International Journal of Academic Pedagogical Research (IJAPR)
ISSN: 2643-9123
Vol. 5 Issue 7, July - 2021, Pages: 25-32

Developing Conceptual and Procedural Knowledge of Mathematics among Grade 3 Learners

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Abstract: *This study aimed to determine the problem-solving skills and the level of conceptual and procedural knowledge of the Grade 3 learners in Mathematics. Using a descriptive type of study, a researcher-made test was created as an instrument to gather data. There were 105 learners that were considered as respondents for the study using a purposive sampling technique. The data gathered were subjected to statistical treatment such as frequency and percentage. The results of the study revealed that learners are outstanding in their problem-solving skills on the ability in understanding the problem as well as in devising a plan, satisfactory in carrying out a plan, and very satisfactory in looking back. In addition, the level of conceptual and procedural knowledge of the learners in easy problems is outstanding, satisfactory in average problem as well as in difficult problem-solving. Based on these results, the researchers provided some pertinent recommendations on the pedagogy of the subject.*

Keywords—conceptual knowledge; grade 3 learners; Mathematics; procedural knowledge; problem-solving skills

1. INTRODUCTION

Mathematics plays a vital part in our daily life. It helps us to be able to plan, decide and properly solve each problem in our everyday life. Mathematics can be found everywhere and it is all around us. Children should appreciate the subject in a sense that it will not become a major obstacle of their daily life routine. This implication exists due to various factors and issues surrounding the subject.

Andamon and Tan (2018) stated that one of the main aims of mathematics is to solve a problem systematically so that similar problems can be solved more easily in the same way. Mathematics prepares schoolchildren with a exceptionally powerful set of tools to comprehend and transform the world. These tools include logical reasoning, problem-solving skills, and the ability to think abstractly.

In school learning, Mathematics is known as one of the major challenges for students. Booth (2011) mentioned that though there are several reasons why students may have difficulty in mathematics at different points in development, one concern that can affect the learning of all students (regardless of whether they have a mathematics learning disability, or MLD) is a lack of conceptual understanding.

According to Hope (2006), conceptual mathematics understanding is the knowledge that involves a thorough understanding of underlying and fundamental concepts behind the algorithms performed in mathematics. Rittle-Johnson and Schneider (2014) defined conceptual knowledge as knowledge of concepts. This information is usually not tied to specific problem categories. It can be implicit or explicit, and thus does not have to be verbalizable. The National Research Council adopted a similar definition as "comprehension of mathematical concepts, operations, and relations". This type of knowledge is sometimes also called conceptual understanding or principled understanding.

Lambdin (2003) believes that to be able to solve problems, one must have a deep, conceptual understanding of the mathematics involved; otherwise, one will be able to solve only routine problems. So, to become a good problem solver, a student must truly understand the inherent concepts. Thus, understanding enhances problem-solving. A primary tenet of teaching through problem-solving is that individuals confronted what they know with the problems at hand. Therefore, learning through problem-solving develops understanding. Students' mental webs of ideas grow more complex and more robust when the students solve problems that force them to connect, extend and elaborate on their prior knowledge.

Rittle-Johnson and Schneider (2014) cited in their article that a procedure is a series of steps, or actions, done to accomplish a goal. Knowledge of procedures is often termed procedural knowledge. Procedural knowledge is "knowing how", or the knowledge of the steps required to attain various goals.

Booth (2011) cited in her article that the National Council of Teachers of Mathematics (2000) stressed the importance of conceptual understanding for learning in mathematics and recommended the alignment of facts and procedures with concepts to improve student learning.

Saleh, Rahman, and Mohamed (2010) mentioned in their study that learning with both conceptual and procedural understanding is important to ensure the appropriate development of individual mathematical knowledge. It is essential to equip learners not only with the skills necessary for achieving higher education and career aspirations but also in

obtaining personal fulfillment. As an essential recognized discipline, mathematics has been introduced as a core subject at the elementary level of schooling throughout the world.

Understanding the significance of developing conceptual and procedural knowledge in mathematics, and in line with the Philippine K to 12 Basic Education Curriculum, critical thinking skills, and problem-solving have been the focus of the framework of mathematics curriculum to develop lifelong learners. These are the twin goals of mathematics in the basic education level, K-10.

Its content is categorized into five, as adopted from the framework prepared by MATHTED & SEI (2010) namely, Numbers and Number Sense, Measurement, Geometry, Patterns and Algebra, and Probability and Statistics. The values and attitudes that are to be honed are accuracy, creativity, objectivity, perseverance, and productivity (K to 12 Mathematics Curriculum Guide, 2016). These standards suggest that learners be provided with learning activities suited to their interests, prior knowledge, and experiences to build a strong foundation of mathematical concepts through active learning using appropriate tools necessary in teaching Mathematics.

Since problem-solving is one of the most skills to be developed in mathematics, pupils have difficulty in understanding or analyzing it. This creates a learning gap which results in a negative effect on the teaching and learning process. Therefore, it is imperative as well to offer necessary interventions like student protection against bullies and discrimination (Asio et al, 2020) and for teacher bullying as well from students among others (Asio, 2019; Asio & Gadia, 2018; 2019). This realization can make the learning environment more conducive and appropriate for learners especially in the subject. There will always be pressure upon students and this will hamper their development and achievement in the pursuit of Mathematics.

This study was anchored from the K to 12 Program where critical thinking and problem-solving are the twin goals of the Mathematics Curriculum in the basic education level K to 10. These serve as the focal points in learning Mathematics.

The definition of mathematical problem solving according to Polya (1945 & 1962) is finding a way around a difficulty, around an obstacle, and finding a solution to a problem that is unknown. These two goals are to be achieved with an organized and rigorous curriculum content, a well-defined set of high-level skills and processes, desirable values and attitudes, and appropriate tools, considering the different contexts of Filipino learners (K to 12 Mathematics Curriculum Guide, 2016).

The difficulties of Grade 3 pupils in Mathematics especially in problem-solving gave the interest to the researcher to conduct this study. The researcher believes that it is necessary to determine the level of conceptual and procedural knowledge in problem-solving to intervene with pupils and develop their mathematical concepts. The result of this study serves as the basis for the formulation of an appropriate classroom-based intervention program where pupils are provided with the processes and strategies that make mathematics problem solving easy to learn and learners become successful and efficient problem solvers.

The study aimed to determine the problem-solving skills and the level of conceptual and procedural knowledge in Mathematics among Grade three learners at New Cabalan Elementary School, Olongapo City during the School Year 2018-2019.

Specifically, the study sought to answer the following questions:

1. How may the profile of the respondents be described in terms of?
   a) Section;
   b) Sex;
   c) Monthly Family Income;
   d) Guardian;
   e) Educational Attainment of the Guardian; and
   f) Occupation of the Guardian?
2. How may the problem-solving skills of the learners be described in terms of:
   a) Understanding the Problem;
   b) Devising a plan;
   c) Carrying out a plan; and
   d) Looking back?
3. How may the conceptual and procedural knowledge in problem-solving of the learners be described in terms of:
   a) Easy Problem Solving;
   b) Average Problem Solving; and
   c) Difficult Problem Solving?

• METHODOLOGY

2.1 Design

To systematically conduct the research study and to gather the data information, the study utilized a descriptive method of research.

According to Rahi (2017), the descriptive method of research refers to the type of research that is aimed at obtaining information on the current state of phenomena. This type of research sets out to provide an accurate profile of the situations, people, or events.

The descriptive survey method was used in this study. It involved collecting data to answer the questions concerning the current study. Open-ended questions were designed to encourage full and meaningful answers using respondents' knowledge or feelings. The descriptive survey type utilized the questionnaire for obtaining and analyzing quantitative data to determine the problem-solving skills and the level of conceptual and procedural knowledge of the respondents in Mathematics.

2.2 Respondents of the Study

The respondents involved were the Grade 3 learners and from a total population of 218 during the school year 2018-2019, 105 pupils were considered as the subjects of the study.

The researcher used purposive sampling in selecting respondents. Crossman (2019) stated that purposive sampling is a non-probability sampling that is selected based on the characteristics of a population and the objective of the study. It is also known as judgmental, selective, or subjective sampling.

The study had chosen Grade 3 as respondents of the study because even if the teachers were given enough time to conduct their remedial instruction to address the problems in problem-solving, the pupils continue to exhibit difficulties in Mathematics. To address this concern, the study came up so these pupils can be trained where they are provided with the processes and strategies through the classroom-based instruction program which was designed to develop the Grade 3 learners' conceptual and procedural knowledge, make their mathematics problem solving easy to learn and make learners efficient problem solvers.

2.3 Research Instrument

This study made use of the teacher-made test as the main research instrument.

A teacher-made test was the test constructed by the teacher which consists of items from the different content areas of Grade 3 Mathematics.

This contextualized structured test was used as the major instrument in determining the conceptual and procedural knowledge of the respondents in problem-solving. Part I of the instrument is information about the respondents' profile in terms of their section, sex, monthly family income, guardian, educational attainment, and occupation of their guardian.

Part II of the instrument consists of 9 problems from the content areas of the Grade 3 Mathematics Curriculum where learning competencies involve had already been taught up to the third grading period. Three questions for every grading period were constructed and were categorized into easy, average, and difficult. Easy being the simplest and difficult being the most complex. The tests measured the methods used by Polya in solving problems namely: Understanding the problem, devising a plan, carrying out a plan, and Looking back. Each problem should be solved with a complete solution and explanation to determine the problem-solving skills and the conceptual and procedural knowledge of the learners in Mathematics.

The structured test was based on K to 12 Curriculum Guide in Mathematics 3, learning materials, teaching guide, and other references on teaching Mathematics 3.

The instrument was checked and validated by the Education Program Supervisor in Mathematics, Master Teacher, and Grade 6 Mathematics Teacher of New Cabalan Elementary School for corrections and suggestions.

The improved instrument was submitted to her adviser for comments and suggestions and after that final draft was prepared.

To measure the problem-solving skills and the level of conceptual and procedural knowledge of the respondents, the Department of Education Learners Progress Descriptors was adopted (DepEd Order 8, s. 2015)

2.4 Statistical Analysis

The data gathered were tabulated, organized, and processed through Microsoft Excel and Statistical Package for Social Sciences version 20 (SPSS v.20) respectively. The following are the statistical treatment used in the study.

Frequency and Percentage Distribution were used to categorize the profile of the respondents, as well as the Problem-Solving Skills and conceptual and procedural knowledge in problem-solving.

2. RESULT AND DISCUSSION

This section contains the data presentation used in the research, the analysis, and the interpretation of data. It includes the profile of the respondents and the results of the data gathering after a thorough descriptive statistics analysis. The data are organized in sequential order based on the statement of the problem.

Table 1. Frequency and Percentage Distribution of Respondents according to Section

Section	Frequency	Percentage
Gumamela	40	38.1
Sampaguita	25	23.8
Rose	20	19.0
Daisy	20	19.0
Total	**105**	**100.00**

Table 1 presents the frequency and percentage distribution of the respondents when grouped according to their section. It shows that majority of the respondents belong to section

Gumamela with forty or 38.1%. Twenty-five or 23.8% of the respondents belong to section Sampaguita. Section Rose and section Daisy have the same percentage of respondents which is twenty or 19%. The data shows that the number of respondents who belong to the section Gumamela comprises the majority of the respondents and the least belong to section Sampaguita, Rose, and Daisy.

According to Abletis (2009), student sectioning is an adaptive mechanism performed by schools to effectively manage the great number of students over the limited number of teaching and supervising staff.

Table 2. Frequency and Percentage Distribution of Respondents according to Sex

Sex	Frequency	Percentage
Male	40	38.1
Female	65	61.9
Total	**105**	**100.00**

Table 4 presents the frequency and percentage distribution of the respondents when grouped according to their sex. The table shows that sixty-five or 61.9% are female and forty or 38.1% are male. This reveals that the majority of the respondents are female. According to the report of the Philippine Statistics Office on the Key Statistics on Education Indicators by Sex in 2016 as cited by Buenaventura (2019), females outnumber males in enrollment.

Table 3. Frequency and Percentage Distribution of Respondents according to Monthly Family Income

Monthly Family Income	Frequency	Percentage
₱ 24, 000 and above	17	16.2
₱ 18, 000 - ₱ 23, 999	15	14.3
₱ 12, 000 - ₱ 17,999	31	29.5
₱ 6, 000 - ₱ 11, 999	32	30.5
Below ₱ 6,000	10	9.5
Total	**105**	**100.00**

Table 3 presents the frequency and percentage distribution of the respondents when grouped according to the monthly income of the family. This reveals that the majority of the students come from low-level income families. There were thirty-two or 30.5% whose monthly income is ₱ 6, 000 to ₱ 11, 999, 31 or 29.5% have a monthly family income of ₱12,000-₱17,999, 17 or 16.2% earn a monthly income of ₱24,000 and above 15 or 14.3% have a monthly income of ₱18,000-₱23,999 and 10 or 9.5% belong to a family whose income is ₱6,000. Since the majority of the respondents come from low-level income families, parents cannot sometimes provide the necessary school supplies for their children. Thus, this affects the mathematics performance of the pupils.

According to Seo, as cited by Amora, Bonote, Dupende, and Salapang (2013), it is believed that students' interest in studies and academic performance is also affected by the socio-economic status like the income that the family is consuming in a day, month or year. In terms of the school projects and assignments, students need to spend an ample amount on the materials needed like paper, ballpen, etc. and these things cannot be acquired without money.

Table 4. Frequency and Percentage Distribution of Respondents according to Guardianship

Guardian	Frequency	Percentage
Mother	61	58.1
Father	29	27.6
Sister/Brother	13	12.4
Grandparents	1	1.0
Others	1	1.0
Total	105	100.00

Table 5 presents the frequency and percentage distribution of the respondents when grouped according to their guardians. Out of 105 respondents, 61 or 58.1% of pupil's guardians are their mothers, 29 or 27.6% are their father, 13 or 12.4% are their sister/brother, and 1 or 1.0% are their grandparents and others.

The engagement of parents and guardians, Desforges and Abouchaar (2003) note, what parents do with their children at home is much more significant than any other factor open to educational influence. Parental participation is the cornerstone of success and when parents interact with schools and with their children to promote math then positive things will happen. This is true of any guardian, or other important adults in a child's life. Commonly, math homework in problem-solving set by the school is one way this is done but this has become emotive and contentious. Math's solving-problem homework can accelerate progress while giant strides can be made but it can also be fraught with difficulty and can interfere with achievement leading to some backward steps for the child.

Table 5. Frequency and Percentage Distribution of Respondents according to Guardians' Educational Attainment

Educational Attainment	Frequency	Percentage
Elementary	6	5.7
Secondary	65	61.9
College	34	32.4
Total	**105**	**100.00**

Table 5 presents the frequency and percentage distribution of the respondents when grouped according to their guardians' educational attainment. This reveals that the majority of their guardians are secondary level while the least belong to tertiary or college level. There is 65 or 61.9% of guardians' educational attainment is secondary, 34 or 32.4% are college level and elementary graduated are 6 or 5.7%.

According to Olufemi as cited in the study of Andamon and Tan (2013), parents' educational background or attainment could affect the children's success in school. Therefore, there is a need for parents to realize the importance of education and the roles they are expected to play in the actualization of better achievement or outcome of their

children especially in helping their children cope up with problem-solving in mathematics.

Table 6. Frequency and Percentage Distribution of Respondents according to Guardians' Occupation

Occupation	Frequency	Percentage
Professional	15	14.3
Technical	41	39.0
Housewife/ Unemployed	49	46.7
Total	**105**	**100.00**

Table 6 presents the frequency and percentage distribution of the respondents when grouped according to their guardians' occupation. This reveals that the majority of the occupation of the guardian are technical while the least is professional. Out of 105 respondents, 49 or 46.7% are housewives/unemployed, 41 or 39% are technical and 15 or 14.3% are professional.

Giannelli and Rapallini (2018), investigated in their study the mechanism through which having parents who work in a math-related career contributes to explaining children's math performance by affecting intangible factors such as parental attitude, children's motivations, and anxiety toward math.

Table 7. Frequency and Percentage Distribution of Respondents' Problem-Solving Skills based on Understanding

Understanding the Problem	Frequency	Percentage
Did Not Meet Expectation	0	0
Fairly Satisfactory	0	0
Satisfactory	1	1.0
Very Satisfactory	24	22.9
Outstanding	80	76.2
Total	**105**	**100.00**

Table 7 presents the frequency and percentage distribution of the respondents in problem-solving as described on the ability in understanding the problem. 80 or 76.2% of them are outstanding, 24 or 22.9% are very satisfactory, 1 or 1. 0% is satisfactory and 0 or 0% is fairly satisfactory and did not meet the expectation. This means that most of the Grade III learners can comprehend a word problem. This indicates that respondents found it easy to identify what was being asked in the problem and can easily determine the given facts in the word problems.

According to Polya as cited by Mehmood (2014), "Problem-solving is a method to develop the ability of Mathematical problem-solving. It enables the students to become independent discoverers and by this method, they can solve daily life Mathematical problem-solving. It helps in developing higher-level like analysis, synthesis, evaluation, and creativity."

Table 8. Frequency and Percentage Distribution of Respondents' Problem-Solving Skills based on Devising a Plan

Devising a Plan	Frequency	Percentage
Did Not Meet Expectation	0	0
Fairly Satisfactory	2	1.9
Satisfactory	17	16.2
Very Satisfactory	35	33.3
Outstanding	51	48.6
Total	**105**	**100.00**

Table 8 presents the frequency and percentage distribution of the respondents in problem-solving as described on the ability in devising a plan. There are 51 or 48.6% respondents who are outstanding, 35 or 33.3% are very satisfactory, 17 or 16.2% are satisfactory, 2 or 1.9% are fairly satisfactory and none of them did not meet the expectation. The result implies that the learners showed good performance in devising a plan through determining the operation they need to use in problem-solving.

According to Polya as cited by Mehmood (2014), in this second step (devising a plan), students are motivated to find out links between data given and the unknown. This stage provides a deeper understanding of the problem. For this, students are asked about a similar nature problem. If students came to know about a similar problem they are asked to recall and solve that one. The way from understanding the problem to conceiving a plan may be long and difficult. The plan for a problem can be prepared through a bright idea or an "auxiliary problem".

Table 9. Frequency and Percentage Distribution of Respondents' Problem-Solving Skills based on Carrying Out a Plan

Carrying Out a Plan	Frequency	Percentage
Did Not Meet Expectation	3	2.9
Fairly Satisfactory	19	18.1
Satisfactory	38	36.2
Very Satisfactory	29	27.6
Outstanding	16	15.2
Total	**105**	**100.00**

Table 9 presents the frequency and percentage distribution of the respondents in problem-solving as described on the ability in carrying out a plan. Out of 105 respondents, 38 or 36.2% are satisfactory, 29 or 27.6% are very satisfactory, 19 or 18.1% are fairly satisfactory, 16 or15.2% are outstanding and 3 or 2.9% of them did not meet the expectation. The results revealed that the learners have difficulty in carrying out a plan. The learners, as a whole, have difficulty in formulating equations or writing the number sentence in the problem and have difficulty in identifying the complete answer in the problem.

According to Polya as cited by Mehmood (2014), after careful planning at step-2, what has been decided is now

implemented to reach a solution. To devise a plan, to conceive the idea for the solution is not an easy task; it takes a long exercise. Contrary to carry out is easy. The plan provides the general outlines for implementation and we have to put data into it and find either it is working or not. If the student develops the plan to solve the problem it is good for the teacher because much of the work has been done now. The major danger at this stage is that students may forget the plan, but it happens when students borrow it if they develop themselves, it provides them satisfaction.

Table 10. Frequency and Percentage Distribution of Respondents' Problem-Solving Skills based on Looking Back

Looking Back	Frequency	Percentage
Did Not Meet Expectation	3	2.9
Fairly Satisfactory	11	10.5
Satisfactory	24	22.9
Very Satisfactory	41	39.0
Outstanding	26	24.8
Total	**105**	**100.00**

Table 12 presents the frequency and percentage distribution of the respondents in problem-solving as described on the ability in looking back. There are 41 or 39% respondents who are very satisfactory, 26 or 24.6% are outstanding, 24 or 22.9% are satisfactory, 11 or 10.5% are fairly satisfactory and 3 or 2.9% of them did not meet the expectation. This means that the learners were able to perform well on the ability in looking back. They can check the results once again step by step and understand all the variables regarding known and unknown.

Mehmood (2014) cited that this 4th step (looking back) of Polya's problem-solving method in mathematics have to confirm their solution by applying a new situation. The students seek new arguments and try to recheck their findings by comparing the known with the unknown. By looking back means reconsidering and re-examining the results and the process of solving for the consolidation of their knowledge and to develop the ability to solve such examples independently in their daily life.

Table 11. Frequency and Percentage Distribution of the Conceptual and Procedural Knowledge of Respondents in Easy Problem-Solving

Easy	Frequency	Percentage
Did Not Meet Expectation	0	0
Fairly Satisfactory	4	3.8
Satisfactory	34	32.4
Very Satisfactory	32	30.5
Outstanding	35	33.3
Total	**105**	**100.00**

Table 13 presents the frequency and percentage distribution of the respondents in conceptual and procedural knowledge in easy problem-solving. Out of 105 respondents, 35 or 33.3% are outstanding, 34 or 32.4% are satisfactory, 32 or 30.5% are very satisfactory, 4 or 3.8% are fairly satisfactory and 0% or none of them did not meet the expectation. This reveals that the majority of the respondents were able to perform well in solving easy word problems. This indicates that most of the respondents' level of performance in easy problem solving is very satisfactory.

In the study of Diziol, Rummel, and Spada (2009), they mentioned that literature on knowledge acquisition in mathematics distinguishes between two different types of knowledge: procedural and conceptual knowledge. Procedural knowledge refers to students' ability to execute action sequences to solve routine problems (e.g., Rittle-Johnson & Alibali, 1999).

Table 12. Frequency and Percentage Distribution of the Conceptual and Procedural Knowledge of Respondents in Average Problem-Solving

Average	Frequency	Percentage
Did Not Meet Expectation	1	1.0
Fairly Satisfactory	17	16.2
Satisfactory	44	41.9
Very Satisfactory	26	24.8
Outstanding	17	16.2
Total	**105**	**100.00**

Table 12 presents the frequency and percentage distribution of the respondents in conceptual and procedural knowledge in average problem-solving. As shown in the table, 44 or 41.9% of learners are satisfactory, 26 or 24.8% are very satisfactory, 17 or 16.2% are outstanding and fairly satisfactory and 1 or 1% did not meet the expectation. This means that most of the respondents manifested satisfactory performance in average problem-solving.

Table 13. Frequency and Percentage Distribution of the Conceptual and Procedural Knowledge of Respondents in Difficult Problem-Solving

Difficult	Frequency	Percentage
Did Not Meet Expectation	3	2.9
Fairly Satisfactory	28	26.7
Satisfactory	46	43.8
Very Satisfactory	20	19.0
Outstanding	8	7.6
Total	**105**	**100.00**

Table 13 presents the frequency and percentage distribution of the respondents in conceptual and procedural knowledge in difficult problem-solving. Out of 105 respondents, 46 or 43.8% are satisfactory, 28 or 26.7% are fairly satisfactory, 20 or 19% are very satisfactory, 8 or 7.6% are outstanding and 3 or 2.9% of them did not meet the expectation. This implies that most of the learners performed satisfactory levels of performance in difficult problem-solving. According to Jawhara as cited in the study of Surif and Mokhtar (2012), problem-solving activities can open

opportunities for students to learn freely. In their way, students will be encouraged to investigate, seek the truth, develop ideas, and explore the problem. Students are also trained not to be afraid to try various ways to solve problems, as well as having the courage to make decisions, act on the decisions and be responsible for the products of actions.

5. CONCLUSION

Based on the results of the findings of the study, the following conclusions were derived in this study.

The respondents involved in this study were the Grade 3 learners in New Cabalan Elementary School. Most of them are Section Gumamela and female. The majority of the learners' monthly family income ranged from ₱ 6,000 to ₱11,999. Most of the guardian's educational attainment was high school graduates and most of them are housewives or unemployed.

The data derived from this study showed that most of the Grade 3 learners are satisfactory in conceptual and procedural knowledge on difficult problem-solving skills.

6. RECOMMENDATIONS

Based on the study and analysis of the data from respondents, the following recommendations were endorsed.

1. Learners with learning difficulties in Mathematics should be given remedial instructions by their teachers and should be exposed to conceptual and procedural knowledge on problem-solving to enhance their competencies.
2. Teachers should utilize innovative instructional materials and enhance their teaching methodologies and strategies in teaching Mathematics and they should always give motivation on how to reach the inner concepts in Mathematics as it can lead to learners' deep understanding to improve their problem-solving skills.
3. Teachers should conduct classroom intervention programs to cater to the needs of the learners to be equipped with values and knowledge in Mathematics.
4. School heads should encourage their teachers to attend training, seminars, and workshops on Mathematics regularly to update their teaching strategies, adopt new methods and techniques in teaching problem-solving skills to attain great achievements in the field of Mathematics.

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