



INSTRUCTIONAL MATERIALS IN THE TEACHING OF PROBLEM-SOLVING IN MATHEMATICS TO GRADE 8 LEARNERS

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Abstract : This study focused on the proposed instructional materials in the teaching of problem-solving in Mathematics to Grade 8 learners at Cabiiao National High School, Schools Division Office of Nueva Ecija during the School Year 2023-2024. It made use of descriptive method with questionnaire as the research instrument. There were 75 Grade 8 learners included in this study. The data gathered were properly recorded, tallied, tabulated and interpreted using the SPSS for windows. The study found out that generally, the Grade 8 learners have low performance in solving Mathematics problems. The least learned skill of the Grade 8 learners during the second quarter is linear inequalities. The developed problem solving instructional material was based on the least learned skill. The instructional material met the criteria for validity. The researcher recommended that the Grade 8 learners should be encouraged to exert more effort in studying Mathematics. They should be motivated to change their impression of Mathematics as a difficult subject, but rather they could have fun in studying it. Weekly assessment of the Mathematics skills of the students should be done to monitor their performance. Parents and teachers should join hands in improving the performance of the students. Teachers should tell the parents about the difficulties encountered by their children in learning Mathematics. The least learned skill in Mathematics should be given emphasis in teaching. Teachers should use appropriate strategies and techniques to develop the skill and give more exercises for the learners to master the skill. The proposed instructional material should be presented to the Schools Division Superintendent for its reproduction and utilization.

Keywords: teaching, problem solving, instructional materials

INTRODUCTION

Education is the primary agent of transformation towards sustainable development, increasing people's capacities to transform their vision for society into reality. Education not only provides scientific and technical skills; it also provides the motivation, justification and social support for pursuing and applying the skills.

Education plays a vital role in human development and societal transformation. It is considered one of the many pillars in developing a particular race or culture. It allows an individual to undergo a process of gaining knowledge, specialized skill or talent to be able to fully function and exist, and to pave the way in building a better society (Franche, 2009).

According to Orfiano (2011), quality education is a prerequisite for education for sustainable development. It is defined by five key dimensions. 1) What learners bring. Children and young people who are physically and psychologically healthy, well-nourished, ready to participate and learn by families or communities are more likely to benefit from quality education. 2) Environment. The learning environment is a critical dimension of educational quality, it must be gender-sensitive, healthy and safe for children, protective of them and successful in helping them learn. A quality learning environment includes adequate facilities—a school building where girls and boys have the same access to physical exercise, adequate hygiene and sanitation facilities, clean water and health services. 3) Quality Content. It includes relevant curriculum and learning materials developed in the context of national goals for education. Government should adapt relevant, student-centered and discriminatory curriculum plans that are easily understood by teachers. 4) Outcome. From a quality basic education comes healthy children who can read and write critically and access Mathematics, science technologies and other skills for life. 5) Process that support quality education include well-trained teachers who continually engage in professional learning and development; well managed, child-friendly and gender fair classrooms and schools; skills-based, children centered participatory methods; skillful assessment to facilitate learning and appropriate technologies.

In today's fast paced world where individuals deal with information generated from computers and calculators to that of mental estimations of daily purchases, it is imperative that students become proficient in mathematics. Not only must learners deal

with a wide range of operational skills, such as computing decimals, percents, fractions to accomplish tasks but must also understand underlying numerical concepts in order to succeed in a variety of effectively with these tasks, citizens must develop self efficacy, feel positive about them and accept that they are accountable for their actions was revealed. In an age now driven by the relentless necessity of scientific and technological advances. Mathematics performance has been assessed to determine whether young people of our country have still been coping up in today's modern trend and to stay competitive in an integral global economy (Chandler, 1998).

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In order for a country to develop and be globally competitive, there is a need to widen the knowledge, improve the needed skills, and familiarize new concepts, changes, and to things that can help to improve our country. As cited in the study of Frempong (2000), the recent report on the performance of our students from both the Third International Mathematics and Science Study (TIMSS) and the National Assessment of Education Progress (NAEP) stated that "Our young people aren't performing well enough in Mathematics to take firm command of our own futures. In line with this context, programs have been planned and materialized in order to achieve Mathematics competency. Our country in its quest to respond to the globalization demand has been striving to upgrade and provide competency in Mathematics among our young people.

There are four important and enduring reasons that underscore the need for our students to achieve competency in Mathematics; 1) the rapid pace of change in both the increasingly interdependent global economy and in the workplace demands widespread mathematics-related knowledge and abilities, 2) citizens need mathematics for their everyday decision making, 3) mathematics is inextricably linked to the nation's security interests, and 4) the deeper, intrinsic value of Mathematics shapes and defines our common life, history, and culture. It is one primary source of lifelong learning and the progress of our civilization (Mattesson, 2006).

Chandler's (1988) study found that teachers in American secondary schools need today a broad field of specialization ranging from study to methods and techniques of teaching classroom management and varied knowledge on update curriculum. These specializations can enhance the effectiveness of the teachers.

Elsbree (1959) cited that the teachers should provide him with BPS from 178 to keep inside the supervisor's corner so that whenever the principal or supervisor comes, he could use it in writing his observation and suggestions during his stay with the teacher in the classroom. When the principal or supervisor writes his comments or suggestions, it does not mean to say that you are criticized. He writes suggestions on the form 178 for the teachers to follow. The BPS form is very important for every teacher in the service. The principal writes for improvement in the teaching of the teachers. So if the teacher finds some suggestions during the teaching, he should be thankful because things that he does not know are being relayed in the form 178 and it will add much to the improvement of his teaching method.

Mansergh (1988) included in his proposed principles to consider in the administration of a supervisory program that the teachers should be assigned to the grade or subject they can teach best. This will minimize the problem, which can arise when the teachers are teaching out of their fields. On the other hand, placement at another grade level or in another subject area is needed to start some teachers on the road to success. Sometimes, just by the making of a change will get a teacher put or a rut. Although he may rebel with the suggested changes, such teacher may thank the principal later when he finds success in the situation.

Mistretta (2004) found out in his study that students' confidence in solving and analyzing problems in Mathematics, their interest, enjoyment, and their disposition toward mathematics is influenced by learning environment they encounter. Attitudes were found to be shaped in great part by the learning environments one experiences like their teacher and the classroom atmosphere.

Bete (2005) investigated the relationship of mathematics achievement of the fourth year high school students to their general scholastic ability, attitude toward mathematics and educational aspirations. The investigation revealed a significant and positive relationship between students' mathematical achievement and their general scholastic ability with the effect of their attitude toward mathematics and educational aspirations.

Fortea (2007) in her study of factors contributing to the attitude of the college students toward mathematics are brought by the combined influences emanating from the students themselves, the mathematics teachers and the environment. The negative and the positive attitude of the students toward mathematics are caused by the students' belief and he concepts about the subjects, skills and the competence of the teacher, family and the peer influence

Ordinario (2009) on his study entitled "Mathematics Anxiety and Performance of Third Year High School Students" affirmed that students with higher level of Math test anxiety tend to have lower test scores. Mathematical anxiety is implicated frequently as an important affective variable related to poor mathematics performance.

The study of Ordinario (2009) is related to the present one for both analyzed the performance of the pupils in Mathematics. However, they are different in scope. The former analyzed the Mathematics anxiety and the performance of third year high school students while the present study analyzed the performance level of Grade IV pupils in solving word problems.

Ekman (2006) compared the effectiveness of presenting addition and subtraction ideas to the Grade III pupils. He presented the ideas in Algorithm form then he developed the idea through picture before presenting the algorithm. The study revealed significant evidence that grade III pupils perform better on the understanding of concept and through transfer of learning. He pointed out the necessity of using concrete materials in teaching-learning process.

Bautista (2007) made an investigation on the relative effectiveness between the modern mathematics technique and the traditional method. The subjects were the 3rd year students and dealt on problem solving. Her study revealed that the skill in computation and ability to solve problems were better developed through the modern mathematics approach than by the traditional approach.

Fernandez (2013) determined the performance level of the Grade VI pupils in Mathematics in Lingayen I District. The study found out that pupil-respondents are mostly eleven (11) years old whose academic rating in Mathematics in the First Quarter Examination ranged from 80 to 84 and with parents having monthly income of P10,000 below. The pupil-respondents have a low performance level with scores ranging from 16-20. The pupils have difficulty in solving 2 to 3 step word problems involving decimals including money, dividing mixed decimals by mixed decimals and dividing mixed decimals by whole numbers. The researcher recommended that pupils should be encouraged to exert more effort in studying Mathematics. They should be motivated

to change their impression of Mathematics as a difficult subject, but that rather they could have fun in studying it. Teachers should make interventions to improve the performance of the pupils. Such interventions are remedial/enrichment activities and/or interactive/instructional materials to help them understand more clearly the concepts. Weekly assessment of the mathematical skills of the pupils should be done to monitor their performance. Parents and teachers should join hands in improving the performance of the pupils. Teachers should tell the parents about the difficulties encountered by their children in learning Mathematics. Parents should also monitor the performance of their children in the school. They should give their full support in their studies like attending PTA meetings and have follow-ups in their studies. The least learned skills in Mathematics should be given emphasis in teaching. Teachers should use appropriate strategy and techniques to develop the skills and give more exercises for the pupils to master the skills.

According to the study of Leonen (2010) entitled “Effectiveness of Intervention Materials in the Development of Selected Competencies in Intermediate Algebra”, there is a favorable effect in using intervention materials like games, mathematical investigation, puzzle, calculator activity, computer hands-on, worksheets, and module to the attitude of students towards mathematics into a better one.

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Statement of the Problem

This study sought to propose instructional materials in the teaching of problem-solving in Mathematics to Grade 8 learners at Cabiao National High School, Schools Division Office of Nueva Ecija during the School Year 2023-2024.

Specifically, it sought to answer the following sub-problems:

1. What is the performance level of the Grade 8 learners along the objectives in problem solving in Mathematics?
2. What is the Grade 8 learners’ least learned skill in problem solving in Mathematics along the aforementioned objectives?
3. Based on the findings, what instructional materials in problem solving can be developed and tried out to the Grade 8 learners?
4. How valid are the proposed instructional materials in problem solving in Mathematics based on the results of the try-out?

METHODOLOGY

This chapter discusses the research design, sources of data, instrumentation and data collection and the tools for data analysis.

Research Design

The study used descriptive method with questionnaire as the research instrument. Descriptive research method obtains facts about existing conditions or significant relationship between current phenomena. This study focused on the proposed instructional materials in the teaching of problem-solving in Mathematics to Grade 8 learners at Cabiao National High School, Schools Division Office of Nueva Ecija during the School Year 2023-2024 in terms of the performance level of the Grade 8 learners along the objectives in problem solving in Mathematics, Grade 8 learners’ least learned skill in problem solving in Mathematics along the aforementioned objectives, validity of the the proposed instructional materials in problem solving in Mathematics based on the results of the try-out.

Instrumentation and Data Collection

The main data-gathering instrument of the study was a test question. The test question focused on solving Mathematical word problems.

The items in the test were formulated by the researcher and were validated by the Mathematics Supervisor and teachers. Suggestions were incorporated in the final draft of the test.

A formal permission to conduct the study and to float the questionnaire was secured from the Schools Division Superintendent of Nueva Ecija.

The researcher personally administered the questionnaire to the respondents in each section and immediately checked the papers in order to get the least learned skill.

Tools for Data Analysis

In this study, the researcher used the following statistical measures to analyze the data for the problems.

To answer sub-problem 1 on the performance level of the Grade 8 learners along the objectives in problem solving in Mathematics, frequency counts and percentages were used.

To answer sub-problem 2 on the Grade 8 learners’ least learned skill in problem solving in Mathematics along the aforementioned objectives, frequency counts and percentages were used using the formula below.

$$\text{Percentage} = \frac{F}{N} \times 100$$

Where:

F = Frequency

N = total number of respondents

To answer sub-problem 4 on the validity of the the proposed instructional materials in problem solving in Mathematics based on the results of the try-out, average weighted mean was used using the formula and rating scale below.

$$\frac{\sum WM}{I}$$

Where: $\sum WM$ = Weighted Mean

I = no. of items/indicators

Rating	Mean Range	Descriptive Equivalent
5	4.21 - 5.00	Very Much Valid (VMV)
4	3.41 - 4.20	Highly Valid (HV)

3	2.61 - 3.40	Moderately Valid (MV)
2	1.81 - 2.60	Slightly Valid (SV)
1	1.00 - 1.80	Not Valid (NV)

RESULTS AND DISCUSSION

This chapter presents the elements of presenting and interpreting data to answer the sub-problems posited in the chapter of the study.

Performance Level of Grade 8 Learners in Problem-Solving in Mathematics

The level of performance of Grade 8 students in solving Mathematics problems is presented in Table 2.

Table 2. Performance Level of Grade 8 Learners in Solving Mathematics Problems

Performance Level	Descriptive Equivalent	Frequency	Percentage
41-50	OP	8	10.67
31-40	VHP	11	14.67
21-30	HP	14	18.67
11-20	AP	24	32
6-10	LP	17	22.67
0-5	VLP	1	1.32
Total		75	100

Legend

Score	Descriptive Equivalent
41-50	Outstanding Performance (O)
31-40	Very High Performance (VHP)
21-30	High Performance (HP)
11-20	Average Performance (AP)
6-10	Low Performance (LP)
0-5	Very Low Performance (VLP)

It can be seen in Table 2 that Grade 8 learners averagely performed in Mathematics as reflected by their scores. There are 24 or 32% who 11-20 scores described as average performance, 17 or 22.67% who got 6-10 scores described as low performance, 14 or 18.67% with 21-30 scores described as high performance, 11 or 14.67% with 31-40 scores described as very high performance, 8 or 10.67% with 41-50 scores described as outstanding performance, and only 1 or 1.32% who got very low performance.

Least Learned Skill in Problem Solving in Mathematics

It is reflected in Table 3 that the least learned skill in solving Mathematics during the second quarter is Linear Inequalities with only 35 out of 75 respondents who got the correct answer. In the light of the findings revealed by the study, learners really need instructional materials in Linear inequalities in studying Mathematics to improve their performance.

Table 3. Least Learned Skill in Problem Solving in Mathematics

Topics/Lessons	No. of Learners Who Got the Item Right	Percentage	Level of Mastery
1. Linear Inequalities	35	47	Average (A)

Legend:

Descriptive Equivalent
96% - 100% Mastered (M)
86% - 95% Closely Approximating Mastery (CAM)
66% - 85% Moving Towards Mastery (MTM)
35% - 65% Average (AVR)
15% - 34% Low (L)
5% - 14% Very Low (VL)
0% - 4% Absolutely No Mastery (ANM)

Table 4. Validity of the Problem Solving Instructional Material

Indicators	Weighted Mean	Descriptive Equivalent
1. The background knowledge and skills are appropriate to for the Grade 8 students.	4.90	Highly Valid
2. The background knowledge and skills are based on Mathematics competency.	4.90	Highly Valid
3. The Instructional Materials really measure the students' performance in Linear Inequalities.	4.80	Highly Valid
4. The exercises are appropriate to the development of the solving skill to stimulate the interest and challenge the students in performing problem-solving	4.90	Highly Valid
5. The exercises are designed not only to improve their English but also to gain knowledge about the world for they are content-based.	4.90	Highly Valid
6. The exercises jibe with the background knowledge and skills	4.80	Highly Valid
7. The exercises are varied to meet individual differences	4.90	Highly Valid

8. The exercises encourage students to apply what they learned	4.90	Highly Valid
Overall Average Weighted Mean	4.88	Highly Valid

Legend

Alpha = .8996

Point Value	Limits	Descriptive Equivalents
5	4.21 - 5.00	Highly Valid
4	3.41 - 4.20	Valid
3	2.61 - 3.40	Moderately Valid
2	1.81 - 2.60	Slightly Valid
1	1.00 - 1.80	Not Valid

The Grade 8 teachers of Cabiao National High School, Schools Division Office of Nueva Ecija evaluated the Instructional Material in Problem Solving in terms of its content, the purpose of which was to determine whether the instructional material covered what was intended to tackle.

Table 4 on the previous page presents the content validity of the instructional material in Mathematics 8. The table indicates that the overall average weighted mean of **4.88** is interpreted as **Highly Valid**. This is supported by the average weighted means of all indicators which are also described as **Highly Valid**.

Cronbach's Alpha Coefficient was also obtained for each to further validate the findings obtained through the use of the scale. The alpha coefficient measures the correlation of all the evaluators rating thereby giving the reliability and internal validity of the instrument used. The higher the coefficient is, the higher also is the validity of the instructional material used and provides a good indicator that the checklist measures what is really supposed to measure.

For the validity, it has obtained a Cronbach's Alpha Coefficient of .08996 which indicates that reliability and internal validity of the instruments used are good.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

1. Generally, the Grade 8 learners have low performance in problem solving in Mathematics.
2. The least learned skill of the Grade 8 learners during the second quarter is linear inequalities.
3. The developed problem solving instructional material was based on the least learned skills.
4. The instructional material met the criteria for validity.

Recommendations

On the basis of the foregoing findings and conclusions, the following are hereby recommended:

1. The Grade 8 learners should be encouraged to exert more effort in studying Mathematics. They should be motivated to change their impression of Mathematics as a difficult subject, but rather they could have fun in studying it.
2. Teachers should make intervention measures to improve the performance of the learners. Such intervention measure helps them understand more clearly the concepts.
3. Weekly assessment of the Mathematics skills of the learners should be done to monitor their performance.
4. Parents and teachers should join hands in improving the performance of the learners. Teachers should tell the parents about the difficulties encountered by their children in learning Mathematics. Parents should also monitor the performance of their children in the school. They should give their full support in their studies like attending PTA meetings and have follow-ups in their studies.
5. The least learned skill in Mathematics should be given emphasis in teaching. Teachers should use appropriate strategies and techniques to develop the skill and give more exercises for the learners to master the skill.
6. The proposed instructional material should be presented to the Schools Division Superintendent for its reproduction and utilization to help the Mathematics teachers.

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