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Teaching Methods and Parental Involvement in Shaping Numeracy Skills Development

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ABSTRACT

This study investigated how teaching methods and family participation influenced secondary students' numeracy skills in Cotabato Province during the 2024-2025 school year. It assessed instructors' instructional strategies, parental involvement, and students' numeracy development. The study investigated the relationships between teaching techniques, parental participation, and numeracy skills, highlighted obstacles and coping solutions, and made policy recommendations based on the findings.

A descriptive-correlational design was employed with 302 teachers (229 math majors, 73 non-majors). The self-developed instrument showed great reliability, with Cronbach's Alpha values of.873,.980, and.974. The data was analyzed using mean scores, Spearman's rho, and multiple linear regression.

The findings suggested that collaborative learning and hands-on activities were commonly used, while technology integration was less prevalent. Parental participation encompassed home, school, attitude, mentoring, and socioeconomic sectors. Students displayed procedural knowledge, problem-solving abilities, logical reasoning, and critical thinking. Teaching techniques were substantially associated with numeracy development, with technology improving critical thinking and hands-on activities affecting all skill areas. School-based and attitudinal parental participation had a considerable impact on specific numeracy skills.

INTRODUCTION

Numeracy skills are essential for academic achievement, but inconsistent teaching and uneven parental involvement lead to early competence gaps, particularly in areas where quality instruction and home support are scarce, hurting math performance and confidence. Ball and Forzani (2020) emphasize that interactive, student-centered education improves numeracy, whereas Cohen (2019) demonstrates that active parental engagement, such as home activities and teacher communication, promotes progress. Aunio et al. (2016) highlight hands-on problem-solving strategies in conjunction with parental involvement, whereas Cornelius-White (2020) emphasizes the value of home practice and encouragement; together, these elements boost skills, academic outcomes, and math confidence.

Despite significant study, the impact of effective teaching techniques and parental involvement on numeracy development remains unknown (Cheung & Pomerantz, 2018). Few research have looked into their interplay or how aligned approaches boost early childhood numeracy development (Finn & Vandermaas-Peeler, 2019).

This study seeks to investigate this junction by providing educators and parents with techniques for integrating education and parental engagement. Addressing this gap aims to provide practical insights for a complete approach to numeracy instruction.

Statement of the Problem

This study aimed to explore the teaching methods and parental involvement in shaping numeracy skills development among secondary students in the Province of Cotabato for school year 2024-2025.

Specifically, this study sought to answer the following research questions:

1. What is the level of teaching methods in terms of collaborative learning, technology integration, and hands-on activities?

2. What is the level of parental involvement in terms of home-based involvement, school-based involvement, attitudinal involvement, mentoring and guidance, and socio-economic support?

3. What is the level of numeracy skill development of the students in terms of procedural fluency, problem-solving skills, logical reasoning, and critical thinking?

4. Is there a significant relationship between teaching methods and numeracy skill development of the students?

5. Do teaching methods significantly influence on numeracy skill development of the students?
6. Is there a significant relationship between parental involvement and numeracy skill development of the students?
7. Does parental involvement significantly influence on numeracy skill development of the students?

METHODOLOGY

This chapter presents the methods used. It includes the design, the locale of the study, respondents, data gathering procedure, and data analysis.

Research Design

The descriptive qualitative was employed in this study. This study employed a survey technique or survey research to generate data from respondents.

Respondents of the Study

The respondents of the study covered the 229 secondary mathematics major teachers and 73 non-mathematics majors with a total of 302 from 2 divisions in the Province of Cotabato namely: Kidapawan City Division and Cotabato Division.

Research Instruments

The researcher employed a self-created, validated questionnaire with Cronbach's Alpha reliability (Morse et al., 2018).The questionnaire was divided into three parts: teaching methods (15 items on collaborative learning, technology integration, and hands-on activities), parental involvement (25 items across five dimensions), and numeracy skill development (20 items on procedural fluency, problem-solving, logical reasoning, and critical thinking). All items used a 5-point Likert scale.

Statistical Analysis

The questionnaire data were systematically enumerated, categorized, and tabulated for a thorough analysis. Following that, the unprocessed data was summarized and analyzed using descriptive statistical methods.

RESULTS AND DISCUSSIONS

This section of the study provides discussions based on real data acquired about teaching approaches and family engagement in molding numeracy skill development. It examined the data and interpreted the study's conclusions using a textual and tabular format.

Teaching Methods of the Teachers

Table 1 shows high overall utilization, with a grand mean of 4.26; collaborative learning scored 4.45, hands-on activities 4.28, and technology integration 4.04, all regarded as practiced.

These findings reveal that teachers apply a variety of interactive tools, including collaborative and hands-on ways. The lower technology integration score indicates a need for additional training and resources, which is consistent with studies on student-centered approaches (Johnson & Johnson, 2017; Prince, 2018) and the significance of teacher confidence in effective technology use (Voogt et al., 2019

.**Table 1** Level of **teaching methods of teachers**

Teaching Methods of Teachers	**Weighted Mean**	**Description**
Collaborative Learning	4.45	Highly Practiced
Technology Integration	4.04	Practiced
Hands-on Activities	4.28	Highly Practiced
Grand Mean	**4.26**	**Highly Practiced**

Parental Involvement

Table 2 shows that the average level of parental participation is 4.03, with attitudinal involvement at 4.19, followed by socioeconomic support (4.11), mentoring and guidance (4.03), school-based (3.96), and home-based involvement (3.88).

These findings reveal that parents regularly support their children's education, particularly through positive attitudes, financial aid, and mentoring, which improves kids' motivation, self-esteem, and academic accomplishment.

The significance of parental involvement is well-documented: Epstein (2018) links varied engagement to improved achievement and behavior; Hill and Tyson (2019) highlight the impact of attitudinal involvement on academic engagement; and Fan and Chen (2019) associate material and emotional support with better outcomes across educational levels.

Table 2 Level of **parental involvement**

Parental involvement	**Weighted Mean**	**Description**
Home-based Involvement	3.88	Involved
School-based Involvement	3.96	Involved
Attitudinal Involvement	4.19	Involved
Mentoring & Guidance	4.03	Involved
Socio-economic Support	4.11	Involved
Grand Mean	**4.03**	**Involved**

Numeracy Skill Development

Table 3 reveals a grand mean of 4.07, suggesting strong skills in all categories, with procedural fluency greatest at 4.13, followed by problem-solving (4.07), critical thinking (4.05), and logical reasoning (4.01).

These studies demonstrate successful teaching strategies for both foundational and advanced math skills. To improve abilities further, teachers should incorporate increasingly sophisticated, real-world problem-solving assignments.

This is consistent with Boaler's (2021) encouragement of inquiry-based learning and real-world applications to improve critical thinking and reasoning, as well as Cai et al. (2017)'s emphasis on balanced instruction that combines fluency and problem-solving to develop numeracy.

Table 3 Level of **numeracy skill development**

Numeracy Skill Development	**Weighted Mean**	**Description**
Procedural Fluency	4.13	Developed
Problem Solving	4.07	Developed
Logical Reasoning	4.01	Developed
Critical Thinking	4.05	Developed
Grand Mean	**4.07**	**Developed**

Relationship of the Teaching Methods and Numeracy Skill Development

Table 4 reveals that there is no significant relationship between collaborative learning and the following numeracy skills: procedural fluency ($r = 0.174$, $p = 0.222$), problem-solving ($r = 0.156$, $p = 0.275$), logical reasoning ($r = 0.263$, $p = 0.062$), and critical thinking. These p-values above 0.05 imply that collaborative learning, as it is now practiced, has no meaningful impact on numeracy development, most likely due to misalignment with specific abilities and a lack of organization. This is consistent with Hattie's (2019) observation that the effectiveness of collaborative learning is dependent on a clear structure, learning goals, and individual accountability to avoid uneven participation and shallow knowledge.

Technology Integration and Numeracy Skill Development

Technology integration correlates significantly with all numeracy skills: procedural fluency ($r = 0.415$, $p = 0.002$), problem solving ($r = 0.358$, $p = 0.010$), logical reasoning ($r = 0.335$, $p = 0.016$), and critical thinking ($r = 0.410$, $p = 0.003$). With all p-values less than 0.01, using technology in the classroom significantly improves students' numeracy skills by delivering engaging, individualized instruction. Muir and Geiger (2018) emphasize the significance of digital tools in transforming training by providing dynamic visuals and simulations that make abstract concepts concrete and encourage deeper reasoning.

Hands-on Activities and Numeracy Skill Development

Hands-on activities significantly correlate with all numeracy skills: procedural fluency (r = 0.516), problem solving (r = 0.484), logical reasoning (r = 0.475), and critical thinking (r = 0.500), all with p = 0.000. This confirms that active, tangible experiences effectively improve these skills. Hughes and Wilson (2017) emphasize that hands-on methods help students concretize abstract concepts and deepen understanding by manipulating materials and applying ideas in real contexts, underscoring the value of experiential learning.

Table 4 Correlation matrix showing the relationship of the **teachers' teaching methods and students' numeracy skill development.**

Spearman Rho					
Teaching Methods		**Procedural Fluency**	**Problem Solving**	**Logical Reasoning**	**Critical Thinking**
Collaborative learning	Cor. Coef.	0.174	0.156	0.263	0.263
	Probability	0.222	0.275	0.062	0.062
Technology	Cor. Coef.	**0.415****	**0.358****	**0.335***	**0.410****
Integration	Probability	0.002	0.010	0.016	0.003
Hands-on	Cor. Coef.	**0.516****	**0.484****	**0.475****	**0.500****
activities	Probability	0.000	0.000	0.000	0.000

**.Correlation is significant at the 0.01 level.

*.Correlation is significant at the 0.05 level.

Influence of the Teaching Methods and Numeracy Skill Development

Teaching Methods on Procedural Fluency

Table 5 shows teaching methods significantly affect procedural fluency (F = 5.001, p = 0.004), rejecting the null at the 1% level. Hands-on activities explain 24.2% of the variance, with 75.8% due to other factors. As the strongest predictor, hands-on activities enhance students' accuracy and efficiency in mathematical procedures. Active engagement with physical manipulatives and experiential learning fosters foundational numeracy skills, as supported by Moyer-Packenham and Westenskow (2018) and Boaler (2021).

Teaching Methods on Problem Solving

Combined teaching methods significantly influence problem-solving skills (F = 5.417, p = 0.003), rejecting the null at the 1% level. Hands-on activities account for 25.7% of variation, the highest among methods studied. They develop problem-solving by promoting critical thinking, exploring multiple solutions, and applying math to real-life contexts. This aligns with Haury and Rillero (2018), who link experiential learning to deeper engagement and critical thinking, and Kolodner et al. (2019), who highlight inquiry-based, hands-on learning's role in constructing and testing solutions.

Teaching Methods on Logical Reasoning

Teaching methods collectively significantly affect logical reasoning (F = 6.756, p = 0.000), rejecting the null at the 1% level. Hands-on activities explain 30.1% of the variance, the strongest predictor. These activities enhance logical reasoning by enabling exploration of patterns, relationships, and sequences. Sowell (2019) confirms hands-on learning promotes stronger reasoning and problem-solving than traditional methods, fostering deeper cognitive engagement for analysis and connection of ideas.

Teaching Methods on Critical Thinking

Teaching methods significantly impact critical thinking (F = 9.824, p = 0.000), rejecting the null at the 1% level. Technology integration and hands-on activities together explain 37.2% of variance. They create interactive environments that support analysis, evaluation, and reasoned decision-making through digital tools and practical experiences. Voogt et al. (2019) show digital tools foster higher-order thinking, while Prince and Felder (2018) emphasize hands-on learning's role in analysis, evaluation, and synthesis. Together, these methods deepen engagement, problem-solving, and independent critical thinking.

Table 5 Summary of the influence of **teaching methods of teachers on numeracy skills development of the students'**

Teaching Methods	Procedural Fluency	Problem Solving	Logical Reasoning	Critical Thinking
	t-value	**t-value**	**t-value**	**t-value**
(Constant)	2.323	1.466	0.616	0.413
Collaborative Learning	1.597	1.155	0.813	0.313
Technology Integration	1.848	1.500	1.266	**2.076***
Hands-on Activities	**2.617***	**2.840****	**3.221****	**2.889****
	$R^2 = 0.242$	$R^2 = 0.257$	$R^2 = 0.301$	$R^{2=}0.372$
	Prob. = 0.004	*Prob.= 0.003*	*Prob.= 0.000*	*Prob=0.000*
	F–Value=5.001	*F-Value =5.417*	*F-Value =6.756*	*F-Value=9.284*

Relationship of the Parental Involvement and the Numeracy Skill Development

Home-based Involvement and Numeracy Skill Development

Table 8 shows significant positive correlations between home-based parental involvement and numeracy skills: procedural fluency (r = 0.576), problem-solving (r = 0.624), logical reasoning (r = 0.662), and critical thinking (r = 0.754), all with p = 0.000. These results confirm that active parental support at home—helping with homework, engaging in math activities, and fostering positive attitudes—strongly enhances students' mathematical abilities, emphasizing the importance of home-school collaboration. Jeynes (2016) and Desforges and Abouchaar (2017) similarly highlight home involvement's role in boosting math achievement and problem-solving skills.

School-based Involvement and Numeracy Skill Development

School-based parental involvement shows strong positive correlations with numeracy skills: problem solving (r = 0.771), logical reasoning (r = 0.727), and critical thinking (r = 0.733), all p = 0.000. This underscores the impact of active participation in school environments—through teacher guidance, classroom activities, and peer interaction—on enhancing math skills. Epstein (2018) and Hattie (2019) stress that interactive teaching and feedback significantly promote numeracy development.

Attitudinal Involvement and Numeracy Skill Development

Attitudinal involvement correlates significantly with all numeracy skills: problem solving (r = 0.625), procedural fluency (r = 0.568), logical reasoning (r = 0.433), and critical thinking (r = 0.514), all p = 0.000. Positive attitudes and motivation from students and families foster engagement, confidence, and persistence in math, improving performance. These findings align with Fennema and Franke (2022) and Caswell and Smith (2017), who emphasize the role of supportive attitudes in boosting achievement.

Mentoring and Guidance and Numeracy Skill Development

Mentoring and guidance significantly correlate with numeracy skills: problem solving (r = 0.707, 0.691), logical reasoning (r = 0.632), and critical thinking (r = 0.734), all p = 0.000. Active parental support—such as homework help, encouragement, and resource provision—enhances confidence and math skills, reinforcing learning and academic success. This supports findings by Jeynes (2016) and Epstein (2018) on the importance of parental guidance for numeracy development.

Socio-economic Support and Numeracy Skill Development

Socio-economic support shows significant positive correlations with numeracy skills: problem solving (r = 0.693, 0.611), logical reasoning (r = 0.576), and critical thinking (r = 0.635), all p = 0.000. Financial and material support—access to educational resources, tutoring, and a stable environment—is vital for improving mathematical abilities. Duncan and Brooks-Gunn (2020), Desforges and Abouchaar (2017), and Evans (2019) emphasize that socio-economic advantages enhance numeracy through enriched home learning conditions and additional support.

Table 8 Correlation matrix showing the **parental involvement and the numeracy skill development of the students.**

Spearman Rho					
Parental Involvement		**Procedural Fluency**	**Problem Solving**	**Logical Reasoning**	**Critical Thinking**
	Cor. Coef.	**0.576****	**0.624****	**0.662****	**0.754****
Home-based	Probability	0.000	0.000	0.000	0.000
	Cor. Coef.	**0.771****	**0.720****	**0.727****	**0.733****
School-based	Probability	0.000	0.000	0.000	0.000
	Cor. Coef.	**0.625****	**0.568****	**0.433****	**0.514****
Attitudinal	Probability	0.000	0.000	0.002	0.000
Mentoring and guidance	Cor. Coef.	**0.707****	**0.691****	**0.632****	**0.734****
	Probability	0.000	0.000	0.000	0.000
Socio-economic support	Cor. Coef.	**0.693****	**0.611****	**0.576****	**0.635****
	Probability	0.000	0.000	0.000	0.000

**Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level.

Influence of the Parental Involvement and the Numeracy Skill Development

Parental Involvement on Procedural Fluency

Table 9 shows parental involvement significantly impacts procedural fluency (F = 12.596, p = 0.000), explaining 58.3% of its variance. School-based involvement is the strongest predictor—active participation in school activities strengthens foundational math skills by reinforcing learning and aligning home and school expectations. Fan and Chen (2019), Sheldon and Epstein (2018), and Hill and Taylor (2020) highlight that such engagement enhances achievement and supports children's skill development.

Parental Involvement on Problem Solving

Parental involvement significantly affects problem-solving skills (F = 11.436, p = 0.000), with school-based involvement accounting for 56% of the variance. Active participation in school events, teacher communication, and support of school initiatives strengthen critical thinking and strategic problem-solving by linking home and school. Epstein and Van Voorhis (2020), Gonzalez-DeHass et al. (2019), and Sheldon and Epstein (2018) emphasize its role in improving academic behaviors, self-regulation, and higher-order math achievement.

Parental Involvement on Logical Reasoning

Parental involvement significantly influences logical reasoning (F = 13.380, p = 0.000), with school-based and attitudinal involvement explaining 59.8% of the variance. These forms foster reasoning by aligning parents with academic goals and encouraging curiosity and structured thinking. Hill and Tyson (2019), Fan and Williams (2019), and Sheldon and Epstein (2018) connect positive attitudes and school engagement to enhanced cognitive engagement, perseverance, and logical performance.

Parental Involvement on Critical Thinking

Parental involvement significantly impacts critical thinking (F = 8.656, p = 0.000), with attitudinal involvement explaining 49% of its variance. Positive parental attitudes—valuing education, encouraging curiosity, and supporting independence—are key to developing critical thinking, enabling students to evaluate, reason, and decide effectively. Castro et al. (2017), Tan and Goldberg (2019), and Núñez et al. (2017) emphasize that parental expectations, inquisitiveness, and encouragement foster engagement in higher-order thinking and self-regulated learning.

Table 9 Summary of the influence of **parental involvement on numeracy skills development of the students'**

Parental Involvement	Procedural Fluency	Problem Solving	Logical Reasoning	Critical Thinking
	t-value	**t-value**	**t-value**	**t-value**
(Constant)	3.844	2.950	3.499	4.409
Home-based	0.972	0.231	1.522	1.806
School-based	**2.931***	**1.965***	**3.081****	1.239
Attitudinal Involvement	0.625	0.436	**3.021****	**1.939***
Mentoring & Guidance	0.153	0.422	0.152	0.711
Socio-economic Support	1.445	0.700	0.492	0.119
	R^2 = 0.583	*R^2 = 0.560*	*R^2 = 0.598*	*$R^{2=}$0.490*
	Prob. = 0.000	*Prob.= 0.000*	*Prob.= 0.000*	*Prob=0.000*
	F–Value=12.596	*F-Value =11.436*	*F-Value =13.380*	*F-Value=8.656*

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study examined the role of teaching methods and parental involvement in developing numeracy skills among secondary students in Cotabato Province during the 2024-2025 school year. It assessed levels of teaching methods, parental involvement, and students' numeracy skills, analyzing their relationships and influences.

Using a descriptive-correlational design, data were collected from 302 secondary teachers (229 math majors, 73 non-majors) via a validated questionnaire (Cronbach's Alpha: .873–.980). Analyses included mean scores, Spearman rho correlations, and multiple linear regression.

Findings show teachers frequently use collaborative learning and hands-on activities, with moderate technology integration. Parents actively engage across home-based, school-based, attitudinal, mentoring, and socio-economic dimensions. Students demonstrated growth in procedural fluency, problem-solving, logical reasoning, and critical thinking. Technology integration and hands-on activities significantly relate to all numeracy areas, with technology notably impacting critical thinking and hands-on activities influencing all skills. Parental involvement strongly correlates with numeracy development, especially school-based involvement affecting procedural fluency, problem-solving, and logical reasoning, while attitudinal involvement impacts logical reasoning and critical thinking.

Conclusion

Based on the study's findings, the following conclusions were drawn:

Teachers frequently employ collaborative learning and hands-on activities; technology integration is moderate.

Parents actively support learning through diverse forms of involvement.

Students show growth across all numeracy skills.

Technology integration and hands-on activities significantly enhance numeracy skills.

Technology mainly boosts critical thinking; hands-on activities influence all numeracy skills.

All parental involvement dimensions significantly improve numeracy abilities.

School-based involvement strongly affects procedural fluency, problem-solving, and logical reasoning; attitudinal involvement contributes to logical reasoning and critical thinking.

Recommendation

Based on the conclusions of the study, the researcher offered the following recommendations of the study.

1. District Supervisors should promote hands-on and collaborative learning while increasing technology integration to enhance numeracy skills.

2. Principals should provide professional development on effective technology use and support hands-on, collaborative teaching.

3. Teachers should prioritize collaborative and hands-on methods and expand technology use to develop higher-order thinking.

4. Parents should maintain active home and school engagement, focusing on mentoring, guidance, and socio-economic support to boost numeracy, especially problem-solving and reasoning.

5. Students should actively participate in hands-on and collaborative learning, utilizing support from parents and teachers to strengthen critical thinking and problem-solving.

6. Future research should explore long-term effects of technology integration on numeracy and critical thinking.

7. The Modified Framework highlights that technology and hands-on activities broadly impact numeracy skills, with parental involvement—especially school-based and attitudinal—playing a vital role.

Jordan and Levine (2019) confirm teaching methods and parental involvement as key to numeracy skill development, while Tan and Goldberg (2019) emphasize that comprehensive parental engagement drives academic growth.

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