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INTERPLAY OF LEARNING CLIMATE, MATHEMATICS ANXIETY REGULATION SKILLS, INSTRUCTIONAL STRATEGIES AND MATHEMATICS PROBLEM-SOLVING SKILLS

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ABSTRACT

Mathematics problem solving is central to basic education because it requires learners to understand problems, select strategies, carry out procedures, and examine answers, yet Philippine learners continue to show low mathematics performance. Learning climate, mathematics anxiety, and instructional practices are often studied separately and through self-report, and few studies examine their interplay with an actual performance measure among Grade 6 learners. This study examined the interplay of learning climate, mathematics anxiety regulation skills, instructional strategies, and mathematics problem-solving skills of Grade 6 learners in seven public elementary schools in Kalilangan East District in October 2026, School Year 2026-2027. Using a quantitative predictive-correlational design, 156 learners were surveyed through total enumeration, and the Grade 6 Rapid Mathematics Assessment measured problem-solving skills. Learners reported a positive learning climate, High anxiety regulation skills, and favorable instructional strategies, yet their problem-solving skills remained Developing. Together, the three predictors significantly but modestly predicted problem-solving skills, explaining only a limited part of performance differences. Schools should also strengthen the direct development of problem-solving skills among learners. Future researchers should replicate the study with larger, more diverse samples, measure anxiety level separately from regulation strategies, add classroom observations, and examine prior achievement, motivation, attendance, and parental involvement.

Keywords: *learning climate*, *mathematics anxiety regulation skills*, *instructional strategies in mathematics*, *mathematics problem-solving skills*, *Grade 6 learners*

INTRODUCTION

Mathematics remains a core area of basic education because learners use it to reason, make decisions, and solve problems in school and daily life. Mathematics problem solving requires learners to understand a problem, select a workable plan, carry out the needed procedures, and examine whether the answer is reasonable, which makes it more than the recall of rules or formulas (Olivares et al., 2021; Ukobizaba et al., 2021). The need to strengthen mathematics learning remains clear in the Philippine setting. Only 21% of Filipino 15-year-old learners reached at least Level 2 proficiency in mathematics in PISA 2025, compared with the OECD average of 65% (OECD, 2026), and the Department of Education adopted the National Learning Recovery Program to strengthen learning recovery and numeracy (Department of Education, 2023). These conditions show the need to examine not only learners' scores but also the classroom and learner factors that may be related to their mathematics performance.

Learning climate is one such factor. It includes the relationships, support, communication, and sense of belonging that learners experience while learning, which can shape their participation and willingness to work through difficult tasks (Hennessy et al., 2023; Štremfel et al., 2024). Teacher–student and peer relationships are connected with academic, social, and behavioral outcomes, although the strength of these relationships varies across settings and measures (Baars et al., 2021; Endedijk et al., 2022; Roorda et al., 2011). The present study therefore examined peer interactions and teacher–student interactions as two parts of the learning climate that learners directly experience.

Mathematics anxiety is another concern because worry and tension can compete with the attention that learners need when they solve mathematical tasks. Meta-analyses show a consistent negative relationship between mathematics anxiety and mathematics achievement (Barroso et al., 2021; Brunner et al., 2026; Namkung et al., 2019), and interventions can address anxiety through several approaches, although the evidence differs by type and quality (Balt et al., 2022). This study focused on mathematics anxiety regulation skills, which are learners' reported ways of staying calm, focusing on the task, using helpful self-talk, practicing, and continuing to work when Mathematics becomes difficult, rather than on anxiety level alone.

Instructional strategies also form part of the learning experience because teachers decide how examples, questions, activities, feedback, group work, and problem-solving tasks are used during lessons. Instructional quality is commonly treated as a multidimensional construct that includes student support, classroom management, and cognitive activation (Mu et al., 2022), and teaching that supports problem solving gives learners repeated opportunities to understand problems, justify strategies, work with others, and reflect on solutions (Cevikbas et al., 2022; Olivares et al., 2021).

Although learning climate, mathematics anxiety, and instructional practices have been widely studied, they are often examined separately and through self-report. Few studies have examined them together while using an actual Mathematics performance

measure among Grade 6 learners within one public-school district. This gap is important because a learner may report a supportive classroom and useful teaching practices while still showing difficulty in a performance assessment, which means that positive perceptions should not be treated as direct proof of strong problem-solving skills.

The study is anchored on four theories that explain the social, personal, emotional, and instructional parts of Mathematics learning. Vygotsky's (1978) Social Constructivist Theory explains learning as a process that develops through social interaction and guided support, and it supports the learning climate variable through peer and teacher–student interactions. Bandura's (1986) Social Cognitive Theory, through the concept of self-efficacy, explains why learners who believe they can continue working tend to persist when tasks become difficult, which supports the study of anxiety regulation skills. Pekrun's (2006) Control-Value Theory of Achievement Emotions explains how emotions such as anxiety arise from the control learners believe they have over a task and the value they give to it. Bruner's (1966) Constructivist Theory of Instruction explains that learners build understanding when they actively work with ideas and receive scaffolded support, which supports the instructional strategies variable. Guided by these theories, learning climate, mathematics anxiety regulation skills, and instructional strategies in Mathematics were treated as the independent variables, and Mathematics problem-solving skills as the dependent variable.

Therefore, this study determined the learning climate, mathematics anxiety regulation skills, instructional strategies in Mathematics, and Mathematics problem-solving skills of Grade 6 learners, and whether the three predictors significantly predict problem-solving skills. The study is aligned with Sustainable Development Goal 4 on inclusive and equitable quality education, and its findings may provide learners, teachers, school administrators, curriculum developers, parents, and policymakers with local evidence on the classroom and learner conditions that support effective Mathematics learning.

Research Questions

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

1. What is the participants' assessment of their learning climate in terms of:
    1.1 peer interactions; and
    1.2 teacher–student interactions?
2. What is the level of the participants' mathematics anxiety regulation skills?
3. What is the participants' assessment of their teachers' instructional strategies in Mathematics?
4. What is the level of the participants' Mathematics problem-solving skills?
5. Do learning climate, mathematics anxiety regulation skills, and instructional strategies in Mathematics significantly predict Mathematics problem-solving skills?

For Research Question 5, the null hypothesis stated that learning climate, mathematics anxiety regulation skills, and instructional strategies do not significantly predict Mathematics problem-solving skills. It was tested at the .05 level of significance.

METHODOLOGY

This study employed a quantitative predictive-correlational research design to examine whether learning climate, mathematics anxiety regulation skills, and instructional strategies in Mathematics predicted the Mathematics problem-solving skills of Grade 6 learners. The design was appropriate because the study measured naturally occurring variables and used statistical procedures to examine their associations without assigning learners to treatments or manipulating classroom conditions (Creswell & Creswell, 2023). The findings were interpreted as associative and predictive and were not used to establish causal relationships.

The study was conducted in seven public elementary schools in Kalilangan East District, Division of Bukidnon, during School Year 2026–2027. The respondents were 156 Grade 6 learners. Total enumeration was used, so all eligible Grade 6 learners in the participating schools were invited to take part. A separate pilot group of 30 Grade 6 learners from a public elementary school outside the seven study schools was used to test item clarity and internal consistency, and their data were not included in the main analysis.

Data were gathered using three learner questionnaires and one Mathematics performance assessment. The Learning Climate Questionnaire contained 12 items covering peer interactions and teacher–student interactions, adapted from the classroom-environment literature (Fraser et al., 1996). The Mathematics Anxiety Regulation Skills Questionnaire contained 10 items on how learners manage nervousness, worry, and loss of confidence during Mathematics, informed by Richardson and Suinn (1972), Suinn et al. (1988), and Balt et al. (2022). It measured reported regulation strategies and not the level of mathematics anxiety. The Instructional Strategies in Mathematics Questionnaire contained 10 items on the teaching practices learners experienced, guided by the literature on instructional quality (Mu et al., 2022). All three questionnaires used a five-point scale from 1 (Strongly Disagree) to 5 (Strongly Agree), with higher scores indicating a more positive climate, more frequent use of regulation strategies, and more favorable perceptions of teaching strategies, respectively. Mathematics problem-solving skills were measured through the 40-item Grade 6 Rapid Mathematics Assessment (RMA), which included selected-response and constructed-response tasks and gave a performance measure separate from the questionnaires.

The questionnaires were adapted and contextualized by the researcher, and the RMA was scored according to its answer key and scoring guide. Qualified evaluators reviewed the questionnaires for alignment with the study variables, clarity of wording, and suitability for Grade 6 learners, and revisions were made where items were unclear, repetitive, or not aligned with the intended construct. The revised questionnaires were

then pilot tested, and internal consistency was examined using McDonald's Omega, with a coefficient of 0.70 or higher considered reliable. Only instruments that completed expert review and reliability testing were used in the main data gathering.

For the questionnaires, mean scores of 4.51–5.00 were interpreted as Very High (Strongly Agree), 3.51–4.50 as High (Agree), 2.51–3.50 as Moderate (Neutral), 1.51–2.50 as Low (Disagree), and 1.00–1.50 as Very Low (Strongly Disagree). The RMA, with a maximum score of 40, was interpreted as Advanced (32.01–40.00), Proficient (24.01–32.00), Developing (16.01–24.00), Beginning (8.01–16.00), or Poor (0.00–8.00).

The researcher first secured research ethics approval and the required administrative permissions from the concerned offices and school authorities. After approval, the researcher coordinated schedules with the school heads and the Grade 6 teachers. The questionnaires and the RMA were administered with clear instructions and enough time for completion. The completed materials were checked for completeness, assigned research codes, and encoded for statistical analysis without learner names in the analysis file.

Descriptive statistics (frequency, percentage, mean, and standard deviation) summarized each variable. Canonical correlation examined the two learning-climate dimensions as a set in relation to problem-solving skills, and Pearson's correlation was used for anxiety regulation skills and instructional strategies, each represented by a single composite scale. Multiple linear regression tested whether the three predictors jointly predicted problem-solving skills, and the overall F test, R, R^2, adjusted R^2, unstandardized coefficient (B), standardized coefficient (β), confidence interval, t value, and p value were interpreted (Field, 2018). Bootstrap confidence intervals based on 5,000 resamples were used for the regression coefficients because diagnostic checks showed a departure from normality. The level of significance was set at .05, and all analyses were carried out using IBM SPSS Statistics.

The study covered only Grade 6 learners from seven public elementary schools in Kalilangan East District, so its findings apply to this population. It examined three predictors and did not include other factors such as prior achievement, motivation, attendance, family support, or learning resources. The questionnaires relied on learners' self-reports, the RMA was administered once, and the predictive-correlational design supports association and prediction but not causal conclusions.

RESULTS

Research Question 1. *What is the participants' assessment of their learning climate in terms of peer interactions and teacher–student interactions?*

Table 1
Descriptive Statistics of the Participants' Level of Learning Climate in Terms of Peer Interactions and Teacher-Student Interactions

Score Range	Interpretation	Peer f	Peer %	Teacher f	Teacher %
4.51 – 5.00	Very High	27	17.31	58	37.18
3.51 – 4.50	High	68	43.59	77	49.36
2.51 – 3.50	Moderate	49	31.41	20	12.82
1.51 – 2.50	Low	11	7.05	1	0.64
1.00 – 1.50	Very Low	1	0.64	0	0.00
Total		**156**	**100.00**	**156**	**100.00**
Mean		**3.67**		**4.21**	
SD		**0.82**		**0.62**	
Interpretation		**High**		**High**	

Legend: Interpretation scale: 4.51–5.00 = Very High (Strongly Agree); 3.51–4.50 = High (Agree); 2.51–3.50 = Moderate (Neutral); 1.51–2.50 = Low (Disagree); 1.00–1.50 = Very Low (Strongly Disagree). Overall learning climate: M = 3.89, SD = 0.62, High.

Table 1 shows that learners rated peer interactions as High (M = 3.67, SD = 0.82) and teacher–student interactions as High (M = 4.21, SD = 0.62), with an overall learning climate mean of 3.89 (SD = 0.62), interpreted as High. In all, 60.90% of learners rated peer interactions High or Very High, and 86.54% rated teacher–student interactions High or Very High.

Research Question 2. *What is the level of the participants' mathematics anxiety regulation skills?*

Table 2
Descriptive Statistics of the Participants' Level of Mathematics Anxiety Regulation Skills

Score Range	Interpretation	Frequency	Percentage
4.51 – 5.00	Very High	18	11.54
3.51 – 4.50	High	95	60.90
2.51 – 3.50	Moderate	40	25.64
1.51 – 2.50	Low	3	1.92
1.00 – 1.50	Very Low	0	0.00
Total		**156**	**100.00**
Mean		**3.84**	
SD		**0.57**	
Interpretation		**High**	

Legend: Interpretation scale: 4.51–5.00 = Very High (Strongly Agree); 3.51–4.50 = High (Agree); 2.51–3.50 = Moderate (Neutral); 1.51–2.50 = Low (Disagree); 1.00–1.50 = Very Low (Strongly Disagree).

As shown in Table 2, learners reported High mathematics anxiety regulation skills (M = 3.84, SD = 0.57). A total of 72.44% were in the High or Very High categories, 1.92% were Low, and none was Very Low.

Research Question 3. *What is the participants' assessment of their teachers' instructional strategies in Mathematics?*

Table 3
Descriptive Statistics of the Participants' Assessment of Their Teachers' Instructional Strategies in Mathematics

Score Range	Interpretation	Frequency	Percentage
4.51 – 5.00	Very High	44	28.21
3.51 – 4.50	High	89	57.05
2.51 – 3.50	Moderate	23	14.74
1.51 – 2.50	Low	0	0.00
1.00 – 1.50	Very Low	0	0.00
Total		**156**	**100.00**
Mean		**4.18**	
SD		**0.52**	
Interpretation		**High**	

Legend: Interpretation scale: 4.51–5.00 = Very High (Strongly Agree); 3.51–4.50 = High (Agree); 2.51–3.50 = Moderate (Neutral); 1.51–2.50 = Low (Disagree); 1.00–1.50 = Very Low (Strongly Disagree).

As shown in Table 3, learners assessed their teachers' instructional strategies as High (M = 4.18, SD = 0.52). In all, 85.26% rated the strategies High or Very High, and no learner rated them below Moderate.

Research Question 4. *What is the level of the participants' Mathematics problem-solving skills?*

Table 4
Descriptive Statistics of the Participants' Mathematics Problem-Solving Skills (RMA)

Score Range	Interpretation	Frequency	Percentage
32.01 – 40.00	Advanced	2	1.28
24.01 – 32.00	Proficient	38	24.36
16.01 – 24.00	Developing	55	35.26
8.01 – 16.00	Beginning	56	35.90
0.00 – 8.00	Poor	5	3.21
Total		**156**	**100.00**
Mean		**19.39**	
SD		**6.94**	
Interpretation		**Developing**	

Legend: RMA scores are out of 40 items. 32.01–40.00 = Advanced; 24.01–32.00 = Proficient; 16.01–24.00 = Developing; 8.01–16.00 = Beginning; 0.00–8.00 = Poor.

Table 4 shows that learners obtained a mean RMA score of 19.39 out of 40 (SD = 6.94), interpreted as Developing. The largest groups were in the Beginning (35.90%) and Developing (35.26%) categories, followed by Proficient (24.36%), Poor (3.21%), and Advanced (1.28%).

Research Question 5. *Do learning climate, mathematics anxiety regulation skills, and instructional strategies in Mathematics significantly predict Mathematics problem-solving skills?*

Table 5
Canonical Correlation Analysis Between Learning Climate and Mathematics Problem-Solving Skills

Variable	Cross-loading	Rc	Rc^2	F(2, 153)	p
Learning Climate		0.08	0.01	0.476	0.622
Peer Interactions	−0.07				
Teacher-Student Interactions	0.01				
Mathematics Problem-Solving Skills	−0.08				

Legend: Rc = canonical correlation. *Significant at the .05 level (two-tailed).

Table 5 shows that the canonical correlation between the learning-climate set and problem-solving skills was very small and not significant (Rc = .08, Rc^2 = .01, p = .622).

Table 6
Correlation Between Mathematics Anxiety Regulation Skills, Instructional Strategies in Mathematics, and Mathematics Problem-Solving Skills

Variable	r(154)	p
Mathematics Anxiety Regulation Skills	−0.108	0.179
Instructional Strategies in Mathematics	−0.011	0.889

Legend: r = Pearson's correlation coefficient. *Significant at the .05 level (two-tailed).

Table 6 shows that neither anxiety regulation skills (r = −.108, p = .179) nor instructional strategies (r = −.011, p = .889) was significantly correlated with problem-solving skills.

Table 7
Regression Analysis of Learning Climate, Mathematics Anxiety Regulation Skills, and Instructional Strategies in Mathematics on Mathematics Problem-Solving Skills

Predictor	B	SE	β	95% CI	t	p
Constant	22.04	5.29		11.59, 32.43	4.510*	<.001
Learning Climate	2.05	1.17	0.177	−0.32, 4.30	1.585	0.115
Mathematics Anxiety Regulation Skills	−2.58	1.28	−0.210	−5.12, −0.02	−2.040*	0.043
Instructional Strategies in Mathematics	−0.20	1.24	−0.015	−2.56, 2.27	−0.148	0.882

Note. Model summary: R = 0.357, R^2 = 0.127, Adjusted R^2 = 0.110, F(3, 152) = 2.942*, p = 0.035. B = unstandardized coefficient, SE = standard error, β = standardized coefficient, CI = bootstrap confidence interval. *Significant at the .05 level (two-tailed).

Table 7 shows that the overall regression model was significant, F(3, 152) = 2.942, p = .035, with R = .357, R^2 = .127, and adjusted R^2 = .110. Mathematics anxiety regulation skills was the only significant unique predictor (B = −2.58, β = −.210, t = −2.040, p = .043). Learning climate (p = .115) and instructional strategies (p = .882) were not significant unique predictors.

DISCUSSION

The High overall learning climate (Table 1) indicates that learners generally experienced a supportive Mathematics classroom. Teacher–student interactions received the stronger rating compared with peer interactions, and the two dimensions did not receive the same rating, which supports the multidimensional view of learning climate (Baars et al., 2021; Wang & Degol, 2016).

For peer interactions, 39.10% of learners rated this dimension Moderate or lower, so peer support was present but not experienced equally by all learners. Respect for classmates' ideas during group activities was the strongest indicator (M = 3.95), followed by helping create a supportive environment where everyone can participate (M = 3.82) and cooperation during Mathematics activities (M = 3.71). Classmates' encouragement when solving problems had the lowest mean and was the only Neutral indicator (M = 3.37, SD = 1.34). Learners therefore felt included and respected, but encouragement during difficulty was less consistent, and this is the peer area that most needs strengthening. This pattern is consistent with research showing that peer and teacher–student relationships form connected parts of the classroom's social environment (Endedijk et al., 2022).

Teacher–student interactions were among the strongest and most consistent parts of the learning climate, and none of the learners rated them Very Low. Teacher motivation to improve performance (M = 4.30) and help when learners had difficulty (M = 4.28) were rated highest, while helpful feedback was lowest but still positive (M = 4.10). The small standard deviation (0.62) shows that ratings were close to one another. This agrees with

studies showing that affective teacher–student relationships and productive teacher–student dialogue support engagement, belonging, and learning (Hennessy et al., 2023; Roorda et al., 2011; Štremfel et al., 2024). These ratings describe what learners perceived and do not by themselves show how well they solved Mathematics problems.

The High mathematics anxiety regulation skills (Table 2) show that most learners reported using ways of managing worry during Mathematics. Reminding oneself to focus on the solution steps instead of worrying about wrong answers (M = 4.13), reminding oneself that effort can lead to success (M = 4.11), and practicing to become more confident (M = 3.98) were the most reported strategies. Not panicking easily was the lowest (M = 3.51), followed by remaining confident during word problems (M = 3.73) and continuing after mistakes (M = 3.74). Learners therefore had a good base of task-focused strategies, but managing immediate emotional reactions during problem solving was less consistent. Because the variable measures reported strategies, it should not be read as the learners' level of mathematics anxiety (Balt et al., 2022).

The High rating of instructional strategies (Table 3) shows that learners experienced structured and supportive teaching. The SD of 0.52 was the smallest among the four variables, which means that learners' ratings of their teachers' strategies were the closest to one another. Providing examples before exercises (M = 4.54, Strongly Agree), activities that improve problem-solving skills (M = 4.44), and checking whether everyone understands the lesson (M = 4.31) were rated highest. Opportunities to ask questions during discussions (M = 3.84) and encouragement to explain answers (M = 4.01) were rated lowest, although still positively, so learner-initiated questioning and explanation is the area that most needs strengthening. Since instructional quality includes the depth and cognitive demand of teaching (Mu et al., 2022), a questionnaire of this kind reflects perceived practices and not the quality of instruction in actual lessons.

The mean RMA score of 19.39 out of 40 (Table 4) is about 48% of the maximum score. About seven in ten learners (71.15%) were in the Beginning and Developing categories, while only 25.64% reached the Proficient or Advanced levels, and scores varied widely (SD = 6.94). Many learners therefore still needed support in understanding problems, selecting strategies, carrying out procedures, and reaching correct answers (Olivares et al., 2021; Ukobizaba et al., 2021), despite their generally positive reports of the classroom conditions.

The canonical correlation (Table 5) shows that learning climate shared only about 1% of its variability with RMA scores, and neither peer interactions (−.07) nor teacher–student interactions (.01) carried the association. Even teacher–student interactions, the highest-rated dimension, showed essentially no relationship with performance. A supportive climate can benefit participation, communication, and belonging (Hennessy et al., 2023; Štremfel et al., 2024), but it does not by itself teach the skills the RMA measures, such as understanding a problem, choosing a strategy, and checking an answer (Olivares et al., 2021).

Anxiety regulation skills had a small negative correlation with problem-solving skills (Table 6), which concerns a different construct from anxiety level, whose negative

relationship with achievement is well documented (Brunner et al., 2026). A learner may stay calm and still lack the conceptual understanding, reasoning, and strategic thinking needed to solve problems, and learners who struggle more may also report using more coping strategies. Instructional strategies had a negligible correlation, which suggests that a high perception score does not necessarily reflect the depth, frequency, or cognitive demand of the instruction that took place (Mu et al., 2022).

The overall regression model (Table 7) was significant, so the null hypothesis that the three predictors do not significantly predict Mathematics problem-solving skills was rejected. The contribution was modest, however: the predictors explained 12.7% of the variance in problem-solving skills, and 87.3% remained unexplained. Mathematics anxiety regulation skills was the only predictor that made a significant unique contribution, and its coefficient was negative. With the other predictors held constant, a one-point increase in the reported regulation rating corresponded to a decrease of about 2.58 points in the predicted RMA score. The upper limit of the interval (−0.02) was very close to zero and the direction was unexpected, so this finding must be interpreted cautiously and does not mean that using regulation strategies lowers problem-solving skills. One possible interpretation is that learners who find Mathematics more difficult report using more strategies to manage worry and continue working, but the predictive-correlational design cannot establish this explanation or the direction of the relationship.

Learning climate and instructional strategies did not make significant unique contributions. This does not mean that classroom relationships and instruction are unimportant. Learning climate may support participation, communication, and persistence without strongly predicting a single test score (Baars et al., 2021; Hennessy et al., 2023), and instructional strategies may become more meaningful when they give learners regular opportunities to analyze problems, explain solution methods, compare strategies, and check their answers (Cevikbas et al., 2022; Mu et al., 2022; Olivares et al., 2021). Other factors that were not measured, such as prior achievement, conceptual knowledge, motivation, attendance, family support, and opportunities for direct problem-solving practice, may account for more of the differences in performance.

Conclusions

For Research Question 1, learners experienced a High learning climate, with teacher–student interactions rated higher than peer interactions, although encouragement from classmates during problem solving was less consistent. For Research Question 2, learners reported High mathematics anxiety regulation skills, with managing immediate emotional reactions, such as not panicking easily, as the weaker area. For Research Question 3, learners assessed their teachers' instructional strategies as High, although opportunities to ask questions and explain answers were rated lowest.

For Research Question 4, the learners' Mathematics problem-solving skills were only at the Developing level, and most learners were in the Beginning and Developing categories. Supportive conditions therefore did not necessarily correspond with strong problem-solving performance. For Research Question 5, none of the three variables was significantly related to problem solving when examined separately, but together they

significantly yet modestly predicted it, and only mathematics anxiety regulation skills made a significant unique contribution, in a negative direction that should be read cautiously. The null hypothesis was rejected.

Recommendations

Based on the findings, Mathematics teachers are encouraged to keep their strong support while giving learners more chances to ask questions, explain their reasoning, and compare solution methods, and to strengthen peer encouragement during difficult tasks through clear group roles and routines. School administrators may support professional development on mathematical problem solving, classroom dialogue, formative assessment, and scaffolding, and provide varied, multi-step problems for regular practice. Parents and guardians may encourage regular Mathematics practice at home, ask children to explain how an answer was reached, and give calm, constructive encouragement during difficult tasks, while curriculum developers and Mathematics coordinators may continue to emphasize tasks that require reasoning, strategy selection, explanation, and verification of solutions. The most important recommendation is for schools to pair a supportive classroom with regular, direct problem-solving practice in which learners explain, compare, and verify their solutions.

Future researchers are encouraged to replicate the study with larger and more diverse samples, other grade levels, and other districts. Because the negative contribution of anxiety regulation skills was unexpected, they should measure mathematics anxiety level separately from the strategies used to regulate it to verify and explain this result. They may also combine learner self-reports with classroom observations, teacher reports, and repeated performance measures, and examine other factors such as prior achievement, motivation, attendance, parental involvement, and learning resources that may explain more of the differences in problem-solving skills.

Compliance with Ethical Standards

The researcher declares that the study complied with accepted ethical standards for research involving human participants, guided by the principles of respect for persons, beneficence, and justice (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Research ethics approval and permissions from the concerned school authorities were secured before data collection. Written informed consent was obtained from the parents or legal guardians of the learners, and written assent was obtained from the learners themselves. Participation was voluntary, and the learners were free to withdraw at any time without any academic penalty. Learners who did not participate were given an appropriate alternative activity, and their well-being was safeguarded throughout the study. Anonymity was maintained through the use of research codes instead of names, only grouped results were reported, and the data were stored securely in line with the Data Privacy Act of 2012 (Republic of the Philippines, 2012). The results were used purely for research, and the researcher declares that no conflict of interest exists in the conduct of the study. Plagiarism was strictly avoided, all sources were acknowledged, and the findings were interpreted without bias. Artificial intelligence (Claude, developed by Anthropic) was used to assist in

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