INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
Online ISSN: 3028-032X | Print ISSN: 3028-0370
PUBLISHED BY: RISEJOURNALS.ORG
Volume 2, Issue no. 6 | 98

Difficulties Encountered by the Grade 5 Learners in Solving Math Problems

DOI: 10.5281/zenodo.15605593

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Abstract:

The primary goal of studying mathematics is to develop problem-solving skills. This study aimed to determine the level of difficulties the Grade 5 learners encountered in solving Math problems in a district of a large-sized division in Central Philippines for the school year 2022-2023, as the basis for an enrichment plan. It employed a descriptive method utilizing a self-made questionnaire subjected to validity and reliability tests on 193 Grade 5 learners. Findings revealed that the level of difficulties encountered by Grade 5 learners in solving Math problems was moderate in terms of comprehension skills but high in terms of teachers' pedagogy and Mathematical processes. The same result was revealed when the respondents were grouped according to sex, average family monthly income, and size of the family, Further, no significant difference in the level of difficulties encountered by Grade 5 learners in solving Math problems in all areas when grouped and compared according to the aforementioned variables except in the area of teachers' pedagogy when grouped and compared according to average family monthly income. It was concluded that learners struggle more with how math concepts are taught and the processes required to solve problems than with basic comprehension of problem statements. Thus, it is recommended that intervention programs be focused on improving teachers' strategies and enhancing the procedural fluency of learners in solving math problems.

Keywords: Difficulties, Solving Math Problems, Enrichment Plan

Introduction:

Nature of the Problem

The primary aim of mathematics education is to cultivate problem-solving skills, enabling learners to apply mathematical thinking in everyday life. Mathematics is not only essential for solving mathematical tasks but also contributes to the development of cognitive strategies useful in non-mathematical contexts (Phonapichata & Wongwanich, 2014). However, students often face challenges in problem-solving due to limited comprehension skills, particularly in interpreting word problems and translating them into mathematical equations. Serad (2019) emphasizes that poor reading comprehension significantly hinders students' ability to solve math problems. Furthermore, pedagogical shortcomings—such as the inability of teachers to effectively convey concepts and problem-solving strategies—contribute to learners' difficulties. Despite the acknowledged importance of problem-solving, many pre-service teachers still lack sufficient competence in this area (Koehler & Mishra, 2020). Additionally, the abstract and interconnected nature of mathematics requires higher-order cognitive processing, posing another layer of difficulty for learners (Gafoor & Kurukkan, 2015).

In the observed research setting, even students who grasp mathematical concepts struggle with consistent application. Errors frequently stem from misreading instructions, incorrect placement of numbers, or basic computational mistakes. Many learners also expressed difficulty in understanding the problem-solving process, often attributing it to inadequate teacher explanations. Some students reported disinterest in word problems, finding them tedious, especially when teachers failed to make discussions engaging or clear. These issues highlight both cognitive and instructional gaps that impact the development of effective problem-solving skills.

In such a context, this present study is conceived for the researcher to investigate further the level of difficulties Grade 5 learners encountered in solving math problems, so that appropriate action can be taken to address such difficulties.

Current State of Knowledge

Learners often face significant challenges in solving math problems due to the abstract nature of mathematics and the cognitive demands involved, particularly in interpreting and solving word problems (Phonapichata & Wongwanich, 2014). These problems require students to understand complex language structures and extract relevant information, which becomes even more difficult when reading comprehension is poor (Kelemanik & Creighton, 2016; Serad, 2019). This issue is compounded by insufficient preparation among some pre-service teachers and a lack of real-world applications in classroom instruction, further limiting students' ability to relate to and internalize mathematical concepts (Koehler & Mishra, 2020; Ali, 2019). As such, consistent practice, engaging teaching strategies, and contextual learning are critical in helping students overcome these obstacles.

Expanding on this, problem-solving plays a central role in mathematics education by preparing students to apply math to real-life contexts (Latanga, 2023), yet challenges persist due to the mismatch between students' learning styles and conventional teaching methods (Jazuli et al., 2017). Research highlights the importance of adopting individualized approaches, such as mastery learning, to address these challenges and promote self-confidence and deeper understanding (Mulwa, 2015). Studies show that difficulties extend beyond comprehension to include conceptual and procedural errors, which are often unaddressed by surface-level strategies like keyword identification (Newman et al., 2014).

Moreover, students' proficiency is influenced not just by instructional quality, but also by socioeconomic factors—including parental education, income, and family structure—that affect early math readiness and cognitive development (Marks & Pokropek, 2019; Lombardi & Dearing, 2020). Despite these systemic barriers, research underscores that teaching methods, especially those that connect abstract concepts to concrete experiences, can significantly improve comprehension and retention (Reyes et al., 2019). However, persistent gaps in instructional quality, limited use of varied teaching tools, and student attitudes continue to hinder learning outcomes (Siniguian, 2017; Talikan, 2021), suggesting a need for more targeted, inclusive, and adaptive approaches to mathematics instruction.

Theoretical Underpinnings

This study is grounded in David Perkins' (2007) Theory of Difficulty, which explains that certain concepts are inherently challenging to learn due to their abstract, dynamic, conditional, and nonlinear nature. Perkins highlights that these conceptual complexities make mastery difficult, as they often require deeper cognitive engagement than straightforward, mechanical tasks. Supporting this, Shabi (2018) emphasizes that understanding conceptual difficulties can be improved through insights from learning and development literature, which offer strategies for addressing such challenges through focused interventions aimed at enhancing performance.

This theoretical framework is particularly relevant to the study of Grade 5 learners' difficulties in solving math problems, which include issues in comprehension, ineffective pedagogy, and gaps in understanding mathematical processes. When learners struggle to translate word problems into mathematical equations and receive insufficient guidance from teachers, their ability to grasp problem-solving steps diminishes, often resulting in poor performance. The Theory of Difficulty helps identify these common areas of struggle and provides a basis for analyzing their causes, with the ultimate goal of informing more effective teaching and learning practices.

Objectives of the Study

This study aimed to determine the level of difficulties the Grade 5 learners encountered in solving math problems in a district of a large division in Central Philippines for the school year 2022-2023 as a basis for an enrichment plan. Specifically, it sought to answer the following: 1) the level of difficulties encountered by Grade 5 learners in solving math problems in the area of comprehension skills, teachers' pedagogy, and mathematical processes; 2) the level of difficulties encountered by Grade 5 learners in solving math problems when grouped according to the aforementioned variables; and 3) the significant difference in the level of difficulties encountered by Grade 5 learners in solving math problems when grouped and compared according to the aforementioned variables.

Methodology:

This section presents the discussion of the research methodology used, the subjects and respondents of the study, the research instruments used, the validity and reliability of the instruments, the procedure for data gathering, and the statistical tools and procedure for data analysis.

Research Design

This study utilized the descriptive research method to assess the level of difficulties encountered by Grade 5 learners in solving math problems during the 2022–2023 school year in a school within a large district in Central Philippines, serving as a basis for an enrichment plan. Descriptive research, which aims to systematically and accurately describe a population or phenomenon, is suited for identifying prevailing conditions without exploring causality (McCombes,

2019). The study focused on quantitatively describing the learners' challenges using a questionnaire to capture current difficulties in mathematical problem-solving, making the chosen method appropriate for achieving the research objectives.

Study Respondents

The respondents of this study were the 193 Grade 5 learners selected through purposive sampling. Purposive sampling is a technique for discovering and choosing instances to efficiently use scarce research resources by choosing respondents who are most likely to provide relevant and valuable information (Palinkas et al., 2015). In order to choose the most valuable sample, the researcher must apply their skills.

Instruments

The researcher employed a self-made questionnaire composed of two parts: Part I gathered respondent profiles, including sex, average monthly family income, and family size, while Part II assessed the level of difficulties Grade 5 learners faced in solving math problems, focusing on comprehension skills, teachers' pedagogy, and mathematical processes, using a 5-point Likert scale. To ensure validity—defined as the extent to which a tool measures what it is intended to measure (Middleton, 2019)—the instrument underwent face and content validation by three qualified experts in educational management and mathematics, resulting in a validity score of 4.89, rated as excellent. Reliability, which measures consistency (Middleton, 2019), was tested using Cronbach's Alpha, a statistical tool for internal consistency (Taber, 2018). The reliability test, conducted with 30 non-respondent Grade 5 learners from the same district, yielded an index of 0.796, interpreted as acceptable.

Data Gathering Procedure

A letter requesting permission to conduct the study was sent to the Schools Division Superintendent. After the approval was sought, the researcher informed the district supervisor of the administration of the questionnaire, which she did during the learners ' vacant periods. The questionnaires were retrieved right after they were answered to ensure the complete return of the questionnaires.

Data Analysis and Statistical Treatment

Objective No. 1 utilized a descriptive-analytical scheme and mean to determine the level of difficulties encountered by Grade 5 learners in solving math problems in communication skills, teachers' pedagogy, and mathematical processes.

Objective No.2 also employed a descriptive-analytical scheme and mean to describe the level of difficulties encountered by Grade 5 learners in solving math problems when grouped according to the aforementioned variables.

Objective No.3 used a comparative analytical scheme and Mann-Whitney U test to determine the significant difference in the level of difficulties encountered by Grade 5 learners in solving math problems when grouped and compared according to the aforementioned variables.

Ethical Consideration

To ensure confidentiality, the researcher kept the respondents' information secret and did not release it to the public under any circumstances. All the data from the study instrument was kept in a safe place and was accessible only to the researcher. The researcher also ensured the respondents' anonymity by instructing them that writing their names was optional. The researcher observed safety and health norms while directly presenting the survey questionnaire to the respondents. Before administering the questionnaires, the researcher asked the teachers for permission to be the chosen respondents of the study. The researcher explained the purpose of the study and that participation is voluntary.

Results and Discussion

This section deals with the presentation, analysis and interpretation of data gathered to carry out the objectives of this study. All these were made possible by following certain appropriate procedures so as to give the exact data and solution to each specific problem.

Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to the Comprehension Skills, Teachers' Pedagogy, and Mathematical Processes

Table 3
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills

Items	Mean	Interpretation
In solving Math problems, I find difficulty in…		
1. reading mathematical words.	2.03	Low Level
2. turning a word problem into a number sentence.		
3. finding clues that will help figure out how to solve the problem, like adding or subtracting.	2.72	Moderate Level
4. skipping or selecting extra information not needed for computation		
5. representing and analyzing relationships using tables, charts, and graphs.	3.15	Moderate Level
6. writing equations to represent relationships.	3.31	Moderate Level
7. figuring out what math operation to use	3.35	Moderate Level
8. remembering formulas and procedures.	3.60	High Level
9. relating mathematical ideas to the real world.	3.68	High Level
10. remembering verbal or written descriptions of math concepts	3.73	High Level
Overall Mean	**3.15**	**Moderate Level**

Table 3 reveals the level of difficulties encountered by Grade 5 learners in solving math problems according to comprehension skills. As shown in the table, the overall mean score is 3.15, with a verbal interpretation of a moderate level. Grade 5 learners can grasp straightforward instructions and concepts, yet challenges arise when problems involve abstract reasoning, multi-step solutions, or unfamiliar terminologies. Further, the lowest mean result is 2.03, or a low level. This is item 1 on the difficulty of reading mathematical words. Inspecting the table further, it can be noted that the highest mean result is 3.73, which is a high level in item 10. It is on the learners' difficulty remembering verbal or written descriptions of math concepts.

Grade 5 learners struggle to retain and process abstract or complex information. This happens when descriptions are not provided with concrete examples, visual aids, or hands-on activities. Learners may struggle to connect the concepts to real-world applications, prompting difficulties in comprehension and recall.

This supports Siniguian's (2017) study, which showed that one of the students' difficulties is their inability to use correct mathematics, leading to difficulty understanding written or verbal directions or explanations in math word problems. Additionally, this aligns with the study of Unson (2021), which showed that the very root of difficulties experienced by students in vocabulary and identification of information is the poor grasp of concepts, which need to be addressed. As confirmed further, the pupils found it challenging to solve word problems and translate verbal expressions into mathematical symbols (Mingke & Alegre, 2019).

Table 4
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Teachers' Pedagogy

Items	Mean	Interpretation
I find it difficult when the teacher does not…		
1. explain the objectives of the lesson at the start of the class	3.48	Moderate Level
2. have mastery of the subject matter, especially problem-solving.	3.53	High Level
3. share updates on present trends relevant to problem-solving.	3.64	High Level
4. use various teaching aids to present the lesson.	3.76	High Level
5. give illustrative examples first before giving practice exercises	3.91	High Level
6. vary the activities involving word problems.	3.93	High Level
7. show patience when answering our questions or clarifying questions.	3.93	High Level
8. review basic concepts to be used in problem-solving.	4.05	High Level
9. provide positive reinforcement to let students know when they have mastered a new concept or skill.	4.13	High Level
10. help the learners identify their problem-solving errors.	4.16	High Level
Overall Mean	**3.86**	**High Level**

Table 4 depicts the level of difficulties encountered by Grade 5 learners in solving math problems according to teachers' pedagogy. It shows an overall mean score of 3.86, which is a high level. This is because teaching strategies may not always be aligned with the learners' needs and learning styles. Moreover, item 1 obtained the lowest mean result of 3.48, or a moderate level. The difficulty in solving math problems arises when the teacher does not explain the lesson's objectives at the start of the class.

On the other hand, item 10 got the highest mean score of 4.16, which is interpreted as a high level of difficulty in solving word problems when the teacher does not help the learners identify their problem-solving errors. Without guidance in reflecting on their understanding of where they went wrong, learners miss the opportunity to develop critical thinking and self-correction skills. This lack of feedback prevents them from improving their problem-solving strategies.

This conforms with the result of Newton et al. (2014), which reveals that understanding the specific errors made by learners in tackling algebraic tasks related to real-world scenarios can equip learners with the tools necessary for critical thinking and practical problem-solving. Moreover, understanding the errors made by learners is crucial for informed decision-making and proposing effective interventions to assist them (Kenney & Ntow, 2024).

On the other hand, the result does not lend credence to the study of Jazuli et al. (2017), revealing that strategies used by the Math teachers do not enable students to improve—after all, teachers' teaching pedagogy influences effective teaching (Mupa & Chinooneka, 2015).

Table 5
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Mathematical Processes

Items	Mean	Interpretation
I find difficulty in…		
1. connecting abstract mathematical ideas to concrete objects.	3.81	High Level
2. reasoning and proving	3.92	High Level
3. reflecting on which approach to solving is appropriate and better.	3.99	High Level
4. relating concepts and skills from one strand of mathematics to the other.	4.05	High Level
5. posing and asking relevant questions.	3.29	Moderate Level
6. representing mathematical ideas and relationships properly.	4.07	High Level
7. selecting appropriate technologies and tools to perform particular mathematical tasks.	4.08	High Level
8. making mental computation and estimation	3.97	High Level
9. communicating their reasoning to others, including by gesturing.	4.19	High Level
10. performing complex operations.	4.52	Very High Level
Overall Mean	**3.99**	**High Level**

Table 5 presents the level of difficulties encountered by Grade 5 learners in solving math problems according to mathematical processes. The respondents obtained an overall mean of 3.99 with a verbal interpretation of a high level. As these processes often require a combination of skills, such as comprehension, reasoning, computation, and application, which can be challenging to integrate effectively, learners may struggle, especially when they lack a strong foundation in basic math skills. Furthermore, the lowest mean result of 3.29, or moderate level, was on item 5 on the difficulty of posing and asking relevant questions.

Remarkably, item 10 obtained the highest mean result of 4.52, or a very high level, on the difficulty of performing complex operations. This indicates gaps in foundational skills such as basic arithmetic, and a lack of confidence or familiarity with complex problem types hinders their ability to solve problems effectively. This aligns with the research finding of Suryadi et al. (2024) that some students still do not understand the concepts and procedures of counting operations, such as addition, subtraction, multiplication, and division. The pupils seldom know what operations to use and what process to follow, and they do not like reading word problems (Mingke & Alegre, 2019).

Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills, Teachers' Pedagogy, and Mathematical Processes when grouped according to Sex, Average Family Monthly Income, and Size of the Family

Table 6
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems According to Comprehension Skills when grouped according to Sex

Items	Male		Female	
	Mean	Interpretation	Mean	Interpretation
In solving Math problems, I find difficulty in…				
1. reading mathematical words.	2.13	Low Level	1.94	Low Level
2. turning a word problem into a number sentence.	2.81	Moderate Level	2.63	Moderate Level
3. finding clues that will help figure out how to solve the problem, like adding or subtracting.	2.95	Moderate Level	2.94	Moderate Level
4. skipping or selecting extra information not needed for computation	3.01	Moderate Level	3.05	Moderate Level
5. representing and analyzing relationships using tables, charts, and graphs.	3.06	Moderate Level	3.23	Moderate Level
6. writing equations to represent relationships.	3.32	Moderate Level	3.31	Moderate Level
7. figuring out what math operation to use	3.31	Moderate Level	3.40	Moderate Level
8. remembering formulas and procedures.	3.59	High Level	3.60	High Level
9. relating mathematical ideas to the real world.	3.71	High Level	3.66	High Level

10. remembering verbal or written descriptions of math concepts	3.79	High Level	3.66	High Level
Overall Mean	**3.17**	**Moderate Level**	**3.14**	**Moderate Level**

Table 6 presents the level of difficulties in classroom management of elementary teachers according to comprehension skills when grouped according to sex. As evident from the table, both the male and the female groups have a moderate level, obtaining mean results of 3.17 and 3.14, respectively. Veering closely at the mean results, it is in item 1 where the mean results vary greatly: 2.13 for the male group and 1.94 for the female group, with the same low-level interpretation. This is due to the difficulty of reading mathematical words.

Grade 5 female learners may have less difficulty reading mathematical words than males due to verbal and language development differences. Girls tend to excel in linguistic and reading-related tasks at this age. This advantage may make it easier for female learners to decode, interpret, and pronounce mathematical terms accurately. This supports the study of Bjorn et al. (2018) that there were no gender differences in math word problem-solving performance, but the girls were better in technical reading and reading comprehension.

Table 7
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Teachers' Pedagogy when grouped according to Sex

Items	**Male**		**Female**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
I find it difficult when the teacher does not…				
1. explain the objectives of the lesson at the start of the class	3.31	Moderate Level	3.65	High Level
2. have mastery of the subject matter, especially problem-solving.	3.42	Moderate Level	3.64	High Level
3. share updates on present trends relevant to problem-solving.	3.58	High Level	3.69	High Level
4. use various teaching aids to present the lesson.	3.74	High Level	3.79	High Level
5. give illustrative examples first before giving practice exercises	3.93	High Level	3.90	High Level
6. vary the activities involving word problems.	3.96	High Level	3.91	High Level
7. show patience in answering our questions or clarifications	3.97	High Level	3.89	High Level
8. conduct a review of basic concepts to be used in problem-solving.	4.08	High Level	4.02	High Level
9. provide positive reinforcement to let students know when they have mastered a new concept or skill.	4.18	High Level	4.08	High Level
10. help the learners identify their problem-solving errors.	4.26	High Level	4.05	High Level
Overall Mean	**3.84**	**High Level**	**3.87**	**High Level**

Table 7 depicts the level of difficulties encountered by Grade 5 learners in solving math problems according to teachers' pedagogy when grouped according to sex. The male and the female groups have high difficulties according to teachers' pedagogy, with the mean results of 3.84 and 3.87, respectively.

Taking a closer look at each result, it can be noted that item 1 had mean results with greater variation; males obtained 3.31, or a moderate level, while females obtained 3.65, or a high level. It is the difficulty learners meet when the teacher does not explain the lesson's objectives at the start of the class. This is because girls tend to benefit more from clear structure and guidance in the learning process when expectations and goals are explicitly stated.

This result aligns with Rusdi et al.'s (2020) study, which found that male students can explain the strategy and the steps of solving the problem quite clearly, but less so, while female students can explain the strategy and steps to resolve the problem clearly and more so.

Table 8
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Mathematical Processes when grouped according to Sex

Items	**Male**		**Female**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
I find difficulty in…				
1. connecting abstract mathematical ideas to concrete objects.	3.85	High Level	3.77	High Level

2.	reasoning and proving	3.93	High Level	3.91	High Level
3.	reflecting on which approach to solving is appropriate and better.	4.04	High Level	3.95	High Level
4.	relating concepts and skills from one strand of mathematics to the other.	4.07	High Level	4.02	High Level
5.	posing and asking relevant questions.	3.31	Moderate Level	3.27	Moderate Level
6.	representing mathematical ideas and relationships properly.	4.07	High Level	4.07	High Level
7.	selecting appropriate technologies and tools to perform particular mathematical tasks.	4.08	High Level	4.08	High Level
8.	making mental computation and estimation	4.02	High Level	3.93	High Level
9.	communicating their reasoning to others, including by gesturing.	4.23	High Level	4.15	High Level
10.	performing complex operations.	4.53	Very High Level	4.51	Very High Level
Overall Mean		**4.01**	**High Level**	**3.97**	**High Level**

Table 8 shows the level of difficulties encountered by Grade 5 learners in solving math problems according to mathematical processes when grouped according to sex. The male group obtained a mean score of 4.01 while the female group got 3.97; both were interpreted as a high level.

Examining further the mean results, which differ greatly, it can be observed that in item 1 on the difficulty of connecting abstract mathematical ideas to concrete objects, males got 3.85 while females got 3.77. Both mean results had a verbal interpretation of a high level. Males having a greater mean result than females indicates that males focus more on procedural or symbolic aspects of mathematics, making it harder to establish connections to concrete representations. In contrast, females tend to rely on visual and tangible examples, facilitating the connection between abstract ideas and concrete objects. With this result, a targeted intervention plan can be designed to consider the specific mathematical difficulties and any observable gender-based trends.

This does not support the result of the study of Reyes et al. (2019) that teaching students concrete things before moving to abstraction from actual objects through symbols is particularly effective for students who have difficulties in mathematics, both male and female.

Table 9
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills when grouped according to Average Family Monthly Income

Items	**Lower**		**Higher**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
In solving Math problems, I find difficulty in…				
1. reading mathematical words.	2.09	Low Level	2.00	Low Level
2. turning a word problem into a number sentence.	2.90	Moderate Level	2.62	Moderate Level
3. finding clues to help figure out how to solve the problem, like adding or subtracting.	3.09	Moderate Level	2.86	Moderate Level
4. skipping or selecting extra information not needed for computation	3.16	Moderate Level	2.96	Moderate Level
5. representing and analyzing relationships using tables, charts, and graphs.	3.26	Moderate Level	3.09	Moderate Level
6. writing equations to represent relationships.	3.47	Moderate Level	3.22	Moderate Level
7. figuring out what math operation to use	3.51	High Level	3.26	Moderate Level
8. remembering formulas and procedures.	3.79	High Level	3.49	Moderate Level
9. relating mathematical ideas to the real world.	3.80	High Level	3.62	High Level
10. remembering verbal or written descriptions of math concepts.	3.83	High Level	3.67	High Level
Overall Mean	**3.29**	**Moderate Level**	**3.08**	**Moderate Level**

Table 9 illustrates the level of difficulties encountered by Grade 5 learners in solving math problems according to comprehension skills when grouped according to average family monthly income. The lower category obtained an overall mean score of 3.29, while the higher category obtained 3.08; both were interpreted as a moderate level.

Since both groups had the same moderate level of difficulty in terms of comprehension skills, there is a need to investigate further where the mean scores varied greatly. It is evident in the table that item 8 had the most significant difference in mean scores: 3.79, or high level for the lower group, while 3.49, or moderate level for the higher group. This is on the difficulty of remembering formulas and procedures. Learners from lower-income families may have greater difficulty remembering formulas and procedures in problem-solving due to limited access to educational

resources and less parental support. Further, it could be traced to inadequate exposure to supplementary materials like books, tutoring, or technology, and fewer opportunities for consistent practice.

This contradicts Salde's (2023) study, which revealed that regardless of family income, learners are proficient in following procedures and applying formulas in Math. However, some pupils from low-status families fail to perform effectively even though schools are adequately equipped with resources (Hill, 2014).
Generally, the result is similar to that of Marks and Pokropek (2019), which confirmed the critical effect of the parents' educational level and family income as SES indicators on mathematical problem-solving.

Table 10
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Teachers' Pedagogy when grouped according to Average Family Monthly Income

Items	Lower Mean	Interpretation	Higher Mean	Interpretation
I find it difficult when the teacher does not…				
1. explain the objectives of the lesson at the start of the class	3.50	High Level	3.47	Moderate Level
2. have mastery of the subject matter, especially problem-solving.	3.51	High Level	3.54	High Level
3. share updates on present trends relevant to problem-solving.	3.66	High Level	3.63	High Level
4. use various teaching aids to present the lesson.	3.84	High Level	3.72	High Level
5. give illustrative examples first before giving practice exercises	3.94	High Level	3.89	High Level
6. vary the activities involving word problems.	4.01	High Level	3.89	High Level
7. show patience in answering our questions or clarifications	4.06	High Level	3.85	High Level
8. conduct a review of basic concepts to be used in problem-solving.	4.09	High Level	4.03	High Level
9. provide positive reinforcement to let students know when they have mastered a new concept or skill.	4.21	High Level	4.08	High Level
10. help the learners identify their problem-solving errors.	4.26	High Level	4.10	High Level
Overall Mean	**3.91**	**High Level**	**3.83**	**High Level**

Table 10 presents the level of difficulties encountered by Grade 5 learners in solving math problems according to the teachers' pedagogy when grouped according to average family monthly income. Both the lower and the higher groups have a high difficulty level, with mean scores of 3.91 and 3.83, respectively.

It is in item 7, where the results varied greatly: 4.06 for the lower group and 3.85 for the upper group. It is a learner's difficulty when the teacher is not patient in answering questions or clarifications. Though the verbal interpretation was at a high level for both groups, that of the lower group was greater than that of the higher group. Learners from lower-income families receive less attention from parents who may be working to earn a living; hence, they rely more on their teachers to assist them in problem-solving activities. If teachers are not supportive in guiding these learners to solve math problems, surely, this would cause them difficulty tackling the task.

This fails to substantiate the result of the study of Morre and Casocot (2022) that students' progress depends on a wide range of teaching strategies, not on socio-economic status. It is not always best to choose one method over another; instead, the learning styles of the students and the degree of difficulty of the subject matter covered must be given priority.

Table 11
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Mathematical Processes when grouped according to Average Family Monthly Income

Items	Lower Mean	Interpretation	Higher Mean	Interpretation
I find difficulty in…				
1. connecting abstract mathematical ideas to concrete objects.	3.84	High Level	3.79	High Level
2. reasoning and proving	3.96	High Level	3.89	High Level
3. reflecting on which approach to solving is appropriate and better.	4.01	High Level	3.98	High Level
4. relating concepts and skills from one strand of mathematics to the other.	4.04	High Level	4.05	High Level
5. posing and asking relevant questions.	3.24	Moderate Level	3.31	Moderate Level

6. representing mathematical ideas and relationships properly.	4.04	High Level	4.09	High Level
7. selecting appropriate technologies and tools to perform particular mathematical tasks.	4.10	High Level	4.07	High Level
8. making mental computation and estimation	4.00	High Level	3.96	High Level
9. communicating their reasoning to others, including by gesturing.	4.17	High Level	4.20	High Level
10. performing complex operations.	4.50	Very High Level	4.53	Very High Level
Overall Mean	**3.99**	**High Level**	**3.99**	**High Level**

Table 11 reveals the level of difficulties encountered by Grade 5 learners in solving math problems according to mathematical processes when grouped according to average family monthly income. The lower and higher categories obtained the same mean score of 3.99, with a verbal interpretation of a high level.

Veering closely at each item's result, greater variation is found in item 2 on the difficulty in reasoning and proving, where the lower group got 3.96 and the higher group got 3.89; both are interpreted as a high level. Learners from lower-income families may have greater difficulty reasoning and problem-solving due to limited access to quality learning resources that could have exposed them to diverse problem-solving strategies and logical reasoning exercises. Also, these learners may experience educational gaps due to inconsistent attendance caused by financial pressures or other socio-economic challenges.

This is similar to the result where in the skills of proving and decision-making and conjecturing and reasoning; more students needed significant support as these were only at a transforming level (Alarcon & Abanto, 2024), and more learners from low-income families are in such level as far as reasoning and proving are concerned (Tallud & Caballes, 2023).

Table 12
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems According to Comprehension Skills When Grouped According to the Size of the Family

Items	**Smaller**		**Bigger**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
In solving Math problems, I find difficulty in…				
1. reading mathematical words.	2.08	Low Level	2.00	Low Level
2. turning a word problem into a number sentence.	2.65	Moderate Level	2.77	Moderate Level
3. finding clues that will help figure out how to solve the problem, like adding or subtracting.	2.90	Moderate Level	2.97	Moderate Level
4. skipping or selecting extra information not needed for computation	2.99	Moderate Level	3.06	Moderate Level
5. representing and analyzing relationships using tables, charts, and graphs.	3.05	Moderate Level	3.22	Moderate Level
6. writing equations to represent relationships.	3.22	Moderate Level	3.37	Moderate Level
7. figuring out what math operation to use	3.29	Moderate Level	3.39	Moderate Level
8. remembering formulas and procedures.	3.55	High Level	3.63	High Level
9. relating mathematical ideas to the real world.	3.60	High Level	3.74	High Level
10. remembering verbal or written descriptions of math concepts.	3.68	High Level	3.76	High Level
Overall Mean	**3.10**	**Moderate Level**	**3.19**	**Moderate Level**

Table 12 highlights the level of difficulties in solving math problems according to comprehension skills encountered by Grade 5 learners in solving math problems when grouped according to the size of the family. It is evident in the table that both the smaller and the bigger categories had a moderate level of difficulty as to comprehension skills; 3.10 for the smaller group, while 3.19 for the bigger group.

Upon closely examining the results for each item, greater variation is observed in item 5, which pertains to difficulty in representing and analyzing relationships using tables, charts, and graphs. The smaller group scored 3.05, while the bigger group scored 3.22, with both scores interpreted as high level. This indicates that learners from larger families face bigger challenges in representing and analyzing relationships using tables, charts, and graphs due to having more siblings who compete for resources that support skill development. Likewise, they are likely in a less conducive learning environment that may hinder their ability to practice and refine analytical skills.

This is similar to the research findings that conclude that the topmost difficulty in solving problems is representing data in symbols and diagrams, and solving problems that require a pie chart solution (Loli & Pramudya, 2021). This is true for all learners regardless of the size of the family they belong to.

Table 13
Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Teachers' Pedagogy when grouped according to the Size of the Family

Items	Smaller		Bigger	
	Mean	Interpretation	Mean	Interpretation
I find it difficult when the teacher does not…				
1. explain the objectives of the lesson at the start of the class	3.47	Moderate Level	3.49	Moderate Level
2. have mastery of the subject matter, especially problem-solving.	3.54	High Level	3.53	High Level
3. share updates on present trends relevant to problem-solving.	3.63	High Level	3.64	High Level
4. use various teaching aids to present the lesson.	3.65	High Level	3.83	High Level
5. give illustrative examples first before giving practice exercises	3.90	High Level	3.92	High Level
6. vary the activities involving word problems.	3.88	High Level	3.97	High Level
7. show patience in answering our questions or clarifications	3.91	High Level	3.94	High Level
8. conduct a review of basic concepts to be used in problem-solving.	4.03	High Level	4.07	High Level
9. provide positive reinforcement to let students know when they have mastered a new concept or skill.	4.12	High Level	4.14	High Level
10. help the learners identify their problem-solving errors.	4.12	High Level	4.18	High Level
Overall Mean	**3.83**	**High Level**	**3.87**	**High Level**

Table 13 illustrates the level of difficulties encountered by Grade 5 learners in solving problems according to teachers' pedagogy when grouped according to family size. The smaller group and the bigger group, in terms of family size, had a high level of difficulty according to teachers' pedagogy, obtaining mean scores of 3.83 and 3.87, respectively.

A closer examination of the results for each item reveals greater variation in item 4, which relates to the difficulty in problem-solving when the teacher does not use various teaching aids to present the lesson. The smaller group had a mean score of 3.65, while the bigger group scored 3.83, with both scores categorized as a high level. This implies that Grade 5 learners from larger families may struggle more with problem-solving when teachers do not use diverse teaching aids because they have less exposure to engaging instructional tools due to many siblings utilizing meager resources; hence, they tend to rely heavily on classroom instruction for understanding.

This strengthens the study, which found that teachers do not employ a variety of teaching methods or prepare a variety of media for use in teaching and learning (Mupa & Chinooneka, 2015). However, there was no explicit mention of the influence of the family's size on teachers' failure to use various teaching aids.

Table 14
Level of Difficulties Encountered by Grade 5 Learners in Solving Problems according to Mathematical Processes when grouped according to the Size of the Family

Items	Smaller		Bigger	
	Mean	Interpretation	Mean	Interpretation
I find difficulty in…				
1. connecting abstract mathematical ideas to concrete objects.	3.85	High Level	3.78	High Level
2. reasoning and proving	3.91	High Level	3.92	High Level
3. reflecting on which approach to solving is appropriate and better.	3.96	High Level	4.02	High Level
4. relating concepts and skills from one strand of mathematics to the other.	4.01	High Level	4.07	High Level
5. posing and asking relevant questions.	3.22	Moderate Level	3.33	Moderate Level
6. representing mathematical ideas and relationships properly.	4.01	High Level	4.11	High Level
7. selecting appropriate technologies and tools to perform particular mathematical tasks.	4.03	High Level	4.12	High Level
8. making mental computation and estimation	3.97	High Level	3.97	High Level
9. communicating their reasoning to others, including by gesturing.	4.14	High Level	4.23	High Level
10. performing complex operations.	4.42	High Level	4.58	Very High Level
Overall Mean	**3.95**	**High Level**	**4.01**	**High Level**

Table 14 shows the level of difficulties encountered by Grade 5 learners in solving problems according to mathematical processes when grouped according to the size of the family. Likewise, both groups obtained a high difficulty level, having mean scores of 3.95 and 4.01, respectively.

Upon further examination, it is clear that item 10 showed the most significant variation in results, with the smaller group scoring 4.42 or a high level and the larger group scoring 3.85. It is due to the difficulty of performing complex operations. This connotes that learners from smaller families may face higher difficulty performing complex operations due to limited collaboration with siblings, which promotes critical thinking in larger family dynamics. Therefore, they rely more on individual effort and less on shared learning experiences that promote cooperative learning.

This contradicts the results of Yu and Han (2023), which revealed that children experience decreased cognitive aspects as their family grows and that sibling additions are only important to first- and second-born children's cognitive development. This cognitive development may include performing complex operations.

Comparative Analysis in the Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills, Teachers' Pedagogy, and Mathematical Processes when grouped and compared according to Sex, Average Family Monthly Income, and Size of the Family

Table 15
Difference in the Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills when grouped and compared according to Sex, Average Family Monthly Income, and Size of the Family

Variable	Category	N	Mean Rank	Mann-Whitney U	*p*-value	*Sig. level*	Interpretation
Sex	Male	95	98.60	4503.00	.694		Not Significant
	Female	98	95.45				
Average Family Monthly Income	Lower	70	104.21	2918.00	.000	0.05	Significant
	Higher	123	92.89				
Size of the Family	Smaller	78	89.72	3917.00	.134		Not Significant
	Bigger	115	101.94				

Table 15 shows the difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to comprehension skills when grouped and compared according to sex, average family monthly income, and family size. As reflected in the table, males had a mean rank of 98.60, and females had 95.45, with a computed value of 4503.000 and a p-value of 0.694, greater than the 0.05 significance level. Regarding average family monthly income, the lower group had a mean rank of 104.21, and the higher group had 92.89, with a computed value of 2918.00 and a p-value of 0.000, less than the 0.05 significance level. As to the size of the family, the smaller group had a mean rank of 89.72, and the bigger group had 101.94, with a computed value of 3917.000 and a p-value of 0.134, which is greater than the 0.05 significance level.

Thus, the null hypothesis that there is no significant difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to comprehension skills when grouped and compared according to sex and size of the family was hereby accepted but rejected when grouped and compared according to average family monthly income. This could mean that both male and female learners and those from smaller or larger families have similar opportunities and challenges in developing comprehension skills. It highlights that other motives might play a more significant role in shaping their mathematical comprehension.

On the other hand, rejecting the null hypothesis when learners are grouped by average family monthly income suggests that learners from families with varying income levels face different challenges in developing comprehension skills. In particular, since learners from lower-income families have a higher mean rank compared to those from higher-income families, it could mean that they struggle more with mathematical comprehension due to having more responsibilities at home and for the family in particular.

This finding provides evidence for the study result that income-based gaps in counting and calculation skills at school entry are partly due to the constraints that low family income places on early numerical learning support (Lombardi & Dearing, 2020).

Regarding sex, the finding opposes the study results that male and female students showed a significant difference in their mathematical problem-solving skills (Amalina & Vidákovich, 2023), as female students outperformed male students in comprehending mathematical expressions. However, this confirms the result of the study of Li et al. (2018), who found gender differences in mathematics to be insignificant in terms of comprehending mathematical terms. Moreover, this result strengthened the study, which concluded that there is no gender difference in mathematical performance and problem-solving skills (Saliho et al., 2018).

Regarding the number of siblings, Latanga's study (2018) aligns with this finding, as no significant difference in the students' reading comprehension skills existed when classified by family structure.

Table 16
Difference in the Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to Comprehension Skills when grouped and compared according to Sex, Average Family Monthly Income, and Size of the Family

Variable	Category	N	Mean Rank	Mann-Whitney U	*p*-value	*Sig. level*	Interpretation
Sex	Male	95	90.72	4058.00	.111		Not Significant
	Female	98	103.09				
Average Family Monthly Income	Lower	70	104.21	3800.00	.161	.05	Not Significant
	Higher	123	92.89				
Size of the Family	Smaller	78	93.91	4244.00	.512		Not Significant
	Bigger	115	99.10				

Table 16 discusses the difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to teachers' pedagogy when grouped and compared according to sex, average family monthly income, and family size. As presented in the table, the mean ranks of males and females were 90.72 and 103.09, respectively, with computed values of 4058.00 and a p-value of 0.111, which is not significant at an alpha of 0.05

Regarding average family monthly income, the mean ranks of the lower and higher groups were 104.21 and 92.89, respectively, with a computed value of 3800.00 and a p-value of 0.161, which is insignificant at an alpha of 0.05. Similarly, no significant result is evident as to the family size as the mean ranks of the smaller and bigger groups were 93.91 and 99.10, respectively, with a computed value of 4244.00 and a p-value of 0.111, greater than the alpha of 0.05.

Having all p-values greater than the 0.05 level of significance led to the acceptance of the null hypothesis that there is no significant difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to teachers' pedagogy when grouped and compared according to sex, average family monthly income, and size of the family. This finding implies that the aforementioned variables have little bearing on Grade 5 learners' difficulty solving math problems based on the teaching methods employed. This indicates further that regardless of whether the Grade 5 learners are male or female, belong to lower-income or higher-income families, or have few or many family members, they experience similar difficulty with the instructional practices provided by the teachers.

This coincides with the finding that sex does not significantly influence Grade 5 learners' difficulties in solving math problems when effective teaching methods are employed (Knight, 2023).

Table 17
Difference in the Level of Difficulties Encountered by Grade 5 Learners in Solving Math Problems according to the Mathematical Processes when grouped and compared according to Sex, Average Family Monthly Income, and Size of the Family

Variable	Category	N	Mean Rank	Mann-Whitney U	*p*-value	*Sig. level*	Interpretation
Sex	Male	95	103.09	4076.50	0.121	.05	Not Significant
	Female	98	91.10				
	Lower	70	95.93	4230.00	0.835		Not Significant

Average Family Monthly Income	Higher	123	97.61			
Size of the Family	Smaller	78	89.28	3882.50	0.100	Not Significant
	Bigger	115	102.24			

Table 17 presents the difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to the mathematical processes when grouped and compared according to sex, average family monthly income, and family size. As shown in the table, the mean ranks of the male and female groups were 103.09 and 91.10, respectively, with a computed value of 4076.50, which is insignificant at a p-value of 0.121.

Regarding average family monthly income, the mean ranks of the lower and higher groups are 95.93 and 97.61, respectively, with a computed value of 4230.00, which is insignificant at a p-value of 0.835. Lastly, as to the size of the family, the mean ranks of the smaller and bigger groups were 89.28 and 102.24, respectively, with a computed value of 3882.00, which is not significant at a p-value of 0.100.

With all the p-values greater than the 0.05 level of significance, the null hypothesis that there is no significant difference in the level of difficulties encountered by Grade 5 learners in solving math problems according to the mathematical processes when grouped and compared according to sex, average family monthly income, and size of the family; was hereby accepted.

The finding implies that the difficulties faced by Grade 5 learners in solving math problems are consistent across sex, family income, and family size in terms of the processes involved in solving Math problems. Whether a learner is male or female, belongs to a family with a lower or higher income, or has few or many siblings, they have similar struggles in comprehending and solving math problems. This may be because Math problem-solving requires critical thinking and process-based reasoning, which are challenging for learners regardless of their background.

This result supports the study of Yu and Yan (2023), which demonstrates no significant difference in children's comprehension level in problem-solving based on family size. Also, Baruch and Levy (2024) showed that boys' achievements were significantly higher in word problem-solving.

Moreover, this finding confirms no significant difference in students' proficiency in processing mathematical solutions when grouped according to socio-economic status (Salde, 2023).

Conclusions:

The study found that most Grade 5 respondents were female from lower-income families with many siblings, and overall, learners experienced moderate difficulties in comprehension skills but high difficulties related to teachers' pedagogy and mathematical processes. These difficulty levels remained consistent across sex, family income, and family size, with the only significant difference occurring in teachers' pedagogy when grouped by family income. The findings suggest that learners' struggles are more tied to instructional methods and the complexity of math processes than demographic factors, highlighting the need for flexible, inclusive teaching that addresses diverse student backgrounds. Accordingly, the study recommends quarterly capacity-building for math teachers focusing on concept retention and real-world application, regular classroom observations with targeted professional development on error correction and reinforcement strategies, and mentoring programs to improve students' procedural skills, mathematical communication, and use of technology in learning.

Acknowledgment

This endeavor would not have been possible without the collective support, expertise, and guidance of individuals who played vital roles throughout the research process. The vision extended by academic leadership, the consistent mentorship and assistance provided during the development of the study, the valuable insights and constructive feedback from the oral defense panel, and the time and effort given by the respondents in completing the research instruments all contributed significantly to the success of this work. Deep appreciation is also extended to all who contributed in various ways, and above all, gratitude is offered to the Divine Providence for the enlightenment and guidance bestowed upon the researcher.

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