Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11, 757-765
2025
Publisher: Learning Gate
DOI: 10.55214/2576-8484.v9i11.10988

Empowering mothers in education: An assessment of the impact of enhanced maternal literacy approach for teaching essential skills

Hanissa F. Baraguir[1*], Mary Thallasah Nicole T. Alava[2], Bai Tanto D. Minandang[3], Ana Margarita Agao-Agao[3], Pinky A. Gumogda[1], Datulabi P. Untong Jr.[1], Adelaida A. Edris[4], Usman B. Malim[5], Ana Trisha F. Siocon[6], Sadat G. Blah[7], Datu Duma Sinsuat IV[7]
[1]Science Department, College of Education, Mindanao State University-Maguindanao, Philippines; hfbaraguir@msumaguindanao.edu.ph (H.F.B.).
[2]Languages Department, College of Arts and Sciences, Mindanao State University-Maguindanao, Philippines.
[3]English Department, College of Education, Mindanao State University-Maguindanao, Philippines.
[4]Natural Sciences Department, College of Arts and Sciences, Mindanao State University Maguindanao, Philippines.
[5]Mathematics Department, College of Arts and Sciences, Mindanao State University Maguindanao, Philippines.
[6]Social Science Department, College of Education, Mindanao State University-Maguindanao, Philippines.
[7]College of Engineering and Computing Sciences, Mindanao State University-Maguindanao, Philippines.

Abstract: This study examined the effectiveness of two Enhanced Maternal Literacy Approaches (EMLA) using the Montessori method and the Reggio Emilia method in improving children's foundational skills in reading, writing, and arithmetic (3Rs). A quasi-experimental design with pre- and post-tests was employed, involving fifty (50) mothers and their children in a rural community in Maguindanao del Norte. Twenty-five mothers were trained to implement the Montessori EMLA, while the other twenty-five adopted the Reggio Emilia EMLA. The children's performances were assessed using the Early Grade Reading Assessment (EGRA), Early Grade Writing Assessment (EGWA), and Early Grade Mathematics Assessment (EGMA). Results revealed that both approaches significantly enhanced children's 3Rs performance. The Montessori group showed greater improvement in writing skills, while the Reggio Emilia group demonstrated stronger gains in arithmetic. No significant difference was observed in reading performance between the two groups. The findings indicate that both approaches are effective, but each possesses distinct strengths that complement one another. The study highlights the potential of structured maternal literacy interventions in enhancing children's foundational skills and recommends further integration of both approaches in early childhood education programs.

Keywords: *3Rs, Children's performance, Maternal literacy, Montessori, Reggio Emilia.*

1. Introduction

Parental involvement in children's education is widely acknowledged as a critical component in fostering academic success and lifelong learning [1, 2]. Among various forms of parental involvement, maternal engagement plays a particularly influential role [3], especially during the early stages of a child's educational journey [4]. Research has consistently shown that children whose mothers are actively involved in their education tend to exhibit higher academic performance, better cognitive skills, and more positive attitudes towards learning [5, 6]. This involvement is essential in developing fundamental skills [7] such as reading, writing, and arithmetic, collectively referred to as the 3Rs, which form the cornerstone of a child's educational foundation.

Despite the recognized importance of maternal involvement, many mothers, especially those from disadvantaged backgrounds, face significant challenges that impede their ability to effectively

History: Received: 16 September 2025; Revised: 16 October 2025; Accepted: 20 October 2025; Published: 12 November 2025
* Correspondence: hfbaraguir@msumaguindanao.edu.ph

support their children's learning [8]. These challenges include limited educational resources [9], low literacy levels [10], and competing demands on their time [11, 12]. Addressing these barriers is crucial to harnessing the full potential of maternal involvement in enhancing children's educational outcomes. Hence, the Enhanced Maternal Literacy Approach (EMLA), integrating Montessori and Reggio Emilia approaches, has been developed to empower mothers by improving their literacy skills and equipping them with effective teaching strategies. The EMLA is designed to enhance mothers' capacity to support their children's learning of the 3Rs, thereby directly contributing to their academic success. This approach is grounded in the belief that literate and confident mothers are better positioned to create enriching learning environments at home, engage in meaningful educational activities with their children, and serve as positive role models.

This study aimed to assess the impact of the Montessori and Reggio Emilia Enhanced Maternal Literacy Approaches on children's foundational reading, writing, and arithmetic (3Rs) skills. The impact of these approaches was measured through the Early Grade Reading Assessment (EGRA), Early Grade Writing Assessment (EGWA), and Early Grade Mathematics Assessment (EGMA).

1.1. Statement of the Problem

1. What is the impact of the Montessori Enhanced Maternal Literacy Approach on children's performance based on their pre- and post-tests on the fundamental 3Rs?
2. What is the impact of the Reggio Emilia Enhanced Maternal Literacy Approach on children's performance based on their pre- and post-tests on the fundamental 3Rs?
3. Is there a significant difference between the mean gain scores of children under Montessori and Reggio Emilia's Enhanced Maternal Literacy Approaches?

1.2. Research Hypotheses

Ho_1: There is no significant difference between the mean gain scores of children under Montessori and Reggio Emilia's EMLA in terms of reading skills.

Ho_2: There is no significant difference between the mean gain scores of children under Montessori and Reggio Emilia's EMLA in terms of writing skills.

Ho_3: There is no significant difference between the mean gain scores of children under Montessori and Reggio Emilia's EMLA in terms of arithmetic skills.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

1.3. Conceptual Paradigm

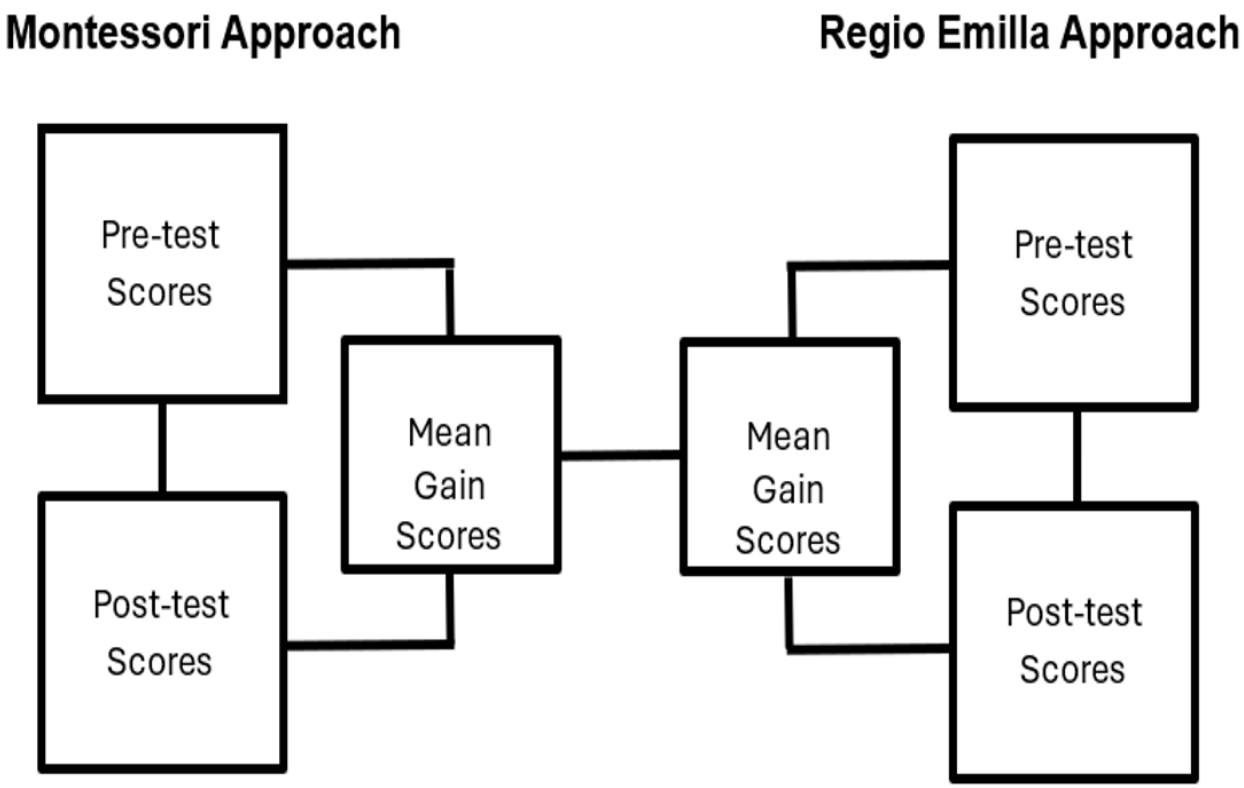

Figure 1.
Conceptual Paradigm of the Study.

The pre- and post-test results of the children under Montessori EMLA are represented by the two boxes on the left side of Figure 1. The line connecting the two boxes shows the procedure for assessing the intervention's effectiveness, which is represented by the mean gain score in the third box. The figure's rightmost two boxes also show the pre- and post-test results of children participating in the Reggio Emilia EMLA scheme, with a line connecting them to illustrate the effect of the intervention. The mean gain score, which is the difference between the pre- and post-test scores as indicated by the lines joining them, is displayed in the third box on the right side of the figure. To assess which approach produces better learning results, the line connecting the two boxes in the center of the figure displays the difference between the mean gain scores of the children under Montessori EMLA and Reggio Emilia EMLA.

2. Research Methodology

This study employed a quasi-experimental design utilizing a pre-test and post-test approach to assess the impact of the Montessori and Reggio Emilia approaches on children's fundamental reading, writing, and arithmetic (3Rs) skills.

The study was conducted in Barangay Penansaran, Datu Blah Sinsuat (DBS), Maguindanao del Norte, a rural community where interventions to strengthen maternal involvement in early childhood education were implemented. The participants of the study consisted of fifty (50) mothers who received training on either the Montessori (n=25) or Reggio Emilia (n=25). The children of these mothers were assessed on their learning progress in reading, writing, and arithmetic. A purposive sampling technique was employed to select the participants, ensuring that

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

all mothers had at least one child in the early grade levels (Kindergarten to Grade 2), were willing to undergo training and implement the assigned teaching approach, and were provided written informed consent for participation in the study, including permission for their children's assessment.

2.1. Research Instruments

Early Grade Reading Assessment (EGRA), Early Grade Mathematics Assessment (EGMA), and Early Grade Writing Assessment (EGWA) were used to measure reading, numeracy, and writing skills before and after the intervention.

2.2. Research Procedures

Before any training, children were assessed using EGRA, EGMA, and EWGA to establish baseline data on their reading and numeracy skills. The 50 participating mothers were divided into two groups (25 per approach) and trained separately on how to teach their children using either the Montessori Approach or the Reggio Emilia Approach. Mothers taught their children at home using the assigned approach for one month per literacy component. After one month of reading instruction, children were assessed again using the EGRA. Mothers were then trained on how to teach writing, followed by another one-month home-based instruction, before conducting another post-test using EGWA. The process was repeated for arithmetic instruction, with final assessments conducted using EGMA.

2.3. Data Analysis

Descriptive statistics, such as mean, standard deviation, percentage, and frequency, were used to analyze pre-test and post-test scores and responses from the acceptability questionnaire. The coefficient of variation (CV) was also used to compare the relative variation of the children's post-test performance in 3Rs under Montessori and Reggio Emilia approaches. A paired sample t-test was used to determine the impact of each approach by comparing pre-test and post-test scores, while an independent sample t-test was used to compare the mean gain scores between the Montessori and Reggio Emilia groups.

2.4. Ethical Considerations

The study adhered to ethical research principles, ensuring voluntary participation, confidentiality, and informed consent. Written consent forms were provided to and signed by all participating mothers, outlining the study's purpose, procedures, potential risks, and benefits. Separate parental consent was obtained for the assessment of their children. All data were kept strictly confidential, and participant identities were anonymized in all research reports and publications. Participants were informed of their right to withdraw from the study at any stage without any consequences. The research protocol was reviewed and approved by the institutional ethics committee to ensure compliance with ethical standards in human research.

3. Results and Discussions

This section analyzes the pre-test and post-test results to determine the effectiveness of the Enhanced Maternal Literacy Approach (EMLA) in improving children's proficiency in reading, writing, and arithmetic. The data gathered provides insights into the extent of progress achieved by the children after implementing the intervention. Comparisons between pre-test and post-test scores highlight the impact of maternal engagement in reinforcing foundational learning skills, shedding light on its potential as a complementary strategy for early childhood education.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

Table 1.
Pre-test and Post-test Scores of Children Under the Montessori EMLA in Terms of Reading, Writing (26 items), and Arithmetic (170 items).

Reading Score	**Pre-test**		**Post-test**		**Description**
	f	**%**	**f**	**%**	
25 - 26	1	5.26	2	10.53	Excellent
20 - 24	1	5.26	6	31.58	Very Good
15 - 19	0	0.00	1	5.26	Good
10 - 14	0	0.00	3	15.79	Satisfactory
5 - 9	1	5.26	3	15.79	Poor
0 - 4	16	84.21	4	21.05	Very Poor
Total	19	100	19	100	
Mean	**3.05**	(Very Poor)	**13.79**	(Satisfactory)	
Sd	7.69		9.46		
Writing Score	f	%	f	%	Description
25 - 26	2	10.53	5	26.32	Excellent
20 - 24	0	0.00	6	31.58	Very Good
15 - 19	2	10.53	3	15.79	Good
10 - 14	1	5.26	2	10.53	Satisfactory
5 - 9	2	10.53	1	5.26	Poor
0 - 4	12	63.16	2	10.53	Very Poor
Total	19	100	19	100	
Mean	**6.84**	(Poor)	**18.26**	(Good)	
Sd	8.5		8.33		
Arithmetic Score	f	%	f	%	Description
145 – 170	0	0.00	5	29.41	Excellent
116 – 144	0	0.00	5	29.41	Very Good
87 – 115	0	0.00	1	5.88	Good
58 – 86	3	17.65	1	5.88	Satisfactory
29 – 57	4	23.53	1	5.88	Poor
0 – 28	10	58.82	4	23.53	Very Poor
Total	**17**	**100**	**17**	**100**	
Mean	28.71	(Poor)	100.06	(Good)	
Sd	23.93		64.19		

Table 1 shows that 16 out of 19 learners under the Montessori Enhanced Maternal Literacy Approach (84.21%) demonstrated very poor reading performance in the pre-test, as revealed by the mean of 3.05 and a standard deviation of 7.69. After the intervention, the average score increased to 13.79, described as satisfactory, with a notable shift from very poor to very good performance (31.58%) and 10.53% in excellent reading performance. The mean gain score of 10.74 points highlights the approach's effectiveness in addressing literacy gaps and fostering substantial progress among children. While there is room for further improvement, the results demonstrate EMLA's potential as a transformative literacy strategy.

Moreover, there was a significant improvement in children's writing performance after the intervention using the Montessori EMLA. The pre-test results show that 12 out of 19 children (63.16%) scored within the lowest range (0–4), indicating very poor performance in writing. However, in the post-test, a notable shift is observed, with 26.32% of children achieving an "Excellent" rating (25–26) and 31.58% attaining a "Very Good" score (20–24). The mean score increased from 6.84 (Poor) to 18.26 (Good), reflecting a mean gain of 11.42 points. Additionally, the standard deviation slightly decreased from 8.5 to 8.33, suggesting a more consistent performance among children. Hence, the results suggest that the Montessori EMLA had a positive impact on enhancing children's writing skills.

In addition, Table 1 also shows a significant improvement in children's arithmetic skills under the Montessori EMLA. The mean score increased from 28.71 (Poor) to 100.06 (Good). A higher

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

percentage of pupils moved to the "Excellent" and "Very Good" categories, indicating the effectiveness of the Enhanced Maternal Literacy Approach. However, the increased standard deviation and coefficient of variation suggest varying individual progress with arithmetic skills [13]. This agrees with the findings that the Montessori approach has significantly enhanced learners' reading skills [14], writing skills [15, 16], and arithmetic skills [17].

Table 2.
Pret-test and Post-test Scores of Children Under Reggio Emilia EMLA in Terms of Reading, Writing (26 items), and Arithmetic (170 items).

Reading Score	Pre-test		Post-test		Description
	F	%	F	%	
25 - 26	1	4.76	4	19.05	Excellent
20 - 24	3	14.29	7	33.33	Very Good
15 - 19	3	14.29	3	14.29	Good
10 - 14	1	4.76	0	0.00	Satisfactory
5 - 9	1	4.76	2	9.52	Poor
0 - 4	12	57.14	5	23.81	Very Poor
Total	21	100	21	100	
Mean	8.5	(Poor)	16.36	(Good)	
Sd	9.34		10.43		
Writing Score	F	%	f	%	Description
25 - 26	6	28.57	12	57.14	Excellent
20 - 24	5	23.81	1	4.76	Very Good
15 - 19	2	9.52	3	14.29	Good
10 - 14	2	9.52	1	4.76	Satisfactory
5 - 9	0	0.00	1	4.76	Poor
0 - 4	6	28.57	3	14.29	Very Poor
Total	21	100	21	100	
Mean	15.47	(Good)	18.14	(Good)	
Sd	10.27		10.08		
Arithmetic Score	F	%	f	%	Description
145 – 170	0	0.00	5	26.32	Excellent
116 – 144	0	0.00	7	36.84	Very Good
87 – 115	0	0.00	0	0.00	Good
58 – 86	1	5.26	3	15.79	Satisfactory
29 – 57	5	26.32	2	10.53	Poor
0 – 28	13	68.42	2	10.53	Very Poor
Total	19	100	19	100	
Mean	18.84	(Very Poor)	102.21	(Good)	
Sd	19.37		50.84		

Table 2 shows the children's reading performance under the Reggio Emilia Enhanced Maternal Literacy Approach. The mean score increased from 8.5 (Poor) in the pre-test to 16.36 (Good) in the post-test, with a mean gain of 7.86 points. The proportion of children in the "Very Poor" category decreased from 57.14% to 23.81%, while those in the "Excellent" category increased from 4.76% to 19.05%. Although the standard deviation slightly increased (9.34 to 10.43), indicating greater score dispersion. Overall, the results show significant improvement in children's reading performance; thus, the Reggio Emilia EMLA enhances reading skills.

In addition, there was an increase in the pre-test mean from 15.47 (Good) to 18.14 (Good) in the post-test. Notably, the proportion of pupils in the "Excellent" category rose from 6 (28.57%) to 12 (57.14%), while those in the "Very Poor" category decreased from 6 (28.57%) to 3 (14.29%). The standard deviation remained relatively stable (10.27 to 10.08). These results suggest that the Reggio Emilia approach contributed to an improvement in writing skills and literacy.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

Furthermore, there was a substantial improvement in children's arithmetic performance under the Reggio Emilia approach. The mean score increased from 18.84 (Very Poor) in the pre-test to 102.21 (Good) in the post-test. The proportion of pupils in the "Very Poor" category dropped significantly from 13 (68.42%) to 2 (10.53%), while those in the "Excellent" and "Very Good" categories increased to 5 (26.32%) and 7 (36.84%), respectively. The standard deviation rose from 19.37 to 50.84, indicating a wider dispersion of scores. The post-test results suggest that the Reggio Emilia EMLA had a remarkable impact on the arithmetic skills of the children.

The findings agree with Elui et al. [18] that the Reggio Emilia approach had significant effects on the achievement and interest of learners in emergent literacy, writing [19], and an effective way to teach number concepts to young children [20].

Table 3.
Post-test mean scores, standard deviation, and coefficient of variation between Montessori and Reggio Emilia's EMLA in terms of 3Rs.

Children's Reading Performance Under Montessori (n = 19)			Children's Reading Performance Under Reggio Emilla (n = 21)		
Mean	13.79	(Satisfactory)	Mean	16.36	(Good)
Sd	9.46		Sd	10.43	
C.V.	**68.60%**		**C.V.**	**63.75%**	
Children's Writing Performance Under Montessori (n = 19)			Children's Writing Performance Under Reggio Emilla (n = 21)		
Mean	18.26	(Good)	Mean	18.14	(Good)
Sd	8.33		Sd	10.08	
C.V.	**45.62%**		C.V.	55.57%	
Children's Arithmetic Performance Under Montessori (n = 19)			Children's Arithmetic Performance Under Reggio Emilla (n = 21)		
Mean	100.06	(Good)	Mean	102.21	(Good)
Sd	64.19		Sd	50.84	
C.V.	**64.15%**		**C.V.**	**49.52%**	

Table 3 compares post-test mean scores, standard deviations, and coefficients of variation (CV) between children under the Montessori and Reggio Emilia EMLA across reading, writing, and arithmetic. In reading, the Reggio Emilia group achieved a higher mean (16.36, Good) compared to the Montessori group (13.79, Satisfactory), with a lower CV (63.75% vs. 68.60%), suggesting more consistent performance. In writing, both approaches resulted in similar mean scores (18.14 vs. 18.26, both Good), but Montessori EMLA had lower variability (CV 45.62% vs. 55.57%). In arithmetic, the Reggio Emilia group had a slightly higher mean (102.21 vs. 100.06, both Good) and significantly lower variability (CV 49.52% vs. 64.15%), indicating more stable performance. Overall, the Reggio Emilia EMLA showed advantages in reading and arithmetic [18] with lower score dispersion, while writing performance remained comparable between the two methods.

This aligns with the view that these approaches have evolved globally, carrying a rich history of promoting children's educational freedom and supporting the foundational basic learning [21, 22].

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988

Table 4.
Test Results for Children's Mean Gain Scores in 3Rs Under Montessori and Reggio Emilia EMLA.

Group	N	Mean Gain	Sd	t-test	P-value	Decision
A. Reading: Montessori Approach	19	**10.74**	8.58	0.979	0.334	Retain Ho_1.
Reggio Emilia Approach	21	7.86	9.89			
B. Writing: Montessori Approach	19	**11.42**	8.42	2.940	0.005	**Reject Ho_2.**
Reggio Emilia Approach	21	2.67	10.18			
C. Arithmetic: Montessori Approach	19	71.35	43.69	0.964	0.341	Retain Ho_3.
Reggio Emilia Approach	21	**83.37**	35.10			

Note: p-value < 0.05 probability to be significant at 0.05 level of significance.

Comparing the Montessori EMLA to the Reggio Emilia EMLA, Table 4 demonstrates that children's reading and writing skills were consistently higher in Reggio Emilia EMLA, with mean gain scores of 10.74 and 11.42 and smaller standard deviations of 8.58 and 8.42. In contrast to Basargekar and Lillard [23], data showed that the Reggio Emilia EMLA exceeded the Montessori EMLA in terms of arithmetic proficiency, achieving a higher mean gain score of 83.37. The t-computed value (2.940) and p-value of 0.005, which is less than the 0.05 level of significance, indicated that the only significant difference found by the t-tests was in writing skills.

Hence, there are significant differences between the mean gain scores in terms of writing skills of the children trained under Montessori and Reggio Emilia EMLA. The p-values of 0.334 and 0.341 are both above the 0.05 significance level, so we also retain null hypotheses 1 and 3. These indicate no substantial differences between the mean gain scores of children under the Montessori and Reggio Emilia EMLA in terms of reading and math proficiency.

4. Conclusion

The findings of this study provide compelling evidence for the effectiveness of the Enhanced Maternal Literacy Approach (EMLA) in improving academic skills among early learners, particularly in reading, writing, and arithmetic (3Rs). Both the Montessori and Reggio Emilia implementations of the EMLA demonstrated positive impacts, albeit with variations in specific learning domains.

Children in both groups improved in foundational academic skills, with pre- to post-test results indicating significant improvements. The Montessori approach led to a statistically significant advantage in writing proficiency, while the Reggio Emilia method yielded slightly higher average scores in reading and arithmetic, along with more consistent outcomes across learners. These results revealed the unique strengths of each model and emphasized the significance of maternal involvement in reinforcing early literacy and numeracy development.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

References

[1] R. E. Lerner and W. S. Grolnick, "Maternal involvement and children's academic motivation and achievement: The roles of maternal autonomy support and children's affect," *Motivation and Emotion*, vol. 44, no. 3, pp. 373-388, 2020. https://doi.org/10.1007/s11031-019-09813-6

[2] M. Wildmon, K. Anthony, and Z. Kamau, "Identifying and navigating the barriers of parental involvement in early childhood education," *Current Issues in Education*, vol. 25, no. 1, 2024. https://doi.org/10.14507/cie.vol25iss1.2146

[3] K. V. Hoover-Dempsey and H. M. Sandler, "Parental involvement in children's education: Why does it make a difference?," *Teachers College Record*, vol. 97, no. 2, pp. 310-331, 1995. https://doi.org/10.1177/016146819509700202

[4] R. Sharma and M. S. Sharma, "Parental involvement in shaping children's education," *Royal Thrive*, vol. 1, no. 1, pp. 62-66, 2024.

[5] X. Fan and M. Chen, "Parental involvement and students' academic achievement: A meta-analysis," *Educational Psychology Review*, vol. 13, pp. 1-22, 2001. https://doi.org/10.1023/A:1009048817385

[6] W. S. Grolnick, "Mothers' motivation for involvement in their children's schooling: Mechanisms and outcomes," *Motivation and Emotion*, vol. 39, pp. 63-73, 2015. https://doi.org/10.1007/s11031-014-9423-4

[7] D. Lyesmaya, B. Musthafa, and D. Sunendar, "The role of mother's education and early skills in language and literacy learning opportunities," *International Journal of Learning, Teaching and Educational Research*, vol. 21, no. 8, pp. 129-143, 2022.

[8] P. Adele, *Exploring parental involvement in the educational support of their child with learning difficulties in a low income community*. Stellenbosch: Stellenbosch University, 2017.

[9] R. Murro, J. Lobo, A. Inso, and J. Chavez, "Difficulties of parents with low educational attainment in assisting their children in modular distance learning during pandemic," *Environment and Social Psychology*, vol. 9, no. 1, p. 1957, 2023.

[10] P. Leseman, T. C. Pellmar, and L. Eisenberg, *Early childhood education and care for children from low-income or minority backgrounds*. Paris: OECD, 2022.

[11] Y. W. Purnomo, T. R. Ainun, P. L. Nina, K. Utami, R. Wijayanti, and S. N. Ismail, "Mother as a teacher at home: Challenges and opportunities for parental involvement in online mathematics learning for elementary school students," *The New Educational Review*, vol. 69, pp. 130-140, 2022.

[12] P. L. Engle *et al.*, "Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries," *The Lancet*, vol. 378, no. 9799, pp. 1339-1353, 2011. https://doi.org/10.1016/S0140-6736(11)60889-1

[13] J. B. Salminen, T. K. Koponen, and A. J. Tolvanen, "Individuality in the early number skill components underlying basic arithmetic skills," *Frontiers in Psychology*, vol. 9, p. 1056, 2018. https://doi.org/10.3389/fpsyg.2018.01056

[14] N. Hoerunisa and A. Fajar, "Improving reading skills through our "Kacakarya" reading we create using a Montessori approach," *ABDIMAS: Jurnal Pengabdian Masyarakat*, vol. 6, no. 2, pp. 3835–3841, 2025. https://doi.org/10.35568/abdimas.v6i2.3276

[15] F. Aghajani and H. Salehi, "Effects of Montessori teaching method on writing ability of Iranian male and female EFL learners," *Journal of Practical Studies in Education*, vol. 2, no. 1, pp. 8-15, 2021. https://doi.org/10.46809/jpse.v2i1.17

[16] E. McFarland, "Importance of handwriting: how Montessori didactic materials support handwriting. UWRF Graduate Research Papers (formerly "Plan B")," 2015. http://digital.library.wisc.edu/1793/72252

[17] K. Ö. Hallumoğlu, H. G. Orhan-karsak, and F. Maner, "The effect of Montessori materials supported mathematics instruction on early mathematical reasoning skills," *Adnan Menderes Üniversitesi Eğitim Fakültesi Eğitim Bilimleri Dergisi*, vol. 12, no. 2, pp. 49-59, 2021.

[18] E. P. Elui, E. O. Ogboru, and I. P. Esekobor, "Effect of Reggio Emilia approach on nursery three children's interest and achievement in emergentliteracy skills in Oshimili South local educationauthority," *UNIZIK Journal of Educational Research and Policy Studies*, vol. 8, pp. 146-152, 2021.

[19] A. Amal, A. Mahmud, and H. A. Gani, "The effect of Reggio Emilia approach application and learning styles toward the language ability of children in kindergartens," *IOSR Journal of Research & Method in Education*, vol. 8, no. 1, pp. 20-25, 2018. https://doi.org/10.9790/7388-0801042025

[20] S. M. Linder, B. Powers-Costello, and D. A. Stegelin, "Mathematics in early childhood: Research-based rationale and practical strategies," *Early Childhood Education Journal*, vol. 39, pp. 29-37, 2011. https://doi.org/10.1007/s10643-010-0437-6

[21] H. Aljabreen, "Montessori, Waldorf, and Reggio Emilia: A comparative analysis of alternative models of early childhood education," *International Journal of Early Childhood*, vol. 52, pp. 337-353, 2020. https://doi.org/10.1007/s13158-020-00277-1

[22] E. Moretti, *The best weapon for peace: Maria Montessori, education, and children's rights*. Madison, WI: University of Wisconsin Press, 2021.

[23] A. Basargekar and A. S. Lillard, "Math achievement outcomes associated with Montessori education," *Early Child Development and Care*, vol. 191, no. 7-8, pp. 1207-1218, 2021. https://doi.org/10.1080/03004430.2020.1860955

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 11: 757-765, 2025
DOI: 10.55214/2576-8484.v9i11.10988