhere to the five inclusion criteria were classified as belonging to the category of papers that satisfied the exclusion criteria. Excluded from the meta-analysis approach were the publications that did not meet the criteria for inclusion [54]. All 14 articles obtained from the Google Scholar database met the stipulated requirements. For both the control and experimental groups, these papers provided details on the sample size, standard deviation, and mean research results [55]. The effect size ( $g$ ) and standard error ( $Seg$ ) values will be calculated using the three data points and then analyzed using the Jeffreys's Amazing Statistics Program (JSAP).

The present study utilizes a random effect model to facilitate the extrapolation of the research results to the broader population, rather than exclusively depending on the data findings for making discoveries. The selection of a random effects model is determined by the degree of heterogeneity, particularly when the  $I^2$  statistic exceeds 25% [56]. The present study does a meta-analysis that centers on the utilization of local culture as a means to augment students' reading proficiency among traditional teaching approaches. The obtained data displays variation intervals, which represent the ranges across which the minimum and maximum values fall. Hence, it is imperative to standardize the raw data. The sample mean/effect size ( $d$ ) [55] is standardized using (1).

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s_{within}}, S_{within} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)}} \quad (1)$$

The standard error  $d$  ( $SE_d$ ) can be calculated using (2).

$$SE_d = \sqrt{v_d}, \text{ with } v_d = \frac{n_1+n_2}{n_1n_2} + \frac{d^2}{2(n_1+n_2)} \quad (2)$$

Hedges [57] demonstrated that the resultant  $d$  values exhibit a minor bias. In order to reduce bias, Hedges is converted into  $g$  using (3) and (4).

$$g = J \times d, \text{ with } J = 1 - \frac{3}{4df-1} \quad (3)$$

$$Df = \text{degree of freedom } (n_1 + n_2 - 2) \\ SE_g = \sqrt{v_g}, \text{ with } v_g = J \times v_d \quad (4)$$

The input data consists of the effect size and  $SE_g$ , which will be used to create a forest plot displaying interval values and standard errors for each study, along with their respective conclusions [58]. Furthermore, JASP facilitates the computation of heterogeneity and publication bias (by funnel plot analysis) [59]. Therefore, it may be inferred that local culture has a positive impact on the learning process.

### 3. RESULTS AND DISCUSSION

This research analyzed 14 papers that satisfied the specified criteria for inclusion. Several studies have determined that students can enhance their reading abilities through the use of resources that cultivate their cultural awareness and drive them to learn [60], [61]. The process of acquiring a language can be enhanced by incorporating the cultural norms and practices of the local culture into the learning environment [46]. Utilizing reading texts that are based on local knowledge is an efficient method to enhance learner comprehension [62], implementing literacy modules that are based on local wisdom leads to exceptional academic achievements among students [63]. It is viable to utilize e-modules [64] that are rooted in the indigenous knowledge of spice drinks to enhance students' proficiency in reading and science [65]. The impact of employing a contextual learning strategy that is rooted in local wisdom on students' listening abilities is significant [66]. In order to enhance the early reading skills of first-grade elementary school students, it is advisable to utilize text flattening media that is based on local wisdom [47]. Textbooks that are based on local wisdom are more efficacious than teaching materials that do not incorporate local wisdom in enhancing students' reading and writing abilities [43].

Utilizing folktales in EFL instruction might enhance students' reading proficiency and broaden their vocabulary, while also facilitating the acquisition of cultural knowledge by the students [67]. Utilizing local culture-based picture storybook media is an effective method for enhancing kids' reading comprehension skills [68]. Creating storybooks that draw from Rembang traditions proves to be an excellent method for enhancing children's reading proficiency in the context of Indonesian language education [69]. The utilization of learning media [70]–[72] based on local wisdom is suitable for enhancing initial reading abilities [47]. Teachers should employ strategies and methodologies such as experiential learning, hands-on activities, and real-world applications to include the local culture and contextualization into the process of teaching and learning [73]. The feasibility of utilizing educational gaming media that incorporates local wisdom to enhance students' first reading abilities has been confirmed [74]. Utilizing indigenous knowledge and local wisdom in literacy teaching materials enhances educational achievements [75]. Teaching resources that are based on local wisdom in English reading have been found to effectively enhance the reading skills of deaf students [76].

The integration of local culture into schooling generally serves to augment students' reading competence. The present study undertaken a comparative analysis between the control group and the experimental group, both of which were subjected to the indigenous culture. Based on the sample size data, mean, and standard deviation shown in Table 1, the researcher computed the effect size and standard error. As indicated in Table 1, a heterogeneity test will be conducted to determine the suitability of the model for the given data. In Table 2, the results of the heterogeneity test are presented.

This study uses a random effect model such that the data have to satisfy the assumption of heterogeneity. One technique available to measure heterogeneity is  $I^2$ . On a range of 0% to 100%,  $I^2$  shows the percentage of fluctuation in the size of the summary effect. The data gathered in this study displayed in Table 2 showed  $P=96.239\% > 25\%$ , thus it is said that there is heterogeneity so that the choice of the random effect model is in line with the criteria. Then, the forest plot in Figure 1 helps one to summarize the general impact [45], [68], [69], [73], [77]–[85]. The  $p$  value reveals the typical effect size among the 17 data from 14 articles. With an average size of 2.091, the  $p$  value in Table 3 is less than alpha (0.05) which is less than 0.001; so, it can be inferred that studying with local culture greatly enhances reading abilities when compared to conventional learning.

Table 1. Summary of effect sizes and standard errors

ID articles	ID	N	With local wisdom		N	Conventional		Esg	SEg
			SD	M		SD	M		
Article 1	[68]	10	2.506	34.5	10	1.506	26.6	3.659810235	0.735647739
Article 2	[69]	10	3.026	34.4	10	1.829	26.7	2.949632986	0.647034483
Article 3	[73]	16	2.33	17.63	16	4.47	12.63	1.367399468	0.3896404
Article 4	[77]	52	4.579	83.83	52	3.785	76.25	1.791117199	0.231767408
Article 5	[78]	17	9.8	86.47	17	13.58	77.94	0.703314086	0.349740275
Article 6	[79]	25	1.62	16.18	25	1.57	18.14	-1.209390423	0.305946245
Article 7	[80]	26	2.21	4.33	23	2.037	3.51	0.378663437	0.286552325
Article 8	[81]	20	2.98866	27.248	20	2.33317	18.3465	3.254223609	0.482774436
Article 9	[82]	33	4.932	27.485	30	1.999	7.733	5.095022975	0.521010479
Article 10	[82]	30	5.595	27.067	30	1.999	7.733	4.542260804	0.489895504
Article 11	[45]	26	10.194	75.65	23	13.357	61.35	1.194370859	0.308899552
Article 12	[45]	26	10.385	79.62	23	10.789	64.62	1.395548366	0.317525253
Article 13	[83]	31	5.893	82.26	31	4.356	78.39	0.737469539	0.261051787
Article 14	[84]	58	2.33	83.2	56	3.41	72.05	3.804765255	0.314299599
Article 15	[85]	27	7.8	80.27	25	7.8	80.27	0	0.275455395
Article 16	[85]	50	1.07	14.67	50	1.36	10.85	3.097926932	0.296731992
Article 17	[85]	50	1.12	15.14	50	1.36	10.85	3.41716856	0.313894459

Notes: i) M represents the mean of each data point in the research sample; n represents the number of data points in the research sample; SD represents the standard deviation exhibited in the research sample; ESg represents the effect size, a quantitative measure used to summarize study results in meta-analysis. Specifically, effect size measures the extent of the correlation between variables in each study. In this study, it indicates the disparity between learning with and without local culture. The genuine effect size interval is determined using SEg = standard error as the fundamental value.

Table 2. Estimations of residual heterogeneity

Term	Estimate	95% confidence interval	
		Lower	Upper
$\tau^2$	2.898	1.537	6.942
$\tau$	1.702	1.240	2.635
$I^2$ (%)	96.239	93.137	98.395
$H^2$	26.592	14.571	62.302

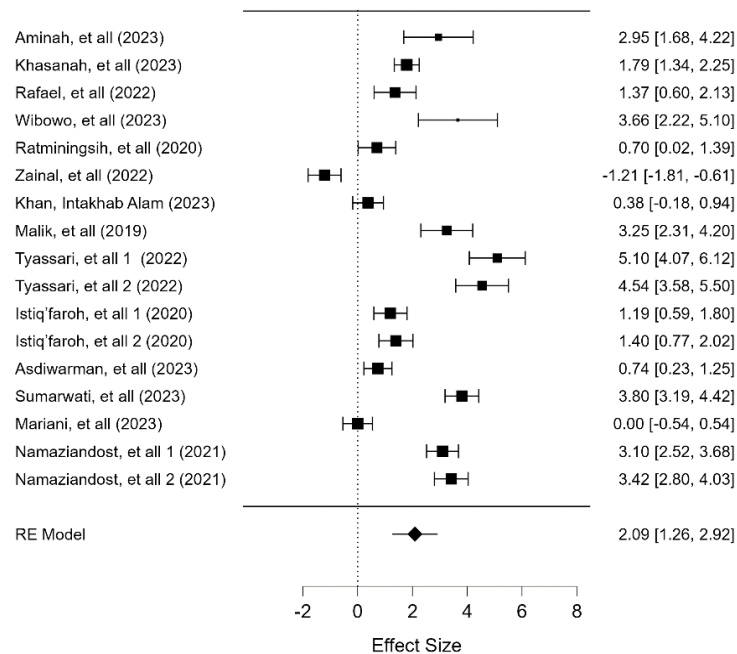


Figure 1. Forest plot

Table 3. Coefficients

Constant term	Estimate	Standard error	z	p	95% confidence interval	
					Lower	Upper
intercept	2.091	0.424	4.929	< .001	1.260	2.922

Note: Wald test.

The forest plot data reveals a summary effect of 2.091. This finding indicates that students who learn by means of local culture-enhanced learning have 209.1% higher learning results than those who employ standard learning approaches. Furthermore, it is known from a confidence interval of 0.95% that the summary effect range is 1.260 to 2.922 hence it does not have a zero value. The findings indicate that students who learn by means of local culture-enhanced learning have 209.1% higher learning results than those who employ standard learning approaches. Furthermore, it is known from a confidence interval of 0.95% that the summary effect range is 1.260 to 2.922 hence it does not have a zero value. This indicates that students who study using conventional learning and local cultural content have somewhat different experiences. We shall then examine the publication bias in the meta-analysis. Since a meta-analysis can be regarded as biased if it only takes studies with the desired results and does not show the results of studies that accept the null hypothesis or provide negative conclusions (contrary to theory/not as expected), this analysis is quite important to show the validity of the conclusions in the research.

This meta-analysis can be analyzed using the trim and fill approach to identify publication bias. The trim and fill method [56], utilizes an iterative procedure to exclude the most extreme and relatively small studies from the positive side of the funnel plot. As a result, the computed effect size is recalculated, the variance of the effect is reduced, and a narrower confidence interval is generated. In Figure 2, the results of the trim and fill analysis performed using JASP software are displayed.

Figure 2 shows that the funnel plot using the random effects model does not display any open points. The data presented confirms the absence of any missing (unpublished) studies. Thus, the assertion that local culture-enhanced learning has a favorable impact in comparison to conventional learning is devoid of any potential bias. In order reinforce this argument, the findings of the initial forest plot illustrated in Figure 1 will be compared with the forest plot utilizing the trim and fill method.

The data for the publishing bias test can be observed by referring to Tables 4 and 5. The purpose of the test is to determine if the acquired data can accurately represent the entire population. This is assessed by analyzing the rank correlation value and conducting a regression test for funnel plot asymmetry [43], [44]. Kendall's rank correlation coefficient, with a value of 0.368, indicates the association between effect magnitude and variation. The p-value of 0.042 is greater than 0.001, indicating that the null hypothesis ( $H_0$ ) is rejected. In other words, there is no evidence of publication bias. The Table 5 displays the z value, which represents the magnitude of the regression coefficient, as 2.645. Additionally, the p-value is 0.008, which is greater than 0.001. This suggests that the  $H_0$  hypothesis is rejected, meaning there is no evidence of publication bias.

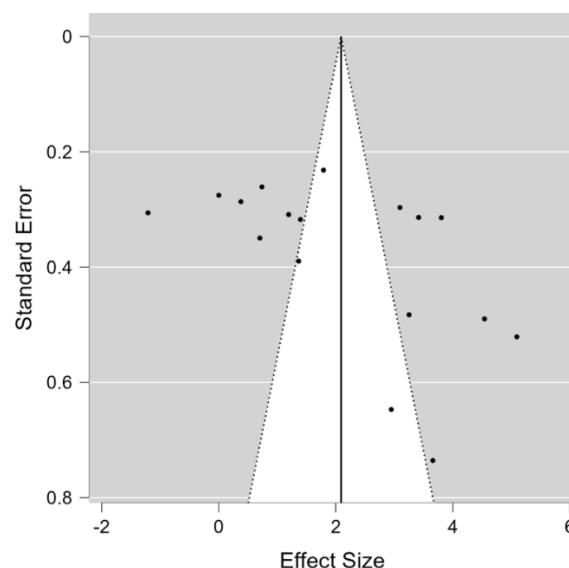


Figure 2. Funnel plot of trim and fill method

Table 4. Rank correlation test for Funnel plot

asymmetry		
	Kendall's $\tau$	p
Rank test	0.368	0.042

Table 5. Regression test for Funnel plot asymmetry

("Egger's test")		
	z	p
Sei	2.645	0.008

There is no difference in the forest plot images between the original one and the one generated using the trim and fill approach, regardless of the specified sample data interval. This comparison reinforces the earlier point that there is no evidence of bias in the meta-analysis. Hence, the assertion that incorporating local culture into the learning process enhances reading abilities more efficiently than conventional learning methods is valid.

Various studies have been undertaken independently, both temporally and spatially [86]. Therefore, their conclusions lack sufficient strength to be considered applicable on a wide scale. This study yielded comprehensive conclusions as it synthesized several investigations. The meta-analysis yields a broad and overarching conclusion. Furthermore, it is worth noting that local culture, in its ordinary state, can serve as a valuable educational asset that enhances the overall quality of the learning experience, thereby positively influencing students' reading proficiency. This discovery can be utilized to emphasize the need of using local culture as a learning tool for different subjects, particularly to enhance reading skills.

#### 4. CONCLUSION

The analysis shows a notable disparity in reading ability between groups that incorporate local culture into their learning and those that do not. Specifically, the group of students who integrate local culture into their learning process demonstrate greater reading ability compared to the group that does not. The Forrest plot data indicates a summary effect of 2.091, suggesting that reading ability is 209.1% greater for students using local culture-enhanced learning compared to those using conventional learning models. Furthermore, at a confidence level of 0.95%, the summary effect interval spans from 1.260 to 2.922, indicating that it does not include a value of zero.

This shows a significant difference in the reading ability of students who receive an education with local culture against those who follow conventional methods of learning. In order to assess the presence of publication bias, the trim and fill approach can be employed. This method reveals that there is no indication of publication bias in the meta-analysis. Therefore, the assertion that local cultural learning is more effective to conventional learning in enhancing reading ability is unbiased. The analytical results unequivocally demonstrate the imperative of incorporating local culture into all facets of education. It is imperative for schools and all stakeholders, including teachers, parents, students, and the wider community, to recognize and determine the specific values embedded in the local culture that should be incorporated into the school curriculum. By aligning the learning materials with the local culture, it is anticipated that the learning process would be enhanced and students' reading literacy will be elevated.

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