ABSTRACT

TITLE : ONLINE INSTRUCTIONAL MATERIALS IN MATHEMATICS VI FOR SELECTED PUBLIC ELEMENTARY SCHOOLS IN DISTRICT 4 DIVISION OF CITY SCHOOLS MANILA: IN RESPONSE TO DEPARTMENT OF EDUCATION'S (DepEd's) LEARNING CONTINUITY PLAN

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Summary

This study is an attempt to design and develop as well as validate sets of Online Instructional Materials in Mathematics VI at selected elementary schools in DCS, Manila, specifically, focused on the study of Geometry and Measurement.

Using both documentary analysis and descriptive method of study, two (2) major groups of respondents were chosen to participate in the study. They were the 6 school administrators who were the School

Principals, Supervisor, Head Teacher, Master Teacher and the 35 Mathematics teachers who represented the seven (7) selected elementary schools in the District 4 of the DCS, Manila. Aside from these experts, she also made use of two (2) sections of Grade VI pupils of a public elementary school in the District, who are the subjects of the study.

The following are the salient findings of the investigations on:

1. Topics to be included in the Online Instructional Materials in Mathematics VI.

Using documentary and historical data, the following indicators were bases in how the researcher decided in how she chose Geometry and Measurement as the core subject areas specifically covered in the modules:

1.1 <u>Content-based for Grade VI Mathematics</u>

Five (5) units were covered, of these areas of concern Geometry was the least covered with only 2 or 9.09 topics and Measurement and Whole Numbers equally had more with 5 or 22.73 percent topics. Rational Numbers have the most substantial topics covered in the MLC.

1.2 <u>DepEd's Prescribed Textbooks and Subject Contents</u>

When the three (3) DepEd's prescribed textbooks were analyzed in terms of the topics and pages covered as prescribed in the prescribed content-based curriculum, again, Geometry and Measurement, which are

considered difficult areas in Mathematics VI were those that were least covered.

They obtained an overall (Measurement with 47:86 topic and page covered ratio) and Geometry with 15:25 topic and page covered ratio and were ranked 3 and 4, respectively among the 5 major units of the subject under study.

1.3 Budget of Work for Mathematics VI

Not much emphasis was also given to both Geometry and Measurement as proofs of the first registering only 11 suggested lessons and 17 sessions; and the second, with 11 suggested lessons with 23 sessions; very limited topics and pages were not only covered, but also not evenly and appropriately distributed considering the significance of the topics in preparing the pupils for higher mathematical procedures and processes.

1.4 Results of the Inventory and Achievement Tests in Mathematics VI in the District 4 of DCS, Manila

The Grade VI pupils totaling 1474 for the schoolyear 2022-2023 enrolled in Mathematics VI were able to perform which resulted to get only 29.27 mean raw or 72.21 transmitted scores in the inventory test; and their performance in the achievement test revealed 44.07 or 86.95 mean raw and

transmitted scores which generated a gain of 14.8 mean scores / 14.74 transmitted scores.

1.5 Table of Specification Covered in the Achievement Test for the Academic Year 2022-2023

In terms of item placement of the topics testing the mathematical skills of the pupils in knowledge, comprehension, application, and analysis on the distribution of test questions, only one (1) item was noted in Geometry and nil in Measurement under application skills. In knowledge and comprehension only one (1) each was recorded, but none in analysis.

1.6 Report on the DepEd's District 4 Organizational Structure on the Status of Basic Education Resource Textbooks, District of DCS, Manila, 2022 - 2023

The Annual Report of the Division significantly revealed the dearth of textbooks and other supplementary materials for the need of the pupils. In schools population, the pupil-textbooks ratio only of 3:7 for Grade VI pupils which revealed the inadequacy of basic textbooks requirement for the grade level.

These data are revealing of the need to come out with supplementary instructional materials to augment the inadequacy and limited textbooks to replace the traditional and obsolete materials to revolutionize the teaching

of mathematics, using alternative approach in no – inclass interactive classroom activities.

In response to these needs, the researcher, a Math teacher who is concern more to improve instruction to effect quality education, endeavors to design and develop sets of content-based modules for the use of Grade VI pupils in Mathematics in the School District of Manila.

The Online Instructional Materials in Mathematics VI concentrated only on the topics of great concern - Geometry and Measurement. Each major area is covered in 7 lessons or a total of 14. Her objective is to provide and equip the learners with needed numerical skills and competencies in the study of the areas focusing in attaining knowledge, developing the skills in comprehension, and applying concepts and analysis.

She also saw to it that the content-based modules were designed and developed with a systems approach in mind, like following and observing each step of the modular process, such as:

1. Entry (starting) behavior of the learner was analyzed;
2. Specific objectives stated;
3. Content selected and sequenced;
4. Learning activities well-planned, designed and developed;

5. Continuous assessments in the form of pre and post and built-in tests; and
6. Effectiveness of the module evaluated.

The content of the online tools is so prepared to allow the pupils to work independently by themselves, and if there is a need for teacher assistance, such help will be at the minimum, and on online instruction.

Another key components of the online tools are that they are highly supportive of each other. Parts like the specific objectives, learner's activities, and evaluation are interrelated and suggested practice exercises or activities are the means used to achieve the predetermined objectives. Likewise, the evaluation serves as the feedback to find out the extent of how much the objectives are realized.

2. Validity of the Contents of the Online Instructional Tools in Mathematics VI.

Based on the survey conducted on the assessment of the school administrators and experts, they were of the professional views that these sets of tools were not only valid as they were very acceptable, as proofs of obtained composite means of X = 4.67 for relevance of objectives; X = 4.78 for relevance of content; X = 4.76 for clarity; X = 4.72 for adequacy; X = 4.82 for suitability; and X = 4.67 for usefulness or resulted to an overall composite mean of X = 4.74.

3. Performance of the Pupils in the Pre and Posttests Using the Sets of Online Instructional Tools in Mathematics VI; and Significant Difference, if any, in the Results of the Pre and Posttests.

The results of the pre- and posttest in Mathematics VI was satisfactory as evidenced by mean gain of 11.15 and further affirmed by the overall result of t = 20.871 which is much > than its tubular t = 2.576 that at .01 alpha level and 85 dfs, that the null Ho posited at the onset of the study is rejected. These findings suggest that pupils were able to enhance their knowledge and skills in the use of the online instructional tools in Mathematics, as an alternative tools in the teaching of Mathematics.

Conclusions

In view of the cited findings, the following conclusions were drawn:

1. Geometry and Measurement subject areas were least covered areas in the DepEd's prescribed textbooks, budget of work, in the inventory ad achievement test and table of specification, results of the yearly test, and annual district report that the researcher focused on the content of her proposal on these two (2) not well-tread and tried topics in Mathematics VI in Geometry and Measurement.

2. In terms of judgmental evaluation, the proposed sets of online instructional materials in Mathematics VI were valid as they were very

acceptable to the school administrators / experts (X = 4.71); and Mathematics teacher (X = 4.75); or an overall composite mean of X = 4.73.

3. In terms of concurrent validity, the results of the achievement test and the average grade of the pupils in Mathematics VI were highly and positively significant.

4. Significant difference is found to exist between the assessments of the school administrators and Mathematics teachers as to the acceptability of the proposed online instructional materials in Mathematics VI.

Recommendations

Based from the conclusions drawn in the study, the researcher offers the following:

1. The Proposed Online Instructional Materials in Mathematics VI should be endorsed and adopted for the use of the Grade VI pupils not only in the District 4, but also on the whole Division of City Schools (DCS) of Manila, to serve as online supplementary materials in the teaching of Mathematics.

2. These sets of online instructional tools in Mathematics VI should further undergo testing and re-testing to improve the design and enrich the topics as well as the classroom activities that suit particular setting. These can also serve as alternative source in the absence in the inadequacy of

teachers and basic textbooks and other reference materials, as well as serve as online instructional tool for pupils as no – class interactive class is still partially suspended because of the pandemic situations.

3. More online instructional tools in Mathematics should be developed in other areas of the subject to ease the problem of big classes, inadequate classrooms and facilities, as well as and ease the burden of the teachers as pupils start to assume responsibility for learning, especially, now that partial no in – class is ordered by the DepEd because of the fear of safety and health satisfaction.

4. Because of the limitation of the study, the researcher further recommends a follow-up research to firmly establish the logical and statistical validity of other sets of online instructional materials in other areas of Mathematics subject.

ACKNOWLEDGEMENT

The completion of this study could not have been possible without the expertise of Dr. Atienza, my adviser. I would also like to express my gratitude to the staff and admin of the school - Dominic Savio College for guiding me. Special thanks to my supportive husband and kids, my current Math students and to their parents.

J.G.M.

DEDICATION

This book is dedicated to my family, Alyssa, David and to my current math students

J.G.M.

CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

The delivery of education requirements saw a paradigm shift during the Covid-19 pandemic crisis because of the global lockdowns and restrictions in all aspects of human lives.

Foremost, both health and safety and livelihood, as well an education are affected and impact the everyday lives of the people.

As a result of the pandemic, all schools were globally lockdowned and health and safety restrictions were improved which equally resulted to the Department of Education's (DepEd`s) employing a hybrid instructional approaches.[1]

Likewise, the educators are not only living in an exciting and revolutionary period in almost every area of intellectual endeavor, but are also faced with the challenge of preparing young people to utilize their fullest potential and assume positions of responsibility in the new era of science, automation, and electronic technology.[2]

[1] UNESCO (2020). Education from Description to Recovery. Reneso, Paris,France
[2] Insights you need wrong. Harvard business review (2023) The year in Tech 2023, U.S.A

In the area of mathematics education, new programs of instruction, new teaching materials, and new teaching methods are meeting this challenge that the tasks of mathematics education programs are to keep pace with the advancement of modern society, cooperative learning, action research, field demonstration, upgrading teaching efficiencies and teachers' competencies which are, but a few answers to the growing need to improve mathematics instruction.

To cope with the current pandemic crises and demands of advance technology, mathematics educators thought of formulating individualized instruction in the form of hybrid instructional approach using online blended - instruction to let every pupil learn and progress at his own pace of learning with less contact from the teachers as they are now homeschooled.

The objective of this study is how to upgrade the competencies of Grade VI Mathematics pupils at the selected elementary schools in District 4 in the Division of City Schools (DCS) of Manila. Though textbooks and other reference materials are used by the teachers in preparing their lessons and the lecture discussions during regular classroom activities, additional learning materials are also needed not only to supplement and fully equip the pupils, but also develop their skills in the study of Mathematics. To maximize learning for each pupil, an instructional material in the form of modules now serve as tools to improve pupil performance in mathematics, using blended - online instruction.

The Department of Education (DepEd) postponed in – person classes until a vaccine for new corona virus disease[3] (Covid) is developed. Since the current curriculum aims to improve the quality of education through provision of quality textbooks/teachers' manual on a one-to-one basis to attain its objectives of developing skills in higher intellectual operations, a more complex comprehension and expression activities as well as in thinking intelligently, actively and creatively in life situation, is also required.[4] This is in response to its Learning Continuity Plan.

To achieve the objectives of the current curriculum, different approaches in learning are employed. In response to this, the researcher thought of developing an alternate approach in presenting instruction. Since online instructional materials give each pupil the chance to work independently online and get through his own pace of learning. Each of them may learn more effectively and maybe motivated to explore on more advanced lessons.

Indeed, the study of Mathematics in the elementary level has increasing degree of complexity and difficulty. As observed by the researcher, teaching Mathematics in Grade VI under the current curriculum, set-up of the subjects, particularly in Mathematics has continuity of the lessons starting from Grade I to Grade VI. Hence, for the Grade VI pupils, they must have acquired and familiarized themselves with the basic concepts in all areas covered in Mathematics for grade

[3] Mathew Reysio Crus (2020), "DepEd Postpone In – Person Classes, PDI, June 9, 2020.
[4] SEDP, DECS. Manual of Information on Elementary Education," (2013). Pasig City.

schoolers in order that they become easy as they study higher concepts. Considering the number of subjects integrated in Grade VI mathematics, the researcher was motivated to device other learning instruments presenting mathematical concepts and improve learning for Grade VI pupils in selected public elementary schools, District 4 of the Schools Division of Manila the use of online content-based instructional materials in Mathematics.

Theoretical Framework

Curriculum change is stimulating, daunting and challenging, but above all, it is achievable. It is achievable, in the sense, if the particular curriculum is implemented effectively. More so, when methods and techniques are used by teachers teaching their field of specialization. Different approaches to learning will make teaching effective and learning outcomes become more meaningful.

Many pupils today find Mathematics both as boring and difficult subject. This should not be ignored. Since Mathematics is a subject where pupils could explore using creative alternative approaches not only in limiting teaching in the form of lecture discussion.

One of the best writers on education in America today is Bruber who stated that: “Emphasis on discovery, indeed helps the child to learn how to go about the

very task of learning."[5] It is impossible to learn much about Mathematics without doing Mathematics. A follow-up activity for pupils upon knowing the concepts would strengthen and develop their skills. From the different researchers listed in the review of related literature and studies, the common finding was the creation of modules as a supplement and/or complement to other textbooks aids to teaching fast learners; and serves as a review or remedial materials for slow learners in a relatively short span of time. Since pupils work within their ability level, they experience success in their attempt to learn the material.

Hence, while it takes time and effort to construct them, it could be gleaned that when the supplementary online instructional tools are appropriately implemented, they can improve learning to an extent, no other teaching material can accomplish.

Conceptual Framework

It is believed that the use of the online self-instructional materials appears to be superior to conventional instructional method for developing concepts and skills essential for instruction for higher cognitive process. Online modular instruction makes the teaching process more direct, effective and interesting and the learning situation more productive.

[5] Richard Brown, (2012) "Making Mathematics as Personal and Incentive Experience" The Education Journsl, Vol. XLVI (4), Michigan Pranklen Publication, Inc.,

Using the Input-Process-Output (IPO) model, the researcher identified the need for effective and reliable instructional materials in the teaching of Mathematics to Grade VI elementary pupils of selected elementary schools in District IV, in the Division of City Schools of Manila. It consists of three (3) phases, which are observed:

From Figure 1, the Input phase, she identified the need for online instructional materials through the different and least prescribed topics in the basic textbooks and based on the MLC for the Mathematics subject as well as the textbook ratio and the results of the inventory and achievement test in Mathematics for the schoolyear 2022-2023. In addition, based on these data, the construction and development of online instructional materials on the identified most difficult topics in Mathematics be proposed. Finally, the sets of instructional tools were evaluated for their validity and reliability.

INPUT	PROCESS	OUTPUT
• The need for online Instructional materials Modules: in Math VI: • Prescribed topics • Textbooks Used • Results of the Inventory and Achievement Test in Math VI • Preliminary preparation,	* The Process • Construction and Development of the Online Instructional tools. • Validity Testing of the Proposed Online Instructional tools by Experts • Pre-testing the Proposed Online Tools • Improving of the Module • Posttesting	• More valid and responsive Online Instructional Tools in Mathematics VI • More effective teaching metho-dologies

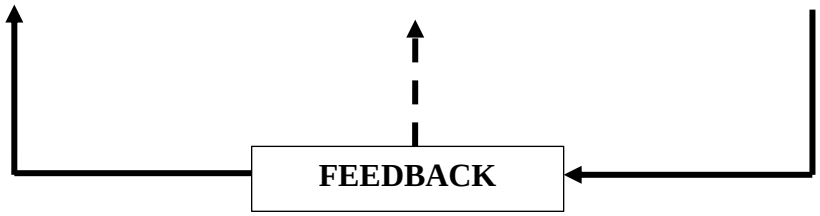

Figure 1. Systems Approach Using the IPO Model in Proposing Sets of Online Instructional Materials in Mathematics VI

In the Process, the study includes the designing and development of online instructional materials in Mathematics VI; and determining the validity of the propose tools where the pre and posttest results were generated from groups of subjects who are the recipients of this instructional tool. From the results, the instructional tools were analyzed so that suggestions and recommendations offered to enhance the design and development of the proposed online instructional tools were incorporated.

Finally, in the Output phase, the study hopes to come out with valid online instructional tools for Mathematics where the teaching of the subject becomes

more effective and pupils develop independent study and acquire more numeracy skills.

It is necessary that the developed online instructional tools are evaluated for their effectiveness or usability as an instructional material so as to improve the learning skills of the Grade VI elementary pupils in working with some topics in Mathematics where they are found deficient.

Statement of the Problem

The study is an attempt to assess the effectiveness of online teaching materials in Mathematics for Grade VI pupils at selected elementary schools in District 4, Schools Division of the City of Manila.

Specifically, this study sought to answer the following questions:

1. From the instructional tools in Mathematics and prescribed DepEd's , what materials, prescribed topics are to be included in the proposed online instructional materials in Mathematics VI?

2. How valid are the content of the proposed online instructional materials in Mathematics as assessed by the group of respondents as to:

    2.1 Relevance of Objectives;

    2.2 Relevance of Contents;

    2.3 Clarity;

    2.4 Adequacy;

    2.5 Suitability; and

2.6 Usefulness?

3. How significant is the difference in the assessment of the groups of respondents?

4. How do the Grade VI pupils perform in the pre-test and posttest using the proposed online-based instructional materials in Mathematics?

5. How significant, if any, is the difference between the pre-test and posttest results?

Hypotheses

The following hypotheses were tested at .05 level of significance.

1. No significant difference exists between the assessments of the two (2) groups of respondents with respect to the validity of the proposed online instructional materials in Mathematics VI with respect to the following aspects:

1.1 Relevance of Objectives;

1.2 Relevance of Contents;

1.3 Clarity;

1.4 Adequacy;

1.5 Suitability; and

1.6 Usefulness.

2. No significant relationship exists between the pre and posttest results of the revised instructional materials in Mathematics VI to prove the reliability of the proposed tools in Mathematics?

Scope and Limitation of the Study

This study is delimited to the following scope:

This study dealt primarily on testing the validity and reliability of sets of proposed online-instructional materials in Mathematics for Grade VI pupils of the selected elementary schools in District 4, of the DCS, Manila.

The topics of the online tools are limited on Geometry, Measurement and Temperature in Grade VI Mathematics, which are found to be difficult as revealed in the results of the test analysis done in the Achievement test administered by the Division of City Schools (DCS) of Manila.

The subjects of this study were Grade VI pupils who were randomly selected from among Grade VI pupils of an elementary school in District IV, Division of City Schools (DCS) of Manila. These pupils were randomly selected in the school for the schoolyear 2022-2023 and were exposed to the use of online instruction.

The study also determined the assessments of the school administrators and teachers on the validity and reliability of the proposed sets of online instructional materials in Mathematics VI.

Likewise, the study determined if there is significant gain in the mathematics performance of Grade VI pupils after the administration of the pre- and posttests in Mathematics VI using the proposed online instructional materials for Grade VI pupils

Significance of the Study

To develop skills in higher intellectual operations and more complex comprehensions and expression activities, and in thinking intelligently, critically and creatively, materials are constructed that would suitably meet the purpose of the study. The country recognizes the importance of mathematics as an instrument for development along scientific and technological areas. Since it is incumbent upon the teachers of Mathematics to equip the learners with Mathematical skills along specified areas, the researcher believes that there is a need to prepare instructional materials purposely designed to realize the desired objectives.

This study is considered significant because it provides measures to improve the teaching of Mathematics through the use of sets of online instructional materials in Mathematics VI.

First, it will help the Grade VI teachers in presenting their lessons in a simplified manner with less confusion on the different Mathematical concepts in Grade VI.

Second, currently this online instruction is believed to be useful and of benefit to Grade VI pupils of Mathematics because of the academic crisis in elementary schools since they have the chance to work independently and go through the lessons at their own pace of learning using online instruction. They may also learn more effectively, and are motivated and inspired to work on a more advanced levels of lessons.

Third, since online instruction insures personal attention for each pupil, working with the use of technology, it can therefore be used as basic instructional materials for all pupils, review materials for average pupils, and supplementary materials for fast pupils. Moreover, through the use of online instructional tools, the pupils will be encouraged to become resourceful and creative, disciplined and more responsive individuals.

Fourth, the findings and results of the study may make the administrators realize that the use of the online instruction could be an effective method of instruction that could create a worthwhile activity in the presentation of mathematical concept during a crisis.

Lastly, to the Grade VI pupils and other researchers on online instruction, this study will serve as a guide for further research and encourage them to work on online tools for better and effective online instruction and learning.

Definition of Terms

The following terms used in the study are defined operationally.

Concurrent Validity. It is a type of criterion-related validity in which the criterion measures are obtained at appropriately the same time as the test scores.

Content Validity. It is a type of validity that is determined by the degree to which the question, tasks or items on a test are representative of the universe.

Control Group. It refers to subjects who received the lecture-discussion method.

Difficult Topics. These refer to the topics covered in the achievement test where the subjects obtained the lowest score and least topics used in the MLC and SLK textbooks.

Elementary Mathematics. The subjects offered in the elementary curriculum, which stresses concepts rather than rote memorization of facts and numbers. The emphasis is on the understanding and discovering of number pattern and number relationship.

Inventory Test. It is a kind of diagnostic given to the pupils at the beginning of the schoolyear to identify the strengths and weaknesses in the performance of the pupils.

Mean Mathematics Performance. This is the result of the pre-test and posttest obtained by the subjects.

Mean Score. This refers to the average score obtained by the subjects in the preliminary test.

Module Try-out. The term refers to the actual use of the developed modules by the subjects.

Posttest. It is the test, which the learner takes after using the instructional materials.

Pre-test. The test, which the learner takes before using the instructional materials.

Reliability. It refers to the attribute of consistency in measurement.

Significant gain. This refers to the gain difference obtained in the pre-test and posttest scores of the subjects.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

Before the drafting of the instructional materials in Grade VI, some related references were gathered in order to determine some factors, problems and suggestions in the teaching-learning process of Mathematics. These served as the basis in the presentation of the instructional materials in Grade VI.

This part of the study covers related mathematical concepts and studies both foreign and local source which are chosen to enrich the framework of the study.

Related Literature

Foreign Source

Good instructional materials especially the printed ones stimulate a good human mentor. It enhances the quality of instruction, therefore it connotes quality education. To achieve this, therefore, the use of the best and most appropriate instructional materials should be given focus, especially the design and development of modules, through textbooks and other instructional materials are still considered the best instrument for enhancing positive transfer of learning according to Wesley and Wronski.[6]

[6] T.N. Wesley and D. Wronski (2015). Designing and Development Instructional Materials

Inspire of the increasing supply of varied materials, the textbook continue to be the principal basis of instruction. Textbook performs several functions like providing logical organization and suggesting common source of content.

Dawson[7] in his book also cited the differences between everyday learning and scientific knowledge. He stressed the importance of the actual manipulation and experimentation of the use of materials to make students understand mathematics concept thoroughly.

The role of mathematics in learning is worth pursuing to a greater extent as cited by Harlen, et al.[8] they believe it should be emphasized to gain understanding of the world of concepts upon the use of process and are equally important and interdependent with one another.

In the classroom, teacher has recently come to occupy an increasing responsibility and a challenging and interesting role in the evolution of modern school. He is not only expected to take care of the usual problem in evaluation, but also of the numerous classroom activities and pupil performance under his care.

Accordingly, it would be surprising to find a dull pupil who can do reading just as bright pupils in the classroom since this equal achievement of the dull and the bright pupils in reading may be due to several factors. He explained that the

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[7] C. Dawson. (2015). “Two Different Ways of Knowledge: Some Inquiries for Science and Technology,” (The Australian Science and Technology).

[8] Wynne, Harlen, et al. (2015) “Progress in Primary Science,” Workshop Material for Teacher Education.

dull pupils may have a book of his own. He may be more studious, or he had been given help by his teacher which the bright pupil does not have. If there are differences in achievement among pupils in the homogeneous class, it may be possible that there are differences in achievement between the local and the central pupils, or between boys and girls.[9]

Dawson[10] also in his book cited the differences between everyday learning and scientific knowledge. He stressed the importance of actual manipulation and experimentation and the use of materials to make students understand science thoroughly.

Likewise, the role of science in learning is worth pursuing to a greater extent because it should be emphasized in understanding of the world.

Brown equally pointed out that as far as mathematics instruction in the elementary school is concerned, the major goal is the involvement of pupils is the process of discovering mathematical ideas and formulating problems. He further states that pupils who memorize proofs and formulas from textbooks without understanding them will never know the joy of mathematics. But the students who utilize educated and sensible guesses to solve a problem or to judge whether another pupils guess' is correct are committing themselves to an often-

[9] "Theory and Practice in Elementary Teaching: The Teacher as a Mediator," (2013).

[10] C. Dawson. (2015). "Two Different Ways of Knowledge: Some Inquiries for Science and Technology," (The Australian Science and Technology).

exhilarating process. This process of inductive leap followed by a deductive argument has been used for centuries.

Good instructional materials especially the printed ones stimulate a good human mentor. It enhances the quality of instruction therefore it connotes quality education. To achieve this therefore, the use of the best and most appropriate instructional materials should be provided especially the learning modules.

Textbooks and other materials are still considered the best instrument for enhancing positive transfer of learning according to Wesley and Wronski.

Postlelethwaite and Wesley[11] also cited the portability of module which can easily be made available at a variety of location and can also be exchanged and disseminated to other schools. The small size of the module leads itself to the possibility of revisions and restructuring into a greater variety of pattern consistent with the different approaches with a minimum cost and effort.

Due to the complexity of imparting knowledge to pupils, a variety of methods and techniques have been experimented on to maximize learning. One of these is the development of modules. According to Dooly and Swanberg,[12] a module is designed to be self-contained lesson plan that student could make use of his own pace of learning. They further stated the significance of the module, which is of great help to a student who has all the time to understand particular concepts of

[11] T.N. Postlethwaite and D.E. Wesley, (2012). (Ed.s) The Study of Science: Science Achievement in Twenty Three Countries (Oxford, Pegamon, Press).

[12] Jim Dooly and Tom Swanberg, (2012). PVCs, “Mathematics Module”, The SEDP Hand-Outs (USA,).

topics. It can be used as supplement materials to help the student improve his mastery of the problem materials. The module can also be used as a way to help the student catch-up with the missed lessons. The student will be able to work at his own pace while learning the missed topics, thus giving the student a chance to maximize his learning. The use of modules would be seen as a better strategy to handle this situation as opposed to just letting the student copy the missed days' lectures from his classmates without further understanding.

Local Source

Mathematics should be regarded as a subject who is very useful and interesting in everyday life. Therefore every student should be motivated and properly inspired to learn mathematics and should find enjoyment in the experience. To make mathematics an enjoyable one, Esteban enumerated some factors that the teachers should consider in order that students will learn mathematics better:[13]

1. when they become aware and have interest in the subject;
2. when the environment is conducive to learning;
3. when their curiosity is being aroused or properly motivated or activated;
4. when the task is simple enough to spark the will and urge to learn; and

[13] Remedios A. Esteban (2015), "Meaningful Approach to Mathematics Teaching" The FilipinoTeachers, Vol. XI, No. 2.

5. when they themselves are the task of constructing and manipulating concrete things.

On one hand, according to Gregorio,[14] most students in the Philippines perceive mathematics subjects as tough and rigorous especially Geometry and Algebra. There is also a belief that only able college bound students are likely to succeed directly or indirectly which teachers convey this opinion to their students.

In this regard, it is the work of the mathematics teachers to make study of mathematics more meaningful and interesting. Therefore, the teacher has to continuously provide him and the students with enough teaching materials like charts, tables, models, pictures, drawings, films and specimens that make teaching and learning more interesting. For more difficult and novel concept to discuss with, the simplest and most appropriate instructional materials are needed. Instructional aids and devices are used by educators in motivating learner's igniting perception and concepts, supplementing their understanding in accomplishing the experiments, in modeling or in demonstration purposes in the conclusion of value judgment in the school. Psychologists claim that instructional materials are indispensable tools in the teaching-learning process. The more senses are used, the better understanding of the instruction in affecting teaching.

[14] Lucille C. Gregorio,(2014). "Science Education Program: A Retrospect," Paper presented to the BIOTA National Commission

The improvement of mathematics education can be achieved to the development of instructional materials, which is also a part of the improvement of the mathematics curriculum.

For its part, the DECS has always pioneered towards the improvement of mathematics curriculum. Hence, in 1989, in the implementation of the New Secondary Education Curriculum (NSEC),[15] one of the objectives is to broaden and heighten one's ability and appreciation for arts, science and technology as means of maximizing one's potential for self-fulfillment and for promoting the welfare of others.

Problems might beset the teachers on how to go about mathematics and help the young ones in grasping mathematics ideas. Among these problems, basing on vicarious experiences, the presence of instructional materials is much to be emphasized to make learning easier. Because of this, the roles of the teachers become challenging. He has to attend to the multifarious tasks in line with his studies to end himself in reading books and educational magazines to keep him abreast with new thrust, never knowledge, application, techniques, methods, and approaches in teaching. He must establish harmonious rapport with peers, superiors, and the whole community and above all make pupils learn what they ought to learn.

[15] Memorandum No. 39 s. 2009. "The Implementation of the New Secondary

Instructional materials can be used effectively to produce positive attitudes, to develop materials and to teach and reinforce skills. Specially, since they provide permanent learning and teaching process, which will prove more interesting to pupils.

Materials should be interesting to children and within their mental grasp in order that much can be accomplished in the growth of scientific knowledge, attitudes and problems involving skill in various fields of science. Pupils are interested in a variety of things in their environment, therefore the selection of materials should be made on the objectives to generate pupil's interest.

Some of the purposes on the use of instructional materials in mathematics are as follows:

1. to equip the pupil with functional understanding of facts and concepts; develop skills in the process of discovery;
2. instill scientific attitudes and habits of works; and
3. develop an awareness and appreciation of the consequences of business and industry.

Since there is no best method in teaching mathematics and other subject matters, it is imperative that the classroom teachers utilize a variety of teaching strategies. The utilization of instruction and teaching in the classroom is the concern of the teachers and administrators. So much has been said about the effectiveness of the teaching-learning process through the use of audio-visual

materials and very little has been done by the teacher in the achievement of better result in education.

For the affectivity of learning on the part of the pupils, the new type of teaching materials as well as classroom activities produces call for an alert teacher whose role includes a follow-up of the degree of learning achieve by the pupils.

One of the activities the teacher could give in a subject matter is the environmental activities. This may help produce greater learning. Pupils must be provided with all these means to develop their potentials. Hence, provide them with enough and rich experiences as one means in helping them develop their abilities to the fullest to express themselves effectively. Education liberates the capacities of the human person and contributes to his fullest development and usefulness in society. One could not dispute the fact that in the field of various disciplines such as mathematics one cannot do without the textbook. The importance and advantages of textbook is indispensable.[16]

Significantly, the place of science and mathematics in the curriculum is the growing concern of all because it is agreed that children should acquire experiences on things that touch their lives so that they may understand better the world in which they live in. For this reason, first based experiences to make them feel,

[16] "Theory and Practices in Elementary Teaching: The Teacher as a Mediator," Forum (July 2013).

see and use all senses make learning more meaningful. It is at this point that the teachers and her side in teaching play an important vital role.

The type of instructional materials to be used by the teacher depends upon the outcome desired and the maturity and ability level of the learners.

On another end, Savellano[17] pointed out the importance of schools in contemporary society. According to her, the future of the nation is determined by the quality of education the school provides. “High quality education depends upon high quality teachers, high quality materials and high quality facilities.

Related Studies

Foreign Setting

Findings of researcher in other countries reflect the effectiveness of modules and instructional materials in the learning experiences of students.

Individualized learning is used to learn specific skills or acquire knowledge. Teachers can help students in individualized instruction by giving them additional review and guided and independent practice for learning. Teachers need to make up activities fitter containing practice exercises written materials. Students requiring services may also be provided individualized activities developed by the teacher. These are good source of ancillary materials and activities. Teachers are

[17] Savellano, Julieta (2012). The Professional: His Role and Responsibilities,” Synthesis of Journal of Ideas.

dealing more and more with special students, therefore, it is imperative that the teachers deal with this specific strategy on individualized instruction, according to the findings of Hughes.

Hughes'[18] study is significally similar to the present study, which also deals primarily on individual instructional materials to make teaching and learning more effective and meaningful in the elementary level.

In the study conducted by Victor, he emphasized the importance of instructional materials, which according to him are means to an end.

As a means he suggested that instructional materials must be designed and selected to accomplish a specific purpose. The chief purpose is to implement ideas in the minds of the students and help them understand and scientific concepts. These concepts will aid the students in his attempt to interpret his surroundings to live effectively with in the environment and to exert measures to control over this environment.

Equally, Dow conducted a study to determine the role of individual instruction in classroom management of a multiple laboratory activity. The analysis and interpretation of data indicated the individual performance of the learners. Teachers attempted to manage multiple classroom activities and manipulating space, time, and student's personal condition, equipment and materials.

[18] Selma Hughes. (2015). "Strategies to Promote Inclusion in Primary Grades Mathematics Classroom: A Study," a survey conducted in the University of Vancouver.

Participant indicated that teacher designed materials were more appropriate than commercial prepared instructional materials and were preferred due to their versatile and low cost while commercially prepared materials were expensive, difficult to locate and does not appeal to students.

The findings of the study supported the claim that instructional materials play a significant role in the classroom management of an Individual multiple laboratory activity.

Dow's[19] study is similar to the present study in the sense that both studies dealt on the importance and effectiveness of instructional materials in the teaching-learning process.

The study of Cematu[20] also found out that modular materials had established an edge over other kinds of materials in education. Among others, modular materials served as enrichment for fast learners and as review or remedial materials for slow learners in a relatively short span of time. He also found out that since pupils work within their ability level, they experienced success in their attempt to learn the materials. Hence, while it takes time and effort to construct them, appropriately implemented, they can improve learning to an extent that no other teaching materials can accomplish.

[19] Alan Dow (2017). "Individualized Instruction As A Classroom Management: Techniques in Individual Education," a dissertation, University of California.

[20] L. Cematu (2016). "Mathematics for the Average College Bound Students," Master's thesis, UCLA, USA.

Montague[21] in his survey combined lecture method and individualized instruction using module. He also cited programmed instruction that favored the slow learners for the following reasons:

1. Every pupil learned and progressed at his pace of learning.
2. The slow learners did not hold up the fast learners.
3. Pupils of varying abilities and background could be accommodated in a classroom at the same time. This favored the pupils in the remedial class, both using modules.
4. If a class interruption occurred, the teacher's work with a single pupil had to stop, but he could immediately resumed his session with the single student since it was easier to get the attention of one student after the interruption than to get the attention of an entire class.
5. The teacher did not have to prepare lesson plan since the module helped her ease the burden of teaching.

However, the existing difficulties of the self-instructional program had been cited as follows:

1. Since the pupils learn through modules in their own pace, they may not finish the lessons as they should because they will need a good deal of self-motivation.

[21] Earl J. Montague (2016). "Fundamentals of Elementary Classroom Instruction Using Lecture and Modular Instruction," dissertation, University of Columbia, Ohio.

2. In a slow class, it might happen that several pupils may stop working at the same time to ask different questions.

3. The program did not provide enough interaction between and among pupils and teachers.

4. Programmed materials would be difficult for pupils with great problems in reading.

5. The teacher may be burdened by the need to explain the same thing again and again. It would be better if the same explanation could be given to as many pupils as possible only once at least (as in the lecture-discussion method).

7. Learning at one's own natural rate may be a disadvantage because one's natural rate may not be acceptable.

The aforecited studies are in one way or other similar to the present study since most of them developed and validated modular materials to alternate the traditional lecture-discussion method in teaching mathematics.

Local Setting

The following studies are highlighted and found to have strong bearing with the present undertaking:

The role of instructional materials in effective instruction cannot be underscored. Moreover, the mathematics instructional materials aide from the basic textbook is essential for meaningful and effective teaching.

The study of de Guzman (2022),[22] in the strands in Mathematics on the meaning of successful Mathematics learning underwent several shifts in response to changes in both society and schooling. For roughly the first half of the century, success in learning the mathematics of pre-kindergarten to eighth grade usually meant facility in using the computational procedures of arithmetic, with many educators emphasizing the need for skilled performance and others emphasizing the need for students to learn procedures with understanding.

In the 1950s and 1960s, the new math movement defined successful mathematics learning primarily in terms of understanding the structure of mathematics together with its unifying ideas, and not just as computational skill. This emphasis was followed by a "back to basics" movement that proposed returning to the view that success in mathematics meant being able to compute accurately and quickly. The reform movement of the 1980s and 1990s pushed the emphasis toward what was called the development of "mathematical power," which involved reasoning, solving problems, connecting mathematical ideas, and communicating mathematics to others. Reactions to reform proposals stressed such features of mathematics learning as the importance of memorization, of facility in computation, and of being able to prove mathematical assertions. These

[22] Celestino de Guzman, Jr. (2022), Academic Predictors of Learning Profienncy Across the Strands in Mathematics for Senior Students of Arellano University – Plaridel Camous in Mandaluyong City.

various emphases have reflected different goals for school mathematics held by different groups of people at different times.

It is in this end that the researcher conducted a study to identify academic predictors of learning proficiency across strands of Mathematics of senior high school students of Arellano University High School Department in Plaridel Campus in Mandaluyong City.

The study, descriptive in nature, made use of five (5) groups of subjects: the senior students who were composed of 42 Grades A and B; and 35 Grade C and D; lastly 40 Grade E senior students of Arellano University High School students of Plaridel Campus in Mandaluyong City.

Using sets of researcher-made questionnaire, the data were gathered and answered specific problems of the study. Most specifically, the following are the findings of the study based on significant information:

1. The level of academic proficiency of the senior students in Mathematics along Algebra are as follows: 104 (54 percent) obtained a score ranging from 16-20, 85 (43 percent) obtained a score ranging from 11-15, while 5 (3 percent) obtained a score ranging from 6-10. The student-respondents have a total frequency of 194 (100 percent); along Geometry, 113 (58 percent) obtained a score ranging from 16-20, 76 (39 percent) obtained a score ranging from 11-15, and 5 (3 percent) obtained a score ranging from 6-10. All senior student-respondents have a total frequency of 194 (100 percent); in Mathematics, 108 (56

percent) obtained a score ranging from 11-15, 76 (39 percent) obtained a score ranging from 16-20, and 10 (5 percent) obtained a score ranging from 6-10; along Statistics and Probability, 99 (51 percent) obtained a score ranging from 16-20, 91 (47 percent) accumulated a score ranging from 11-15, and 4 (2 percent) got a score ranging from 6-10.

2. There exists correlation between the proficiency level of students along Algebra and Mathematics wherein; and it obtained a computed F-value of 4.157 which is equivalent to the P-value of .017 which is less than the .05 degree of freedom, that no significant difference exists.

3. In academic characteristics related to the proficiency level of the senior students along study strategy in terms of Rehearsal, “In studying Math class materials, I will analyze its content again and again” obtained the highest mean score of 4.32 which is verbally interpreted as Strongly Agree, on the other hand, “In studying Math, I usually answer the Chapter Test in my book” got the least mean score of 3.43 which is equivalent to Agree; in terms of Organization, “In reviewing my Math materials, I will read through the class notes textbook and find out the most important parts” ranked first with a mean of 4.37 is verbally interpreted as Strongly Agree, while “In every exam, I will categorize the questions as to its type, i.e. easy, average, hard, etc” got a mean of 3.62; in terms of Self-regulation, “In solving Math questions, I will list down related formula first” obtained a mean of 4.26 which is verbally interpreted as Strongly Agree, in contrast, “If I feel confused

or feel uncertain about my answer in Math test, I immediately verify it or look for the right answer/procedures in my book" obtained the least mean score of 3.55 which is interpreted as Agree; in terms of Study Environment, "I make it a hobby to study Math at a fixed time" ranked first with a mean of 3.83, while "I will follow a weekly schedule to study Math materials" ranked last with a mean of 3.60, both verbally interpreted as Agree; in terms of Attitude towards Mathematics, "Mathematics is difficult but an interesting subject" ranked first with a mean of 4.56 and is verbally interpreted as Strongly Agree, on the other hand, "Mathematics is easier to learn than any other subject" with a mean score of 3.47 ranked last and is verbally interpreted as Agree.

4. In terms of rehearsal strategy using the 194 senior students, it obtained a correlation coefficient scores of 1 in rehearsal, .461 in organization, .579 in self-regulation, .360 in time and study environment and .467 in attitudes toward Mathematics which is not statistically significant with .000 significance level which is verbally interpreted as No Difference based on the 0.01 level of two-tailed test. With the data presented it is evident that there is no significant difference on the Academic Characteristics of the respondents in terms of rehearsal strategy in Mathematics.

In terms of organization strategy utilizing the 194 subjects, it obtained a correlation coefficient scores of .461 in rehearsal, 1 in organization, .256 in self-regulation, .223 in time and study environment and .528 in attitudes toward

Mathematics which is not statistically significant with .000 and .088 significance levels obtained in rehearsal, organization, self-regulation, time and study environment and attitudes toward Mathematics which is verbally interpreted as No Difference based on the 0.01 level of two-tailed test. It is evident that there is no significant difference on the academic characteristics of the respondents in terms of organization strategy in Mathematics

In terms of self-regulation strategy utilizing the 194 respondents it obtained a correlation coefficient scores of .579 in rehearsal, .256 in organization, 1 in self-regulation, .472 in time and study environment and .123 in attitudes toward Mathematics which is not statistically significant with .000 and .002 significance levels obtained in rehearsal, organization, self-regulation, time and study environment and attitudes toward Mathematics which is verbally interpreted as No Difference based on the 0.01 level of two-tailed test. It is evident that there is no significant difference on the academic characteristics of the respondents in terms of self-regulation strategy in Mathematics.

In terms of time and study strategy utilizing the 194 respondents it obtained a correlation coefficient scores of .360 in rehearsal, .223 in organization, .472 in self-regulation, and 1 in time and study environment which is not statistically significant with .000 and .002 significance levels obtained in rehearsal, organization, self-regulation, and time and study environment which is verbally interpreted as No Difference based on the 0.01 level of two-tailed test. It is evident

that there is no significant difference on the academic characteristics of the respondents in terms of rehearsal, organization, self-regulation and time and study environment strategies in Mathematics.

With respect to attitudes toward Mathematics, it obtained a correlation coefficient of .024 which is statistically significant with .738 significance score which denotes that there is strong positive/negative difference on the academic characteristics of the respondents in terms of attitudes toward Mathematics strategy.

And lastly, in terms of attitude towards Mathematics strategy utilizing the 194 subjects, it obtained a correlation coefficient scores of .467 in rehearsal, .528 in organization, .123 in self-regulation, and 1 in attitudes toward Mathematics which is not statistically significant with .000 and .088 significance levels obtained in rehearsal, organization, self-regulation, and attitudes toward Mathematics which is verbally interpreted as No Difference based on the 0.01 level of two-tailed test. It is evident that there is no significant difference on the academic characteristics of the respondents in terms of rehearsal, organization, self-regulation and time and study environment strategies in Mathematics.

With respect to time and study environment, it obtained a correlation coefficient of .024 which is statistically significant with .738 significance score which denotes that there is strong positive/negative difference on the academic characteristics of the respondents in terms of time and study environment strategy

5. There exists significant difference between the academic characteristics and the proficiency level of students wherein, it obtained a computed F-value of 1.307 which is equivalent to the p-value of .263 which is greater than the degrees of freedom of 0.05.

From the research findings, he concluded that:

1. Majority of the subjects got a high rating in Algebra and Geometry, most of the senior students fall above the passing rate of the subject Mathematics, and most of the student-respondents accumulated a high score rating in Statistics and Probability.

2. The null hypothesis is rejected and therefore, there is a significant relationship between the proficiency level of students in Mathematics along Algebra and Geometry.

3. In academic characteristics related to the proficiency level of the senior students along study strategy in terms of Rehearsal, analyzing its contents again and again in studying math materials is strongly agreed by the student-respondents; Organization, reading through the class notes textbook and finding out the most important parts is strongly agreed; Self-regulation, listing down related formula first is strongly agreed; Study Environment, making it a hobby to study Math at a fixed time is agreed; Attitude towards Mathematics, student-respondents treat Mathematics difficult but an interesting subject.

4. There is no significant correlation on the Academic Characteristics of the respondents except in terms of Attitude towards Mathematics and Time and Study Environment which have a strong positive/negative correlation on the academic characteristics of the respondents.

5. There exists significant difference between the academic characteristics and the proficiency level of students

Based on the results of the research, the following were recommended:

1. It is commendable for students to continue coming up of strategies in order to excel in the subject Mathematics, Geometry, Algebra, and Statistics and Probability.

2. It is recommended to enhance Mathematical skills for it entails also accumulation of skills in other subjects such as Algebra and Geometry. It is recommended to practice for expertise in Mathematical skills through reading and analyzing the contents thoroughly, and making it a hobby to study the subject.

3. School is also recommended to conduct activities related to the subject Mathematics, as well as Geometry, Statistics and Probability, and Algebra, to enhance students' Mathematical skills. Giving a variety to the activities and making it more exciting is also commendable.

4. The Department of Education should come up with programs which the school shall adopt that improve and nurture students' skills.

5. It is further recommend that other researcher replicate this study to further bridge the gap in the teaching of Mathematics for senior students to better prepare them for the challenges that await them in their future career.

Another study by Galicha (2018),[23] on proposing a module for Mathematics VI pupils was descriptive in nature where 30 teachers of Mathematics VI and their 5 principals and supervisors were chosen using a combination of purposive-convenience sampling procedure. Five (5) elementary schools in the district of San Fernando, Division of Romblon were chosen and these included: San Fernando Central School; España Elementary School.

For the subjects of the study, two (2) Mathematics VI classes of España Elementary School were used. Both of these sections were grouped heterogeneously. The subjects were sixty-four pupils; thirty-two (32) pupils in each section.

The experimental group which was composed of 32 pupils (16 males; 16 females) were given the modules; while the control group which was composed of 32 pupils (16 males; 16 females) did not use the modules. They were matched by ranking them according to sex, age, ad according to their final rating in Mathematics V. Section A was made as the experimental group and Section B as

[23] Elmer P. Galicha (2018), "A Proposed Module on Basic Concepts in Mathematics VI," Master's thesis, EARIST.

the control group. They were chosen using the purposive-convenience sampling procedure.

The following were the findings of the study.

1. A mean difference of 4.8 in the pre-test score results of the control and experimental groups of students revealed that not much has been achieved by the pupils in the first few months in the study of Mathematics VI in terms of the mastery learning and intellectual skills expected of the Grade VI pupils. This was shown in the reported mean score of the 5 elementary schools which mean scores ranged from 23.5 to 27.

As regards the index of discrimination, 20 or 50 percent of the 40 items were generally good ones and should be retained while 4 or 10 percent should be revised/deleted/discarded as its index of discrimination fall under the lowest level = 0.00 - 0.20

2. The t-test was applied to arrive at the answer to the question if significant differences in the pre-post tests mean scores between the groups of respondents on the use of the proposed module for Mathematics VI, Result of the t-value for the pre-test= 0.30 is much lower than its tabular value of 2.042; hence, 05 alpha level, the null hypothesis raised is accepted. However, after the series of modules were administer the experimental group, the findings on the pupil's performance based on the results of the post-test scores, a composite mean og 20. 46 for the experimental group or a composite mean difference of 6.55.

When these composite means of 13.91 for the control group with 3.77 standard deviation; and a mean score with 20.46 standard deviation for the experimental group were subjected to t-test to determine its significant difference, the results of the computed t-value of 7.38 was much greater and higher than its critical t = 2.042. Therefore, the null hypothesis of no significant difference is rejected.

3. The four (4) standard criteria used in assessing the acceptability of the proposed sets of modules for the use of Grade VI pupils in Mathematics revealed that they are all found to be very much acceptable as shown in the overall weighted means of 4.79 in methodologies used; 4.78 in learner's needs; 4.75 in objectives set; and 4.72 in other criteria.

In the light of the aforecited findings, the conclusions that follow were drawn:

1. The Grade VI pupils did not perform well in the achievement test in Mathematics VI as further proofs of their dismal mean scores. However, the index of difficulty of the test control was generally on the average level and the level of discrimination good.

2. The experimental group of respondents performed within the level of very satisfactory when subjected to the use of the proposed sets of modules for Mathematics VI, than the control group who performed only within the satisfactory level.

3. The contents of the proposed sets of modules jibe with the standard requirements and criteria set by the DECS and measure what they hope to actually measure, hence, the acceptability and usefulness of the proposed supplementary instructional materials according to the school administrators and teachers of Mathematics VI.

She offered the following recommendations:

1. Since the performance of the pupils was low, pupils should be given opportunity for further exploration and drill exercises. They should be exposed to varied mathematics activities.

2. Modules can be used for teaching the basic concepts in Mathematics VI.

3. Since the modules are acceptable as a teaching device, it is recommended that these modules be used in other classes

4. Pupils should be made familiar with modules and these modules should be made accessible to pupils who are interested to learn through them.

5. The modules should be tried out in bigger classes and to slow learners for enrichment/ remedial classes. It should be published, disseminated, and utilized by the teachers for Grade VI pupils not only in the Division of Romblon, but also the DECS as supplementary materials for Mathematics VI. Preliminary on the

local setting, each Mathematics VI teachers should be provided with the modules for free and use in the teaching of Grade VI pupils in Mathematics.

6. Only competent and knowledgeable teachers of Mathematics VI should be assigned to teach the subject so that pupils can perform better and overcome difficulty in the study of Mathematics.

Likewise, the study conducted by Armid[24] disclosed that on the production of instructional materials in Analytic Geometry, the teacher respondents confined themselves to the use of existing instructional materials which were still foreign-authored books rather than locally produced ones. It was observed that despite this, the respondents were willing to adopt instructional materials authored by Filipino educators if they were already out in the market which were less expensive, more understandable and suited to Filipino students.

The use of learning modules instruction was more effective than the non-module approach in solving right triangles. Results showed that the experimental group had a significantly higher gain in academic achievement than the control group. Moreover, he also found out that the use of learning module instruction promotes a favorable learning-teaching strategies.

Moreover, Barasi's[25] findings, were attributed to the cause of unsatisfactory results in the teaching of science to the incompetence of the teachers in account

[24] Diego M. Armid (2016) "Development and Validation of a proposed Worktext in Analytic Geometry," Ed. D., CEU.

[25] Leticia Carag. Barasi (2015). "A Proposed Enrichment Materials for the Teaching of Science for Grade VI, Master's thesis, Tuguegarao, Cagayan.

of their inadequate preparation to teach the subject, insufficient textbooks, instructional aids, lack of laboratory facilities, and a separate science room.

Equally, Padojinog,[26] conducted a study with the use of modules for Grade VI pupils in Mathematics. Findings revealed that the Grade VI pupils were found weak in the higher level of the basic operation facts of whole numbers. They also encountered difficulties in several skills in rational numbers, geometry and problem solving. With the use of the modules, it was found that the quality of learning of the pupils were improved and difficulties

in Mathematics minimized.

This study is similar to the reviewed studies of Padojinog because it dealt with the production of supplementary materials utilizing the steps or principles of research and development. They are also similar with the kind of respondents who were elementary grades pupils; and the subject under study, Mathematics.

The study of Carecho[27] in relation to the quantitative assessment of the modules on the achievement of the subjects also revealed that there was a significant difference between the pre-test and posttest mean scores of the experimental group ion modules I, II, and III. Furthermore, the posttest mean was much higher than the pre-test mean, which may be attributed to the use of the modular instruction. In her study, she concluded that majority of the Grade IV

[26] Derbee O. Padojinog (2014). "Development of Sample Module for Grade VI Mathematics," Master's thesis, PWU.

[27] Concepcion M. Carecho, Ma. (2014). "Modules on Problem Solving for Second Year High School Students," Master's thesis, DLSU.

pupils recognized the need for additional learning aids in acquiring the skills in problem solving. Pupils who used the modules were found to have performed better than those who were exposed to the traditional lecture-discussion method instruction. She further recommended that modules may be used as teaching aids to supplement and/or complement Another study conducted by Aleta,[28] stressed that the academic performance of students maybe improved significantly by providing the high school laboratory with the required equipment and by improving the instructional materials, socio-economic status of parents through increased family income by maintaining high standard of reading instruction in the elementary grades and high standard of instruction in high school.

Raful[29] concluded in her study that: a) insufficient supply of instructional materials like books and other supplementary reading materials could also be another contributory factor why students were deficient or weak in Mathematics as noted by mathematics teachers; b) the used of modules produced significant differences on the scores from the pre-test and posttest; c) students' progress in the used of the modules revealed that the instructional materials were effective tools for learning mathematics; d) the self-instructional materials in the form of modules were suited to the Grade III pupils in their level of understanding, interest

[28] Julito B. Aleta, (2016). "Factors Associated with the Performance of Students of Science and Technology: The Case of Negros Occidental School, Ph.D. CEU.

[29] Hemenia T. Raful,(2015). "Proposed Instructional Materials in the Teaching of Mathematics of the First Year High School Students of Alcala Rural School, Modularization of the Difficiencies," Maser's thesis, Tuguegarao, Cagayan.

and needs. She then made recommendations such as: a) Mathematics teachers should equip themselves teaching methodologies/ techniques and use these instructional materials in their teaching to effect the insufficient supply of textbooks and other instructional references; b) focus on the Elementary Education Curriculum that science is taken for (60) minutes every day, hence Mathematics is also recommended for 60 minutes to give ample time for the understanding of concepts; c) teachers should adjust their instruction to the needs and characteristics of individual learners. Development of their own instructional materials like modules was strongly recommended to cope with these deficiencies; d) school administrators should establish and maintain programs to develop instructional materials like modules especially designed for remedial purposes.

Implications of the study of Gacayan[30] pointed out that: 1) there was a need to reorient and retain mathematics teachers with sufficient knowledge and approaches in teaching Modern Mathematics through in-service education program; 2) therewais a need to conduct group; sessions for the existing instructional materials suited for the students; and 3) there wss a need to construct instructional materials continuously to provide teachers and students with adequate and suitable instructional materials.

[30] Renato P. Gacayan (2015). "Proposed Instructional Materials in Trionometry for SLCT Science High School," Master's thesis, SPU, Tuguegarao, Cagayan.

To determine effectiveness of modular instruction, the aforecited studies were conducted in various areas and discipline. The above-mentioned studies developed instructional materials in the form of module as a technique to facilitate better teaching. They experimented on the use of module to one group and the traditional to another group. Their findings revealed that there is significant difference in the use of module and the traditional approach as seen in the results obtained in the pre-test and posttest.

The other studies proposed instructional materials, which the researchers evaluated, validated and tested for their reliability. They found out that these additional learning materials helped students perform the skills in mathematics effectively. All studies revealed that modular instruction is more effective than the traditional method, thereby improving the performance of the students.

This study is similar to the related studies since the results of the achievement test and pre- and posttest were analyzed to determine deficiencies of the pupils, which was the basis for developing the modules to improve the teaching of Grade VI Mathematics and make the learning situation more productive. Moreover, this study will strengthen the skills of the pupils since they will go through their own pace of learning.

However, the present study differs from the previous studies in terms of the locale, another Division Schools where the module would be an alternative teaching instrument. It also differs in the content materials, as this study covers

topics on a particular area in Grade V Mathematics, especially on geometry, measurement and temperature.

The present study is similar to the mentioned study and methodologies used in the conduct of the study and in the development of instructional materials. However, it is different in the type of respondents used, the venue of the study and the topics modularized.

CHAPTER III

METHODS OF RESEARCH AND PROCEDURES

This chapter contains a description of the ways in which this research was conducted to give the readers an insight into the methods in which the data were gathered and analyzed. It covers the areas of the methods of the study, sources of data, data gathering procedure, data gathering instrument, and statistical treatment of data.

Methods Used

This study made use of the combination of descriptive and qualitative methods of research. Santiago states that the descriptive methods of research concerns the present situation, current practices, contemporary events of a group of individuals, their behavior patterns, attitudes and opinions.[31] The analysis of the present situation may lead to the identification of weaknesses or problems for which the researcher seeks solution which may lead to a proposed or the development of instructional materials for research. Qualitative research is also used since historical data or documents were further utilized in support of the framework of the study.

A survey was likewise conducted through the use of sets of questionnaire and interviews. The questionnaire is the most appropriate, practical, and economical tool to gather data needed in the study. The structured interview

[31] Felisa C. Santiago (2015). A Guide to Educational Research , Manila: Philippines.

technique was also used to clarify and verify the answers of the respondents to the questionnaire.

Respondents of the Study and Sampling Procedure Used

Two (2) major groups of respondents comprise the participants of the study. They were composed of 6 school administrators and experts; and 35 elementary school of Mathematics teachers assigned to teach or a total of 41 participants from selected elementary schools in District 4, Division of City Schools (DCS) of Manila.

Using a combination of purposive-convenience sampling procedure, these groups of respondents were requested to participate in this investigation since the researcher is one of the former Mathematics teachers in the District 4 of DCS, Manila, in Aldana Elementary School in District 4, Manila where she also had the access to data and information she needed badly, not only to enhance instruction of the school, but also contribute to quality education.

As shown in Table I, from a population of 6 school administrators in the person of the Supervisor, Principals, Guidance Counselor, Head Teachers and Coordinators, she was able to retrieve a 100 percent participation. From the 40 Mathematics teachers requested to response to the instrument, 35 or 87.50 welcomed the survey. Therefore, from a population of 46 the researcher was able to retrieve 41 or 89.13 percent retrieval of the survey questionnaire.

Table 1

Population of the Study

Respondents	Pop.	Target Pop.	% Retrieval
School Administrators			
District Supervisor	1	1	100.00
Principals	2	2	100.00
Guidance Counselor	1	1	100.00
Head Teacher	1	1	100.00
Coordinator	1	1	100.00
Subtotal	6	6	100.00
Elementary Mathematics	40	35	87.50
TOTAL	46	41	89.13

Purposively, only the 2 sections of Grade VI classes in an elementary school were included in the survey. It, likewise, used convenience-purposive procedure in the selection of subjects of the study.

As shown in Table 2, the two (2) midsections of Grade VI classes from an elementary school where the researcher was formerly a Math teacher, were made

subjects of the study. These were sections 2 and 4 where from a population of 42 from section 2, 30 or 71.43 percent participated in the survey; and from a population of 40 a 72.50 or 29 percent from section 4 were also made subjects of the study. There was a total of 59 or 71.95 percent participation of the Grade IV pupils.

Table 2

Grade VI Subjects of the Study of Aldana Elementary School

SECTION	N	n	% of Participation
2	42	30	71.43
4	40	29	72.50
TOTAL	82	59	71.95

Description of the Mathematics Teacher and Administrator Respondents

Demographically, the following are the profile information and data of the groups of teachers and administrator respondents according to:

1. Sex and Civil Status. Table 3 on the sex and civil status of the 6 school administrators and 35 teachers. As disclosed on the table, 1 or 16.67 percent of the school administrators is male while 5 or 83.33 percent are female administrators. From the Math teachers, 2 or 5.71 percent are male and 33 or

94.39 percent are female. Evidently, more than the majority of the respondents are female as proof of 38 or 96.68 percent female participation.

As further exhibited in the table, 6 or 100 percent of the administrators were married while 29 or 82.86 percent of the teachers were also married vs. 6 or 17.14 percent single.

These educators are not only predominantly female, but also married.

Table 3
Frequency and Percentage Distribution of the Groups of Respondents According to Sex and Civil Status

CHARACTERISTICS	N = 6 Sch. Admins.		N=35 Math Teachers		N=41 Total		
SEX	F	%	F	%	F	%	Rank
Male	1	16.67	2	5.71	3	7.32	2
Female	5	83.33	33	94.29	38	92.68	1
TOTAL	6	100.00	35	100.00	41	100.00	
CIVIL STATUS							
Single	0	0.00	6	17.14	6	14.63	2
Married	6	100.00	29	82.86	35	85.37	1
TOTAL	6	12.95	35	100.00	41	100.00	

2. Age Range. A look at Table 4, on the age range of the respondents, the first group ranged from 56 to 60 years old were 2 or 33.33 percent indicated their age, the oldest, to 41 – 45 were 1 or 16.67 person placed their age, the youngest. However, the plurality of them with 2 or 33.33 responses had their age range under 46 – 50 years old.

From the 35 Math teachers, the oldest of them with 2 or 33.33 was above 56-61 and above years old against 11 or 31.42 percent under 36-40 age measure which was in the midge. Nonetheless, the greater distribution of the indicator was placed between 31-35 with 6 or 17.14 percent, to 26-30 years old with 9 or 25.71 percent distribution, the youngest in the group.

On the whole, the respondents' age cluster in the particular age range.

Table 4
Frequency and Percentage Distribution of the Groups of Respondents According to Age Range

AGE RANGE	N = 6 Sch. Admins.		N=35 Teachers		N=41 Total		Rank
	F	%	F	%	F	%	
Above 61 years 0	0	0.00	0	0.00	0	0.00	8
56 - 60	2	33.33	1	2.86	3	5.80	6.5
51 – 55	1	16.67	2	17.14	3	6.25	6.5
46 – 50	2	33.33	3	8.57	5	16.52	4
41 – 45	1	16.67	3	8.57	4	26.78	5
36 – 40	0	0.00	11	31.43	11	25.00	1
31 – 35	0	0.00	6	17.14	6	8.48	3
26 – 30	0	0.00	9	25.71	9	8.48	2
21 – 25	0	0.00	0	0.00	0	0.00	0
TOTAL	6	100.00	35	100.00	41	100.00	

3. Highest Educational Attainment. A closer look at Table 5 on the highest educational career of these respondents indicated that 2 or 33.33 each percent of the school administrators with the master's degree of attainment and with doctoral units, there was 1 or 16.67 percent with doctoral degree and master's degree.

Table 5

Frequency and Percentage Distribution of the Groups of Respondents According to Highest Educational Attainment

HIGHEST EDUCATIONAL ATTAINMENT	N = 6 Sch. Admins.		N=35 Math Teachers		N=41 Total		Rank
	F	%	F	%	F	%	
Doctor of Education	1	16.67	0	0	1	2.44	5
Master's degree & with doctoral units	2	33.33	1	2.86	3	7.32	4
Master's degree	1	16.67	6	17.14	7	17.07	3
BSE w/ master's units	2	33.33	8	28.86	10	24.39	2
BSE	0	0	20	57.14	20	48.78	1
TOTAL	6	100.00	35	100.00	41	100.00	

On the part of the 35 Math teachers, the plurality of them with 20 or 57.14 percent were bachelor degree holders while 8 or 22.86 percent were with master's units and the least number of them with 6 or 17.14 were with master's degree and with doctoral units (1 or 2.86 percent) respectively.

4. Number of Years in Teaching Mathematics. A review of Table 6 indicated that the plurality of the school administrators numbering 2 or 33.33 percent had taught for the past 20 – 25 to 26-30 years before they became school administrators while 1 or 16.67 percent had taught the subject from more than 25 years and 10-14 years. On the part of the 35 Math teacher respondents, the plurality of them with 8 or 22.36 percent had taught Mathematics subjects from 10 – 14 years succeeded by 7 or 20 percent who had taught for the last 20-25 years. The longest were 4or 11.43 percent teachers who had taught for 25 and above years while 6 or 17.34 percent of them only taught for 4 and below years, the newest.

Table 6
Frequency and Percentage Distribution of the Groups of Respondents According to Number of Years Teaching Mathematics

NUMBER OF YEARS TEACHING MATHEMATICS	N = 6 Sch. Admins.		N=35 Math Teachers		N=41 Total		Rank
	F	%	F	%	F	%	
25 and above years	1	16.67	4	11.43	5	12.19	5
20 – 25 years	2	33.33	7	20.00	9	21.95	1.5

15 – 19 years	2	33.33	6	17.14	8	19.51	3
10 – 14 years	1	16.67	8	22.86	9	21.95	1.5
5 – 9 years	0	0.000	4	11.43	4	9.76	6
4 and above years	0	0.00	6	17.34	6	14.64	4
TOTAL	6	100.00	35	100.00	41	100.00	

5. Civil Service Eligibility. The eligibility of the respondents as exhibited in Table 7 showed that their tenure is governed by passing professional board licensure exam for teachers, Senior teacher exams and career service professional exam for administrators of the 6 or 100 percent of administrators were all licensed teachers and this was also true to 35 or 100 percent of teacher respondents.

6**. Subject Taught Aside From Mathematics**. A report of Table 8 revealed that the 6 or 100.00 percent school administrators had all taught English, Filipino, Science and aside Mathematics subjects they also (2 or 33.33 percent) also taught Hekasi the same was also evident among teachers.

Table 7

Frequency and Percentage Distribution of the Groups of Respondents According to Civil Service Eligibility

CIVIL SERVICE ELIGIBILITY	N = 6 Sch. Admins.		N=35 Math Teachers		N=41 Total		Rank
	* F	%	* F	%	F	%	
Professional Board							

Exam	0	0	0	0.00	0	0.00	3
Licensure Exam for Teachers	6	100.00	35	100.00	41	100.00	1
Senior Teacher	0	0.00	0	0	0	0.00	3
Career Service Professional Exam	0	0.00	0	0	0	0.00	3
TOTAL	6	100.00	35	100.00	41	100.00	

Legend: * Multiple Responses

Table 8

Frequency and Percentage Distribution of the Groups of Respondents According to Subjects Taught Aside From Mathematics

SUBJECTS TAUGHT ASIDE FROM MATH	N = 6 Sch. Admins.		N=35 Math Teachers		N=41 Total		
	* F	%	* F	%	F	%	Rank
English	6	100.00	35	100.00	41	100.00	2

Filipino	6	100.00	35	100.00	41	100.00	2
Science	6	100.00	35	100.00	41	100.00	2
HEKASI	2	33.33	16	45.71	18	43.90	2
TOTAL	20	83.33	121	86.43	141	85.98	

Legend: * Multiple Responses

7. Number of Seminars/ Workshop Attended. Table 9 on the attendance on seminar/workshop attended by the respondents revealed that the 6school administrators had attended to 8 seminars/workshops related to Mathematics and other allied subjects to enhance the effectivity delivery of instruction while the 35 teacher respondents indicated they only attended 5 or 38.46 seminars/workshops on Mathematics teaching for the schoolyear 2018-2019 which were on the Division, Regional and Local Level.

Table 9

Number of Seminars / Workshops Attended By the School Administrators and Teachers in Mathematics for Schoolyear 2022 - 2023

Respondents	Number of Seminars/ Workshops, etc.	%	Rank
School			

Administrators	8	61.57	1
Teachers	5	38.46	2
TOTAL	13	100.00	

Instrument Used

Two (2) sets of data gathering instrument were designed develop and the same underwent scrutiny and validation process.

As an essential tool, the researcher with the assistance of her adviser and an expert prepared the following instrument:

Part I – The Personal Profile Information Sheet which generated data on the groups of respondents with respect to their sex and civil status, age range, highest educational attainment, civil service eligibility, present position, number of years in present position, and number of seminars/ workshop attended in connection with Mathematics subject.

Part II – The Assessment of the School Administrators and Mathematics Teachers on the Validity and Realibility of the Proposed Online Instructional Materials in Mathematics VI using the following criteria needed for judgmental validation of the materials: clarity; contents; clarity; suitability; usefulness; and relevance. This sets of questionnaire were gathered added relevant information pertinent to the study in addition to historical data which included DepEd's requirements on: under the K-to-12 curriculum for Mathematics; prescribed

Mathematics-based textbooks; school reports on the inventory and achievement tests results; and budget of work for Mathematics VI.

Construction and Validation of the Survey Questionnaire

The researcher prepared the initial draft of her instrument through the guidance of her adviser. All the specific questions raised on Chapter 1 were the basis in the preparation of the questionnaire. The draft was also presented to experts, one of which was Mathematics District Supervisor in the DCS, Manila for critiquing and to her adviser for comments and/or suggestions for the improvement of the instrument.

For content validation, the following criteria were given focused:

- Are directions clear and simple?
- Are the instructions and questions clear and easy to understand?
- Do the statements express real life experiences in local setting?
- Is the questionnaire appropriate to the respondents?

Her adviser as well as the experts' opinions in the school, comments and suggestions were incorporated in the questionnaire and the final draft was once again prepared.

This final draft, upon the approval of her adviser, was personally distributed for dry run in two (2) elementary schools in District 4, Elementary School Annexes in DCS, Manila.

As positive responses were generated and the survey questionnaire was finally put on print, the same was fielded to the two (2) sections of Grade VI in Aldana Elementary School in the same District of DCS, Manila.

Finally, the sets of module were utilized by the researcher, in online teaching of Mathematics VI. The second and third week of February 2023 was used where the researcher handled online Sections 2 and 4 and taught the subject using the sets of online tools. After the subjects in the instructional tools were taken up, the researcher administered the posttest in the last week of February 2023.

Statistical Treatment of the Data

After the retrieval of the instruments, the results were checked, classified, tabulated and analyzed for a clearer visualization and comparison of the findings. Tables are used in the presentation of the summarized data and the following tools were used.

1. Percentage. This was used to compare two or more magnitudes to determine their relationship. It used the formula:

$$\% = \frac{N}{S} \times 100$$

where:

N = the number of responses under a particular category

S = the total number of subject respondents

% = the percentage

2. Frequency. It is the actual responses to specific questions or items in the questionnaire.

3. Ranking. It is a statistical tool which was used to enforce and measure description and degree of association among variables when their distribution is unknown. It also denotes position importance of an item, object, individual or concept in a series of ranks. This was used to analyze the assessments of the respondents as to the acceptability of the proposed modules.

4. Weighted Mean. It was used to measure the respondents' perceptions which were computed using this tool. It was computed by multiplying each value in the table by appropriate weight factor and the product summed up and divided by the total number of respondents. The formula is:

$$\bar{X} = \frac{WX}{N}$$

where:

$\bar{X}$ = the weighted mean; summation of weighted factors

W = weight for each factor

X = the item value

N = the total number of respondents

5. **t-test.** It was also used to compare differences between mean assessments of the group of respondents and used the formula:

$$M_1 - M_2$$

$$t = \sqrt{\left[\left[\frac{(N_1 - 1)S_1^2}{N_1} + \frac{(N_2 - 1)S_1^2}{N_2}\right]\left[\frac{1}{N_1} \quad \frac{1}{N_2}\right]\right]}$$

is:

$$S = \frac{(X - M)_2}{N}$$

where:

M_1 = the mean of the first group

M_2 = mean of the second group

S_1 = the variance of the first group

S_2 = the variance of the second group

N_1 = number of respondents in the first group

N_2 = number of respondents in the second group

X = the raw score

$\sum$ = the sum of the critical t-value of .05 alpha level and different degree (df) will set the region of acceptance and rejection.

Data were interpreted using the Five-Likert Scale Method as the criteria which served as the basis for interpretation of data. The concept of boundary of numericals used the following options and verbal interpretation.

CHAPTER IV

PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA

The chapter presents the findings, analysis and interpretation of data obtained through documentary analysis and survey. This covers the presentation of summarized data presented in tabular form and sequenced according to the specific problems posited in Chapter 1.

The following are the specific problems raised in the study:

1. From the instructional tools in Mathematics VI and DepEd's prescribed task, what prescribed topics are to be included in the proposed online instructional materials in Mathematics VI?

2. How valid are the contents of the proposed online instructional materials as assessed by the groups of respondents as to:

    2.1 Relevance of Contents;

    2.2 Clarity;

    2.3 Adequacy;

    2.4 Suitability; and

    2.5 Usefulness?

3. How significant is the difference in the assessment of the groups of respondents?

4. How do the Grade VI pupils perform in the pre-test and posttest using the online instructional materials in Mathematics VI?

5. How significant, if any, is the difference between the pre-test and posttest results?

The results of the surveys are as follows on:

Specific Problem No. 1

From the Instructional Materials in Mathematics VI and DepEd's prescribed textbooks, what topics are to be included in the instructional tools in Mathematics VI?

Both school administrators and Mathematics teachers are tasked with functions of providing quality instruction and learning to the students/ pupils in the school. They are also expected to work collaboratively to make education a positive instrument of the learners and their parents.

The researcher who is a part of the educational system and who is equally tasked to effect quality learners, envisions a strategy that may help fellow educators make the teaching of Mathematics more interesting to the learners. This strategy which she feels very much needed is using Online Learning Continuity Plan of the DepEd. Instruction, an online approach.

To determine the need for one, especially, for Grade VI pupils in the Schools' DCS of Manila, she initially identified the problems on the need for adequate instructional materials and the adequacy of the topics for the subject as prescribed by the DepEd's and the K-to-12 Curriculum requirement in Mathematics.

Using documentary data, she examined the following documents and analyzed them:

1.1 MLC Online Instruction for Grade VI Mathematics

Appendix C presents the Minimum Learning Continuum intended for Grade VI Mathematics. There are five (5) major areas of concern in the study of the subject. Whole Numbers; Rational Numbers; Geometry; Measurement; and Graphs, Maps and Scales.

A closer scrutiny of the distribution of units revealed the following in:

Unit I - Whole Numbers, five (5) subject areas with the following subtopics are covered: large numbers; addition and subtraction, multiplication and division comprehension lessons and problem solving and/or application of the four-step mathematical process.

Unit II – Rational Numbers, includes ten (10) subject areas with the following comprehension topics on: fractions; application of subtraction of fractions; application of addition and subtraction of fractions; multiplication of fractions; proportion; decimals; addition and subtraction of decimals; multiplication of decimals; and comprehension of percent.

Unit III – Geometry includes only two (2) areas which are comprehension of angles and spatial figures.

Unit IV – Measurement covers five (5) areas ranging from comprehension of perimeter, area, volume and temperature measure.

Unit V - Graphs, Maps and Scales, ahs two (2) major areas: comprehension of graphs and comprehension of maps and scales.

The distribution of the unit and areas covered in the MLC online instruction is further illustrated in Table 10 which enumerated the areas/ topics where the linear share of the area is concentrated in the study of rational numbers with 10 or 41.68 percent topics and is ranked 1, succeeded by whole numbers and measurement with 5 each or 20.83 percent topics and ranked 2.5. The least number of areas covered is in the study of Geometry and Graphs, Maps and Scales which only have 2 each or 8.33 percent topics included in the whole of the MLC Online Instructional and which Unit (Geometry) is considered one of the most difficult areas encountered by pupils in the study of Mathematics VI.

Table 10

Number of Units and areas/Topics Covered in MLC Online Instructional Tools for Mathematics VI

UNITS	N	%	Rank
I. Whole Numbers: Area/topics	5	20.83	2.5
II. Rational Numbers: Area/Topics	10	41.68	1
III. Geometry: Area/ Topics	2	8.33	4
IV. Measurement: Area/topics	5	20.83	2.5

V. Graphs, Maps and Scales	2	8.33	4.5
TOTAL	24	100.00	

1.2 DepEd's Prescribed Textbooks

A scrutiny of Table 11 on the Online tools for Mathematics VI on the DepEd's prescribed textbooks which reported on the minimum learning continuum requirement for the subject under study and the number of pages covered for the researcher to determine further the parameter of the subject content requirement using the five (5) units and subareas of the units, she found out the following in:

Unit I – Whole Numbers, the highest content coverage was in Mathematics for Everyday Use with a total 30:47 content and page covered followed in Journey to Math VI with 28:56 content and page covered and 26:44 subject content and page covered in Math for Everyday Life.

Unit II – Rational Numbers, the bulk of the content and page with 48:111 was in Mathematics for Everyday Use; 44:127 content and page in Journey to Math VI; and 35:125 in Math for Everyday Life;

Unit III – Geometry, a tie of 5:9 content and page was shared in Mathematics for Everyday Life and Journey to Math VI.

Unit IV – Measurement, generated the highest content by the Math VI Series with 17 but only 25 pages succeeded by Journey to Math IV with 15:33 content and page; and in Mathematics for Everyday Use with 15:28 ratio; and

Unit V – Graphs, Maps and Scales, had the bulk of the content and page distribution in Mathematics for Everyday Use with 12:15 ratio followed by Series of 9:14 and 8:13 by Journey to Math VI.

Ranking the distribution of the overall subject and page ratio, ranked 1 was generated in Rational Numbers with a total of 127:363 ratio. Succeeding ranks were in the unit Whole Numbers with 84:147 ratio; Measurement with 47:86 ratio; Geometry with 15:25 ratio; and Graphs, Maps and Scales with 29:42 ratio or ranked 2 to 5, respectively.

Table 11

Online Instructional Materials for Mathematics VI Prescribed Textbooks

CONTENTS	Journey to Math VI	Math for Every day Use	Math in Everyday Life	Total	Rank
I. Whole Number					
A. Reading and Writing Millions	2:3	2:2	2:3	6:8	5
B. Comprehension of Addition	5:7	4:7	6:7	15:21	2
C. Comprehension of Subtraction	8:6	9:5	7:7	24:18	1
D. Comprehension of Multiplication	5:24	7:23	6:14	18:61	3
E. Comprehension of Division	8:16	8:10	5:13	21:39	4
Subtotal	28:56	30:47	26:44	84:17	2
II. Rational Numbers					

A. Comprehension of Fractions	6:15	6:14	5:11	17:40	4
B. Comprehension of Addition and Subtraction of Fraction	7:23	11:18	3:10	21:51	1
C. Comprehension of Multiplication of Fraction	7:15	7:27	5:50	19:92	2
D. Comprehension of Application of Proportion	2:10	2:7	2:9	6:26	9
E. Comprehension of Decimals	4:4	4:7	4:5	12:16	6

Table 11 (cont'd.)

CONTENTS	Journey to Math VI	Math for Every day Use	Math in Everyday Life	Total	Rank
F. Comprehension of Addition and Subtraction of Decimals	4:27	4:9	3:7	11:43	7
G. Comprehension of Multiplication of Decimals	5:9	5:10	4:6	14:25	5
H. Comprehension of Division of Decimals	3:10	3:5	3:8	9:23	8
I. Decimals and Application of Percent	6:14	6:14	6:18	18:46	3
Subtotal	44:127	48:111	35:125	127:363	1
III. Geometry					
A. Comprehension of Angles	2:4	2:5	2:4	6:13	2

B. Comprehension of Spatial Figures	3:5	3:4	3:3	9:12	1
Subtotal	5:9	5:9	5:7	15:25	4
IV. Measurement					
A. Comprehension of Perimeter	4:9	4:9	5:9	13:26	1
B. Comprehension and Application of Area	4:11	4:8	5:6	13:25	2
C. Comprehension and Application of Volume	3:3	3:3	3:4	9:10	4
D. Comprehension and Application of Tempe-rature	4:10	4:9	4:6	12:25	3
Subtotal	15:33	15:28	17:25	47:86	3

Table 11 (cont'd.)

CONTENTS	Journey to Math VI	Math for Every day Use	Math in Everyday Life	Total	Rank
V. Graphs, Maps and Scales					
A. Comprehension of Graphs	2:7	3:6	3:8	8:21	2
B. Comprehension of Maps and Scales	6:6	9:9	6:6	21:21	1
Subtotal	8:13	12:15	9:14	29:42	5
TOTAL	100:238	110:210	92:215	302:663	

Measurement and Geometry are two (2) most difficult subject/areas in the study of Mathematics VI and generated only 3rd and 4th rank in the measure. Though the least in rank was Graphs, Maps and Scales, the subject had not been very difficult for the pupils since this unit had been very interesting and quite easy for them.

1.3 Budget of Work for Mathematics VI

Table 12 on the budget of work intended for the year's teaching and learning of Mathematics VI indicated 12 major topics to be taken up, the suggested number of lessons and number of days for teaching the basic on basic and enrichment level.

A closer examination of the table disclosed the bulk of the suggested budget of work in terms of subject distribution is on fractions which needed 22 lessons with 34 basic and 1 enrichment sessions and was ranked 1. This was followed by decimals with 18 suggested lessons and 30 basic plus 1 enrichment sessions; measurement with 11 lessons and 22 plus 1 basic and enrichment sessions; and addition and subtraction with 14 suggested lessons and 21 plus 1 sessions and as ranks 2 to 4, respectively. The least were in ratio and proportion (3 suggested lessons and 6 basic plus 1 sessions); numbers, through billions (4 suggested lessons with 8 plus basic and enrichment sessions) and in percent with 7 suggested lessons and 10 basic plus 1 enrichment sessions and in graphs maps

and scales with 5 suggested lessons and 10 basic and 1 enrichment sessions, which were ranked from 11 to 9.5, respectively.

On the whole, though the unit on Geometry is with 11 suggested lessons and 17 sessions and Measurement with 11 suggested lessons and 23 sessions, the same areas of concern were not given much emphasis in the prescribed textbooks in Mathematics VI since very limited subject and pages intended for the study of these two (2) major difficult topics are not appropriately distributed as prescribed by the Deped.

Table 12

Budget of Work for Mathematics VI
Division of City Schools, Manila

CHAPTER	Number of Lessons	Suggested Number of Days For Teaching		
		Basic	Enrichment	Total

1. Numbers Through Billions	4	8	1	9
2. Addition and Subtraction	14	21	1	22
3. Multiplication	10	20	1	21
4. Division	10	17	1	18
5. Fractions	6	12	1	13
6. More on Fractions	22	34	1	35
7. Ratio and Proportion	3	6	1	7
8. Decimals	18	30	1	31
9. Percent	7	10	1	11
10. Geometry	8	16	1	17
11. Measurement	11	22	1	23
12. Graph, Maps and Scales	5	10	1	11
TOTAL				218

1.4 Results of the Inventory and Achievement Tests in Math VI in the District 4, DCS, Manila

Table 13 on the results of the inventory test in Math VI last schoolyear 2022 – 2023 in the elementary level in District of 4 of the DCS, Manila revealed

Table 13

Results of the Inventory Test in Mathematics VI, District 4, DCS, Manila
SY 2022 – 2023

SCHOOL		MATHEMATICS				
		* HPS	HSO	LSO	MEAN	SD

	N	RS	TS	RS	TS	RS	TS	RS	TS	RS	TS
School A	369	75	100	58	89	10	57	25.20	67.33	8.55	5.52
School B	215	75	100	41	77	11	57	23.81	65.53	5.10	3.13
School C	169	75	100	50	83	10	57	27.04	69.26	6.45	4.47
School D	288	75	100	31	71	10	57	34.55	78.63	6.91	2.72
School E	250	75	100	40	77	11	57	23.79	72.53	5.3	14.15
School F	75	75	100	55	87	22	65	36.84	78.70	8.09	4.18
School G	108	75	100	52	85	18	62	33.68	72.66	8.58	5.71
TOTAL AVERAGE	1474	75	100	58	89	10	57	29.27	72.21	6.99	5.70

* LEGEND:

HPS = Highest Possible Score
HSO = Highest Score Obtained
LSO = Lowest Score Obtained
RS = Raw Score
TS = Transmuted Score
SD = Standard Deviation

that highest raw score and transmitted score was obtained by Elementary School F with 36.84 / 78.70 followed by School D with 34.55 / 75.63; School G with 33.68 / 72.66; and School E with 23.79 / 72.53 raw and transmitted scores. The lowest was obtained by Elementary School B which generated only 23.81 / 65.53 raw and transmutted scores.

Wholly, the 1474 Grade VI pupils were able to get only 29.27 and 72.21 raw and transmitted score in Math VI, in the initial test for the subject for the 2022-2023 schoolyear.

On the other hand, in the achievement test given last March 2022 as shown in Table 14 revealed that Elementary School E was able to overcome the other 6 schools as it topped the exams with 37.70/90.17 raw and transmitted scores followed by Elementary School G with only 95 pupils who get 51.98/88.70 raw and transmitted scores. The lowest was obtained by Elementary School B with only 51.59 / 86.77 raw/transmitted scores.

On the overall, the District generated a raw score of 44.07 or 86.95 raw and transmitted scores or gains of 14.8 / 14.74 raw / transmitted scores.

Table 14

Results of the Achievement Test in Mathematics VI

SY 2022-2023

District 4 of Manila	N			MATHEMATICS							
		HPS		HSO		LSO		MEAN		SD	
		RS	TS	RS	TS	RS	TS	RS	TS	RS	TS
School A	349	75	100	74	99	35	73	53.75	85.98	8.12	5.37
School B	208	75	100	62	91	38	75	51.59	86.77	6.47	3.85
School C	163	75	100	68	95	17	61	44.22	82.38	10.47	5.95
School D	288	75	100	72	98	45	80	23.19	87.51	7.78	6.76
School E	245	75	100	68	95	32	71	37.70	90.17	6.26	5.05
School F	70	75	100	64	93	40	77	42.07	87.13	4.90	2.45
School G	95	75	100	67	95	37	75	51.98	88.70	7.57	4.58
TOTAL AVERAGE	1418	75	100	74	99	17	61	44.07	86.95	7.37	4.86

LEGEND:

HPS = Highest Possible Score
HSO= Highest Score Obtained
LSO= Lowest Score Obtained
RS= Raw Score
TS= Transmuted Score
SD= Standard Deviation

1.5 Table of Specification Covered in Achievement Pre and Posttest

Results of Mathematics VI for the Academic Year 2022-2023

Using the 12 subject areas as exhibited in Table 15, item placement of the topics required the evaluation of the following mathematical skills in knowledge, comprehension, application and analysis.

The distribution of the test questions showed that the achievement test was concentrated more to evaluate the application skills of the pupils, concentrating more on fractions (4 items); percent (3 items); geometry (an item) and none in measurement. In terms of knowledge, more of the test was concentrated in fractions (3 items), numbers through billions (2 items) and addition and subtraction; ratio and proportion; decimal and money, geometry and measurement with 1 each only. More was recorded in multiplication, division, more on fractions, percent and graphs, etc.

With respect to comprehension, the bulk of the questions was concentrated in addition and subtraction (4 items) and three (3) each in numbers through billions and two (2) in fractions, and only one (1) in ratio and proportion, decimals and money, percent, geometry, and measurement.

As regards analysis, the concentration was more on fractions (3 items) and two (2) each in percent in graphs, maps, and scales. None was recorded in numbers through billions, division, fractions, ratio and proportion, geometry and measurement.

Table 15

Pre-test / Posttest Table of Specification for
Academic Year 2022-2023

CHAPTER	ITEM PLACEMENT				
	Know-ledge	Compre-hension	Applica-tion	Analysis	Total No. of Items
1. Numbers Through Billions	4, 5	1, 2, 3			5
2. Addition and Subtraction	14	13, 22 23, 24	21	46	7
3. Multiplication			25	43	2
4. Division			29, 30		2
5. Fractions	16, 18, 19	15, 20			5
6. More on Fractions			31, 32 33, 34	40, 41 42	7
7. Ratio and Proportion	9	17	44, 45		4
8. Decimals and Money	6	28	26, 27	47	5
9. Percent		7	38, 39	36,37	6

			48		
10. Geometry	10	12	11		3
11. Measurement	8	35			2
12. Graphs, Maps and Scales				49, 50	2
TOTAL	10	14	16	10	50

1.6 Annual Report on the DepEd's Organizational Structure Requirement on the Status of Basic Education Resource Textbooks, District 4 of the DCS, Manila, 2022 - 2023

A portion of the annual report of District of 4 of the DCS, Manila as shown in Table 16 was on the status of the textbooks needs for the six (6) grade levels where the need was strongly felt in all generation textbooks since the prescribed textbooks were already obsolete and outmoded, the pupil-textbooks ratio of 3:7 for Grade VI pupils was quite high considering the 1590 population or an overall 2:9 pupil ratio textbooks.

From these findings, the researcher as one of the Mathematics teachers was prompted to propose sets of online instructional materials when pupils are off-school, specifically, intended for the use of Grade VI pupils in Mathematics which was focused in the study of Geometry and Measurement, two (2) major subject areas found wanting in the teaching of Mathematics VI, but very important framework in the study of higher mathematics using content-based instructional

method, modular approach, an alternative approach essentially important during this pandemic crisis where no in – class instruction is required.

These online instructional materials are found to improve instruction and the objective of which is to increase learning and make the teaching-learning process effective in the use of this tool is one way or identify and understand the different ways students process information and acquire skills as well as develop independent study.

Table 16

Report on the DepEd's District Organizational Structure on the
Status of Basic Education Resources on Textbooks
Division of DCS, Manila
Schoolyear 2022 – 2023

Textbooks for Grade Level	Textbooks Needs	Enrolment	Pupil-Textbook Ratio
I	All New Generation	2039	1.4
II		1685	1.7
III		1703	2.03
IV		1528	2.8

V	Textbooks	1590	3.7
VI		1425	3.9
TOTAL		9970	2.9

The researcher also as a former teacher of Mathematics, for decades has the vision/mission to produce learners who appreciate mathematics as a study of relationships rather as a set of facts to memorize. To be more effective, therefore the teaching of mathematics should be built not only upon a knowledge of the natural and independent and self-pacing process but also content-based by which the pupils learn the use of the module and will in many ways effect quality instruction.

Henceforth, the researcher proceeded to the design of the online instructional tools in Mathematics VI (Appendix N).

The proposed Content-based Modules for Mathematics VI consist of 14 lessons, 7 lessons for each major core areas using the major topics as prescribed in the DepEd's K-to-12 curriculum and other instructional requirements.

The primary objective of the researcher is to provide and equip pupils with skills and competencies in the study of both basic and major topics of the subject in knowledge, comprehension, application of the concepts, and analysis.

The following are the special features of these sets of Online Instructional Materials in Mathematics VI.:

- Each major area starts with an overview of the objectives, content and instruction to be covered to make the learners aware of the concepts / skills expected to master so that they can prepare adequately. The specific learning objectives are taken from the prescribed K-to-12 Curriculum of the DepEd..
- Each lessons and activities is designed and prepared to make pupils deal with daily-life situations as they try to apply their knowledge and analyze problems applying with important mathematics key concepts in each lesson.
- The online instructional materials are unique as it they do not only give the guidelines on how to go about working on the materials, but also help the learners explore each activity to further enhance their mathematical skills and give generalization or summary of the important concepts.
- Pre-mid and posttest also provide pupils with challenging and motivating problem-solving techniques.

- Practice exercises and word problems are provided for pupils to fix the skills and knowledge tested and find its immediate application.
- Multi-visuals are also provided to enhance the work attitude and creativity of the pupil.

The following is the composition of the Proposed Online Instructional materials in Mathematics VI:

- Geometry:

Lesson 1. . .	Perpendicular, Parallel, and Intersecting Lines
Lesson 2 . . .	Angles
Lesson 3 . . .	Plane Figures
Lesson 4 . . .	Circles
Lesson 5 . . .	Congruent Figures
Lesson 6 . . .	Perimeter of a Polygon and a Rectangle
Lesson 7 . . .	Solving Problems on Area and Perimeter

- Measurement:

Lesson 1 . . .	Measuring Weights
Lesson 2 . . .	Solving Problems on Weight Measures
Lesson 3 . . .	Metric Units of Length
Lesson 4 . . .	Square Meters and Hectares

Lesson 5 . . . Metric Units of Capacity

Lesson 6 . . . Measuring Temperature

Lesson 7 . . . Solving Problems on Temperature

These findings bear strong relationship to what Victor, Dow, Cematu (2018), and Montague (2016) emphasize that instructional materials even before they are designed, they are developed to meet specific purpose and individual needs of the educand as their the pupils their work within this ability level and experiences. Though it takes time to develop and implement, the extent of its significance in the teaching-learning process is extensive and a very positive and effective alternative to traditional lecture – discussion method in the teaching of mathematics.

Specific Problem No. 2

Validity of the Contents of the Proposed Online Instructional Materials in Mathematics VI as to:

2.1 Relevance of Objectives;

2.2 Relevance of Contents;

2.3 Clarity;

2.4 Adequacy;

2.5 Suitability; and

2.6 Usefulness?

To determine the content validity of the proposed online instructional materials in Mathematics VI, the researcher went to the rigor of finding out the degree to which the proposed online tools in Math VI represent the essence, the topics, and the areas that the tools are designed to measure. Using judgmental validity, she requested the experts in the persons of the school supervisor of Mathematics and school principals, Master teachers of Mathematics, and Mathematics teachers to assess the sets of Proposed Online Instructional Materials in Mathematics VI

Five criteria were set to assess the proposed online instructional materials in Mathematics VI by 6 school administrators who were composed of the Division District Supervisor, Principals, Head Teachers, Master Teacher, and counselor; and by 35 Mathematics teachers assigned to seven (7) selected elementary schools in the District of 4 of the DCS, Manila.

Findings showed that on:

2.1 Relevance of Objectives

This criterium covers six (6) areas which ranged from: the contents are relevant to the existing course outline (area 1), to the activities are relevant to the concepts being developed in each lesson (area 6).

Table 17

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in

Mathematics VI: RELEVANCE OF OBJECTIVES

Relevance of Objectives	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. The contents are relevant to the existing course outline	4.96	VA	1	4.83	VA	2	4.89	VA	1
2. The contents are relevant to the learning activity	4.87	VA	2	4.88	VA	1	4.87	VA	2
3. Activities provide opportunities for the students to apply concepts and theories	4.51	VA	4.5	4.79	VA	3	4.65	VA	4
4. Activities provide opportunities for the students to be creative and resourceful	4.41	OA	6	4.48	OA	5	4.44	OA	6
5. Activities can be used for practical applications	4.57	VA	4.5	4.45	OA	6	4.48	OA	5
6. The activities are relevant to the concepts being developed in each lesson	4.78	VA	3	4.62	VA	4	4.70	VA	3
TOTAL MEAN	4.67	VA		4.67	VA		4.67	VA	

LEGEND:

VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

It could be gleaned from Table 17 the assessments of the 6 school administrators and 35 Math teachers were rated under two (2) indices from very acceptable, to often acceptable.

Comparatively, the evaluation of these groups of respondents disclosed parallel rankings of responses as shown in how

the school administrators ranked 1, the criterion on the objectives was measurable and achievable with obtained X = 4.96 and was ranked 1 but was ranked 2 by the teachers (X =

4.83), and for teachers ranked 1, the criterion on the contents was relevant to the course outline which obtained the highest X = 4.88 where the school administrators ranked it 2 with (X = 4.83) or very acceptable. Very closely, as the first group of respondents ranked last or 6 the area on activities provide opportunities for the students to be creative and resourceful (X = 4.41), the latter group of respondents equally rated it often acceptable (X = 4.48) and ranked it 5. While the teachers ranked last or 6 the topic reflects the objectives of the subject (X = 4.45), the school administrators rated it higher as it obtained X = 4.51 and was ranked 4.5.

Aggregately, the overall obtained X = 4.67 for the school administrators and Mathematics teachers manifests the well-defined goals attributed to the school administrators and teachers closely working together setting the goals of the subject to effect teaching-learning in a novel method and in a more relaxed pace.

2.2 Relevance of Content

Under this aspect as shown in Table 18 enumerated eight (8) requirements which included from directions on how to use the module are provided, to the contents prepare the student for the practical application.

A review of the table revealed that 6 of the 8 concepts were assessed by the school administrators to very acceptable level since the highest obtained X = 4.86 in overview is provided was ranked 1 followed by X = 4.83 each in illustrations are properly drawn and labeled and the contents prepared the students for practical application were 2.5, respectively; to X = 4.69 in direction on how to use the tools are provided as ranked 6. The aspects on directions on how to go about learning activities are provided (X = 4.48) and time allotment is provided (X = 4.31), were only rated to often acceptable.

Nevertheless, the teachers' responses indicated the 7 high ratings assigned to these in proper sequencing in the presentation of the lessons with $\bar{X}$=4.97, to X = 4.74 in the contents provide sufficient information for the students to understand concepts which was ranked 7. The aspect on time allotment was only assessed to often acceptable (X = 4.41) and was ranked 8.

Generally, the obtained overall X = 4.79 (Math teachers) and X = 4.69 (school administrators) suggest a common line of assessment that the proposed

online instructional tools have strictly observed relevance of content to the high level of rating- very acceptable.

Table 18

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in Mathematics VI: RELEVANCE OF CONTENT

Relevance of Content	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. Directions on how to use the module are provided	4.69	VA	6	4.78	VA	5	4.73	VA	6
2. Directions on how to go about the learning activity are provided	4.48	OA	7	4.77	VA	6	4.62	VA	7
3. There is proper sequencing in the presentation of each lesson	4.76	VA	5	4.97	VA	1	4.86	VA	2
4. Time allotment is provided	4.31	OA	8	4.41	OA	8	4.36	OA	8
5. Illustrations are properly drawn and labeled	4.83	VA	2.5	4.82	VA	4	4.82	VA	4
6. Overview is provided	4.86	VA	1	4.96	VA	2	4.91	VA	1
7. The contents provide suffi-cient information for the student to understand concepts	4.79	VA	4	4.74	VA	7	4.76	VA	5
8. The contents prepare the students for the practical application	4.83	VA	2.5	4.87	VA	3	4.85	VA	3

TOTAL MEAN	4.69	VA		4.79	VA		4.73	VA	

LEGEND:
VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

2.3 Clarity

As reported in Table 19, the school administrators on this aspect of measuring the acceptability of the proposed online materials was viewed at two (2) levels, to wit: from very acceptable with obtained X = 4.97 in specific behavior is stated on what to do is provided, to X = 4.51 in directions are easy to follow even without the help of the teachers as ranked 1 to 7; yet, the aspect on minimum time allotment is provided was only rated to often (X = 4.41).

From the standpoint of the teachers, the distribution of the responses seems to indicate parallel assessments, although the rankings were contradicting. The highest obtained X = 4.86 each was distributed in: introduction provides a clear overview of the module; the directions are clear, simple, and can be easily understood; and contents are presented in simple language and can be easily understood by the students which were ranked 2 on very acceptable rating; however, the aspect on minimum time allotment is provided, only obtained X = 4.48 or often acceptable rating.

The composite means of $\bar{X}$ = 4.76 each for both groups of respondents suggests that the proposed online instructional materials are excellent alternative tools for the Grade VI pupils in Mathematics in the District 4 of the DCS, Manila.

Table 19

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in Mathematics VI: CLARITY

Clarity	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. Introduction provides a clear overview of the module	4.96	VA	2	4.86	VA	2	4.91	VA	1
2. Directions are clear, simple and can easily be understood	4.78	VA	5	4.86	VA	2	4.82	VA	3.5
3. Minimum time allotment is provided	4.41	OA	8	4.48	OA	8	4.44	OA	8
4. Resources and other refe-rences are provided	4.87	VA	3	4.65	VA	7	4.76	VA	6
5. Specific behavior is stated on what to do is provided	4.97	VA	1	4.78	VA	5	4.87	VA	2
6. Objectives are clear	4.82	VA	4	4.83	VA	4	4.82	VA	3.5
7. Directions are easy to follow even without the help of the									

teacher	4.51	VA	7	4.79	VA	6	4.65	VA	7
8. Contents are presented in simple language and can be easily understood by the teachers	4.77	VA	6	4.86	VA	2	4.81	VA	5
TOTAL MEAN	4.76	VA		4.76	VA		4.76	VA0	

LEGEND:
VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

2.4 Adequacy

A look at Table 20 on adequacy of content and other requirements were all rated to high level of very acceptable by the school administrators 6 of the 7 major areas. These included from X = 4.96 in skill lessons are presented in logical order as ranked 1, to X = 4.67 in expected learning is provided and in the activities and practice exercises are more adequate, as ranked 5.5, respectively. On the contrary, the aspect on contents provide adequate information to establish needed principles and concepts which generated X = 4.40 or often acceptable level.

However, the teacher respondents also responded positively as they felt that all the aspects of the criteria were very acceptable to them as they ranked 1 illustrations are provided and well laid out (X = 4.88) and ranked 2.5 the aspects on key points are emphasized and skill lessons are presented in logical order (X =

4.83). The last in rank was the aspect on these are enough activities at the end of the lesson obtained (X = 4.65), still in very acceptable rating.

On the whole, the composite mean of X = 4.77 (teachers) and X = 4.68 (school administrators) once again bear strong semblance to the study of Armid (2016) who also found very acceptable the modules which met the objectives of increasing performance and enhancing the mathematical skills of the learners.

Table 20

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in Mathematics VI: ADEQUACY

Adequacy	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. Expected learning is provided	4.51	VA	5.5	4.72	VA	5	4.61	VA	6
2. Contents provide adequate information to establish needed principles and concepts	4.40	OA	7	4.69	VA	6	4.54	VA	7
3. Key points are emphasized	4.87	VA	2	4.83	VA	2.5	4.85	VA	2.5
4. Skills lessons are presented in logical order	4.96	VA	1	4.83	VA	2.5	4.89	VA	1

5. Illustrations are provided and well laid out	4.82	VA	3	4.88	VA	1	4.85	VA	2.5
6. There are enough activities at the end of each lesson	4.74	VA	4	4.65	VA	7	4.69	VA	4
7. The activities are of varying levels of difficulty	4.51	VA	5.5	4.79	VA	4	4.65	VA	5
TOTAL MEAN	4.68	VA		4.77	VA		4.72	VA	

LEGEND:

VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

2.5 Suitability

As regards suitability as reported in Table 21, assessments of the two (2) groups of respondents showed strong and parallel opinions.

A glance at the table indicated that all the 6 aspects under suitability were all rated to very acceptable and almost parallel also in ranking. Both ranked 1 and 1.5 the aspects on the instructional tools in makes use of strong features of the computer (X = 4.97 school administrators); and (X = 4.86 by the teachers). While the first ranked 2.5 in there is proper sequencing in the presentation of each lesson (X = 4.87), the latter ranked it 1.5 (X = 4.86); and while the former ranked 6 or last

the aspect on the test items are constructed in accordance with the type of test intended for (X = 4.77), the same was ranked 5 (X = 4.79) by the latter.

Conceivably, the obtained X = 4.84 (school administrators); and X = 4.81 (Math teachers) provide strong implication for the need for online tools to prepare and allow the learners to work independently by themselves at their own pace.

Table 21

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in Mathematics VI: SUITABILITY

Suitability	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. There is a proper sequencing in the presentation of each lesson	4.87	VA	2.5	4.86	VA	1.5	4.86	VA	2
2. The module makes use of the strong features of the computer	4.97	VA	1	4.86	VA	1.5	4.91	VA	1

3. The module holds the attention of the students	4.82	VA	4	4.83	VA	3.5	4.82	VA	4
4. The information is appropriate	4.87	VA	2.5	4.83	VA	3.5	4.85	VA	3
5. Test items are constructed in accordance with the type of test intended for	4.77	VA	6	4.79	VA	5	4.78	VA	5
6. The feedback measures the different aspects of learning	4.78	VA	5	4.72	VA	6	4.75	VA	6
TOTAL MEAN	4.84	VA		4.81	VA		4.82	VA	

LEGEND:

VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

2.6 Usefulness

As depicted in Table 22 on usefulness, the school administrators and Mathematics teachers, once more, strongly agreed that the proposed instructional tools were very useful. This is evidenced by obtained means ranging from X = 4.86 in concepts and principles can be learned through the use of the online tools (teachers), succeeded by X = 4.82 in the instructional tools can increase interest in studying (school administrators) and X = 4.77 in the tools help developed

knowledge and skills (school administrators). Similarly, both ranked 5 the aspect on the instructional tools can motivate students to study independently (X = 4.62 teachers; and X = 4.5 school administrators).

The aggregate composite means of $\bar{X}$ = 4.72 (teachers) and $\bar{X}$ = 4.62 (school administrators) imply that the proposed online tools are very much acceptable since knowledge contained and skills developed in the modules have universal appeal that they become not only very acceptable in one field, but also to other academic areas.

Table 22

Assessment of the School Administrators and Mathematics Teachers on the Acceptability of the Proposed Online Instructional Materials in Mathematics VI: USEFULNESS

Usefulness	N = 6 School Admin.			N = 35 Teachers			N =41 Overall		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank	W.A.	V.I.	Rank
1. The modules can increase									

interest in studying	4.82	VA	1	4.72	VA	2.5	4.77	VA	1
2. The modules can motivate students to study indepen-dently	4.50	VA	5	4.62	VA	5	4.56	VA	5
3. The modules are good ins-tructional materials in the absence of textbooks	4.51	VA	3.5	4.72	VA	2.5	4.61	VA	4
4. The modules help developed kowledge and skills	4.77	VA	2	4.69	VA	4	4.73	VA	2
5. Concepts and principles can be learned easily through the use of the modules	4.51	VA	3.5	4.86	VA	1	4.68	VA	3
TOTAL MEAN	4.62	VA		4.72	VA		4.67	VA	

LEGEND:

VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

Specific Problem No. 3

Significant Difference in the Assessment of the School Administrators and Mathematics Teachers as to the Validity of the Online Instructional Materials in Mathematics VI

To determine further if significant difference exists between the assessments of the school administrators and Mathematics teachers as to the validity of the Online Instructional Materials in Mathematics VI the t-test was applied., using the computer-aided tools, the S.P.S.S.

A closer review of Table 23 revealed that null Ho raised in the study was acceptable in all areas of evaluation. For instance, in clarity, and in relevance, the results of the computed t = 0 is much lower than the tabular t = 2.228. The same can be said for content which generated t = -1.072 < -2.145; clarity obtained t = 0 which is < than t = 2.145; adequacy, t = 1.036 < t = 2.179; suitability, t = 0.803 < t = 2.228; and usefulness, the computed t = -1.563 < -2.306. Therefore, at .05 alpha level, the null hypothesis raised is accepted as no significant difference exists in the assessments of the experts using the six (6) criterion.

Table 23
SUMMARY TABLE ON THE ACCEPTABILITY OF THE ONLINE INSTRUCTIONAL MATERIALS IN MATHEMATICS VI BY THE SCHOOL ADMINISTRATORS AND MATHEMATICS TEACHERS

CRITERIA	6 School Admins.			35 Math Teachers		
	W.A.	V.I.	Rank	W.A.	V.I.	Rank

1. Clarity	4.76	VA	2	4.76	VA	4
2. Contents	4.69	VA	3	4.79	VA	2
3. Adequacy	4.68	VA	4	4.77	VA	3
4. Suitability	4.84	VA	1	4.81	VA	1
5. Usefulness	4.62	VA	6	4.72	VA	5
6. Relevance	4.67	VA	5	4.67	VA	6
TOTAL	4.71	VA		4.75	VA	

LEGEND:

VA = Very acceptable
OA = Often acceptable
MA = Moderately acceptable
LA = Least acceptable
VLA = Very least acceptable

Specific Problem No. 4

Performance of Grade VI Pupils in the Pre and Posttest Using the Proposed Online Instructional Materials in Mathematics

Using the 40 item pre-test, the said test was administered first week of February 2023 and the result revealed in Appendix H on the index of difficulty obtained indicated that 5 or 15 percent of the items were quite easy in items 1, 2, 3, 4, 12, and 15, while another 5 or 12.50 percent were under the difficult index in items 9, 10, 11, 19, and 40. On the average range 29 or 72.50 percent of the items were generally appropriate.

With respect to the index of discrimination on Appendix I, 5 or 12.50 percent were of the items were very easy items for the pupils in items 1, 2, 3, 13, and 15 on angles, figures and lines while the item on finding volume using cubic centimeter was very difficult for the pupils since it fell under the 19 and above range measure. Another three (3) or 7.50 percent items in 9, 18 and 31 in identifying congruent lines and computing liter to milliliters were marginal items which needed improvement. Nevertheless, there were 31 or 77.50 percent reasonable items encountered by the pupils in 4, 5, 6, 7, 8, 10, 11, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 20, 32, 33, 34, 35, 36, 37, 38 and 39 which items may also need improvement or maybe retained.

Based on these results, the test was improved and after using the online instructional tools for the next two weeks in February 2023, the posttest was administered last week February 12, 2023 when some aspects of the test questions were improved and recorded. Item 9, 18, 31 and 40 were revised and

some parts were compared, but the emphasis originally to achieve the desired knowledge and skills were maintained in this final draft.

From Appendix J of the index of difficulty, the 2 or 5.00 easy items were still in lines and angles and items in solving for kg. To g. (item 37) was found difficult since it fell under the 24 and below index. Of the 40 items, 37 or 92.50 percent were average items and probably acceptable in all the areas of the subject.

In Appendix K on the index of discrimination, 1 or 2.50 percent (item 1) was poor in identifying plane figure. On the marginal level, another 1 or 2.50 percent needed improvement in item 17 in identifying angle and solving for cost of hectares of land. Generally, 37 or 92.50 were reasonably good items and were in items 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 and 40 which require knowledge and skills from identifying spheres to solving for weight of product.

Furthermore, Table 24 on the itemized results of the pre and posttest scores of the 87 subjects of two (2) sections of Grade VI pupils (Sections 2 and 4), the average score obtained was 14.86 (per-test) and 26.01 (posttest) or a mean difference of 11.05 which gain revealed satisfactory performance of the pupils after using the online instructional tools.

Table 24

Pre-test and Posttest Scores in Geometry and Measurement of Grade VI Pupils

Pupil	Geometry		Measurement		Total	
	Pre	Post	Pre	Post	Pre	Post
1	5	9	6	9	11	18
2	7	10	9	11	16	21
3	6	10	6	8	12	18
4	5	9	9	10	14	19
5	5	10	6	12	11	22
6	6	10	4	8	9	18
7	8	12	9	13	17	25
8	10	14	8	15	18	29
9	5	10	10	15	15	25
10	7	14	7	10	14	24
11	5	13	7	12	12	25
12	6	13	8	15	14	28
13	7	13	8	10	15	23
14	8	10	8	12	16	22

Table 24 (cont'd.)

Pupil	Geometry		Measurement		Total	
	Pre	Post	Pre	Post	Pre	Post
15	8	13	10	13	18	26
16	7	13	10	12	18	25
17	7	11	8	14	15	25
18	7	10	5	12	12	22
19	6	11	6	11	12	22
20	8	10	7	9	15	19
21	5	10	8	13	13	23
22	6	15	8	10	14	25
23	7	13	7	13	14	26
24	10	14	7	13	17	27
25	9	15	10	16	19	31
26	8	16	13	17	21	33
27	9	15	11	15	20	30
28	9	14	10	16	19	30
29	9	12	7	14	16	26
30	10	10	9	13	19	23
31	8	10	10	12	18	22
32	10	15	10	10	20	25
33	6	14	7	14	13	28
34	5	15	6	14	11	29
35	7	13	5	16	12	29
36	5	10	4	10	9	20
37	7	15	6	14	12	31
38	6	13	8	13	14	26
39	5	12	8	13	13	25
40	7	12	6	14	13	26
41	10	14	6	14	16	28
42	7	15	10	15	17	30
43	9	15	9	18	18	33
44	8	18	10	17	18	35

45	9	16	9	18	18	34
46	8	10	8	16	16	26
47	6	12	8	16	14	28
48	7	15	7	14	14	29
49	8	16	7	15	15	31

Table 24 (cont'd.)

Pupil	Geometry		Measurement		Total	
	Pre	Post	Pre	Post	Pre	Post
50	10	14	8	17	18	31
51	9	15	9	15	18	30
52	9	16	11	17	20	33
53	10	14	6	14	16	28
54	9	13	8	13	17	26
55	9	15	11	16	20	31
56	8	14	6	14	14	28
57	8	13	7	13	15	26
58	10	12	`6	15	26	27
59	8	16	8	10	16	26
60	8	10	5	12	13	22
61	6	10	6	11	12	21
62	5	10	7	10	12	20
63	7	8	7	13	14	21
64	10	10	4	13	14	23
65	8	11	7	11	15	22
66	6	10	7	14	13	24
67	10	12	6	13	16	25
68	8	12	8	15	16	27
69	10	16	8	16	18	32
70	9	14	9	16	18	30
71	7	15	7	13	14	28
72	5	14	7	15	12	29
73	6	13	5	17	11	30
74	5	17	6	10	11	27
75	4	10	5	13	9	23
76	10	15	4	11	14	26

77	6	18	10	10	16	28
78	8	15	8	15	16	30
79	10	15	7	17	17	32
80	9	15	8	15	17	30
81	6	15	8	14	14	29
82	6	13	7	10	13	23

Table 24 (cont'd.)

	Geometry		Measurement		Total	
Pupil	Pre	Post	Pre	Post	Pre	Post
83	5	13	5	11	10	24
84	6	10	5	11	11	21
85	8	9	5	11	13	20
86	6	12	6	10	12	22
87	5	10	5	9	10	19
MEAN					14.86	26.01
					2.81	4.06
Mean Difference					11.15	

Specific Problem No. 5

Significant Difference between the Pupils' Performance in the Pre-Posttests in Mathematics VI Before and After the Use of the Proposed Online Instructional Materials in Mathematics VI

To further test the significant difference between the pre and posttest results in Mathematics VI based on the pupils' performance in before and after using Online Instructional Materials in Mathematics VI, the t-test was used.

As reflected in Table 25, the result of the computed t-values in Geometry, t = 17.316 with X = 7.37 and $\bar{S}$ = 1.72 in the pre-test and X = 12.79 and $\bar{S}$ = 2.36 in the posttest is found much higher than its critical t = 2.576 that the null Ho raised in the study is rejected as very significant difference exists.

Table 25

Significant Difference Between the Pre- and Posttest Results Based on the Online Instructional Materials in Mathematics VI

COMPONENT	Post $\bar{X}$	Post S	Pre $\bar{X}$	Pre S	Computed t-value	Tabular t-value	* Verbal Interp./ Remarks
Geometry	12.79	2.36	7.37	1.72	17.316	2.576	S: Reject null Ho
Measurement	13.17	2.48	7.43	1.87	15.325	2.576	S: Reject
Overall	26.01	4.06	14.86	2.89	20.871	2.576	S: Reject null Ho

LEGEND:
df = 85
α =.01
s = significant

It can be inferred from these results that the use of Online Instructional Materials in Mathematics VI proved to be effective tools in the teaching of the subject particularly in Geometry and Measurement. The researcher also attributed the effectiveness of modular instruction to the novelty of the pedagogy and competency of the teachers who handled the subject.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the findings of the study, the conclusions drawn, and the recommendations based on the results / findings of the specific problems raised in Chapter 1.

Summary

This study is an attempt to design and develop as well as validate sets of Online Instructional Materials in Mathematics VI at selected elementary schools in DCS, Manila, specifically, focused on the study of Geometry and Measurement.

Using both documentary analysis and descriptive method of study, two (2) major groups of respondents were chosen to participate in the study. They were the 6 school administrators who were the School Principals, Supervisor, Head Teacher, Master Teacher and the 35 Mathematics teachers who represented the seven (7) selected elementary schools in the District 4 of the DCS, Manila. Aside from these experts, she also made use of two (2) sections of Grade VI pupils of a public elementary school in the District, who are the subjects of the study.

The following are the salient findings of the investigations on:

1. Topics to be included in the Online Instructional Materials in Mathematics VI.

Using documentary and historical data, the following indicators were bases in how the researcher decided in how she chose Geometry and Measurement as the core subject areas specifically covered in the modules:

1.1 Content-based for Grade VI Mathematics

Five (5) units were covered, of these areas of concern Geometry was the least covered with only 2 or 9.09 topics and Measurement and Whole Numbers equally had more with 5 or 22.73 percent topics. Rational Numbers have the most substantial topics covered in the MLC.

1.2 DepEd's Prescribed Textbooks and Subject Contents

When the three (3) DepEd's prescribed textbooks were analyzed in terms of the topics and pages covered as prescribed in the prescribed content-based curriculum, again, Geometry and Measurement, which are considered difficult areas in Mathematics VI were those that were least covered.

They obtained an overall (Measurement with 47:86 topic and page covered ratio) and Geometry with 15:25 topic and page covered ratio and were ranked 3 and 4, respectively among the 5 major units of the subject under study.

1.3 Budget of Work for Mathematics VI

Not much emphasis was also given to both Geometry and Measurement as proofs of the first registering only 11 suggested lessons and 17 sessions; and the second, with 11 suggested lessons with 23 sessions; very limited topics and pages were not only covered, but also not evenly and appropriately distributed considering the significance of the topics in preparing the pupils for higher mathematical procedures and processes.

1.4 Results of the Inventory and Achievement Tests in Mathematics VI in the District 4 of DCS, Manila

The Grade VI pupils totaling 1474 for the schoolyear 2022-2023 enrolled in Mathematics VI were able to perform which resulted to get only 29.27 mean raw or 72.21 transmitted scores in the inventory test; and their performance in the achievement test revealed 44.07 or 86.95 mean raw and transmitted scores which generated a gain of 14.8 mean scores / 14.74 transmitted scores.

1.7 Table of Specification Covered in the Achievement Test for the Academic Year 2022-2023

In terms of item placement of the topics testing the mathematical skills of the pupils in knowledge, comprehension, application, and analysis on the distribution of test questions, only one (1) item was noted in Geometry and nil in Measurement under

application skills. In knowledge and comprehension only one (1) each was recorded, but none in analysis.

1.8 Report on the DepEd's District 4 Organizational Structure on the Status of Basic Education Resource Textbooks, District of DCS, Manila, 2022 - 2023

The Annual Report of the Division significantly revealed the dearth of textbooks and other supplementary materials for the need of the pupils. In schools population, the pupil-textbooks ratio only of 3:7 for Grade VI pupils which revealed the inadequacy of basic textbooks requirement for the grade level.

These data are revealing of the need to come out with supplementary instructional materials to augment the inadequacy and limited textbooks to replace the traditional and obsolete materials to revolutionize the teaching of mathematics, using alternative approach in no – inclass interactive classroom activities.

In response to these needs, the researcher, a Math teacher who is concern more to improve instruction to effect quality education, endeavors to design and develop sets of content-based modules for the use of Grade VI pupils in Mathematics in the School District of Manila.

The Online Instructional Materials in Mathematics VI concentrated only on the topics of great concern - Geometry and Measurement. Each major area is covered in 7 lessons or a total of 14. Her objective is to provide and equip the

learners with needed numerical skills and competencies in the study of the areas focusing in attaining knowledge, developing the skills in comprehension, and applying concepts and analysis.

She also saw to it that the content-based modules were designed and developed with a systems approach in mind, like following and observing each step of the modular process, such as:

7. Entry (starting) behavior of the learner was analyzed;
8. Specific objectives stated;
9. Content selected and sequenced;
10. Learning activities well-planned, designed and developed;
11. Continuous assessments in the form of pre and post and built-in tests; and
12. Effectiveness of the module evaluated.

The content of the online tools is so prepared to allow the pupils to work independently by themselves, and if there is a need for teacher assistance, such help will be at the minimum, and on online instruction.

Another key components of the online tools are that they are highly supportive of each other. Parts like the specific objectives, learner's activities, and evaluation are interrelated and suggested practice exercises or activities are the means used to achieve the predetermined objectives. Likewise, the evaluation

serves as the feedback to find out the extent of how much the objectives are realized.

4. **Validity of the Contents of the Online Instructional Tools in Mathematics VI.**

Based on the survey conducted on the assessment of the school administrators and experts, they were of the professional views that these sets of tools were not only valid as they were very acceptable, as proofs of obtained composite means of X = 4.67 for relevance of objectives; X = 4.78 for relevance of content; X = 4.76 for clarity; X = 4.72 for adequacy; X = 4.82 for suitability; and X = 4.67 for usefulness or resulted to an overall composite mean of X = 4.74.

5. **Performance of the Pupils in the Pre and Posttests Using the Sets of Online Instructional Tools in Mathematics VI; and Significant Difference, if any, in the Results of the Pre and Posttests.**

The results of the pre- and posttest in Mathematics VI was satisfactory as evidenced by mean gain of 11.15 and further affirmed by the overall result of t = 20.871 which is much > than its tubular t = 2.576 that at .01 alpha level and 85 dfs, that the null Ho posited at the onset of the study is **rejected.** These findings suggest that pupils were able to enhance their knowledge and skills in the use of the online instructional tools in Mathematics, as an alternative tools in the teaching of Mathematics.

Conclusions

In view of the cited findings, the following conclusions were drawn:

1. Geometry and Measurement subject areas were least covered areas in the DepEd's prescribed textbooks, budget of work, in the inventory ad achievement test and table of specification, results of the yearly test, and annual district report that the researcher focused on the content of her proposal on these two (2) not well-tread and tried topics in Mathematics VI in Geometry and Measurement.

2. In terms of judgmental evaluation, the proposed sets of online instructional materials in Mathematics VI were valid as they were very acceptable to the school administrators / experts (X = 4.71); and Mathematics teacher (X = 4.75); or an overall composite mean of X = 4.73.

3. In terms of concurrent validity, the results of the achievement test and the average grade of the pupils in Mathematics VI were highly and positively significant.

4. Significant difference is found to exist between the assessments of the school administrators and Mathematics teachers as to the acceptability of the proposed online instructional materials in Mathematics VI.

Recommendations

Based from the conclusions drawn in the study, the researcher offers the following:

1. The Proposed Online Instructional Materials in Mathematics VI should be endorsed and adopted for the use of the Grade VI pupils not only in the District

4, but also on the whole Division of City Schools (DCS) of Manila, to serve as online supplementary materials in the teaching of Mathematics.

2. These sets of online instructional tools in Mathematics VI should further undergo testing and re-testing to improve the design and enrich the topics as well as the classroom activities that suit particular setting. These can also serve as alternative source in the absence in the inadequacy of teachers and basic textbooks and other reference materials, as well as serve as online instructional tool for pupils as no – class interactive class is still partially suspended because of the pandemic situations.

3. More online instructional tools in Mathematics should be developed in other areas of the subject to ease the problem of big classes, inadequate classrooms and facilities, as well as and ease the burden of the teachers as pupils start to assume responsibility for learning, especially, now that partial no in – class is ordered by the DepEd because of the fear of safety and health satisfaction.

4. Because of the limitation of the study, the researcher further recommends a follow-up research to firmly establish the logical and statistical validity of other sets of online instructional materials in other areas of Mathematics subject.

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APPENDIX A. LETTER TO CONDUCT SURVEY

_____

THE SUPERINTENDENT
School Division Superintendent
Division of City Schools
Manila

Dear Sir/Madam:

The undersigned is now in the last phase of her master's program majoring in Mathematics at St. Dominic Savio College in Metro Manila.

She is presently conducting a research study entitled: **"ONLINE INSTRUCTIONAL MATERIALS IN MATHEMATICS VI FOR SELECTED PUBLIC ELEMENTARY SCHOOLS IN DISTRICT 4 DIVISION OF CITY SCHOOLS MANILA: IN RESPONSE TO DEPARTMENT OF EDUCATION'S (DepEd's) LEARNING CONTINUITY PLAN"**

In this regard, she request permission to conduct a survey. Attached are the sets of survey questionnaire which gather the data needed to fulfill the requirements of the course. Rest assured all the information should will be kept confidential and will only be used for academic purposes.

Thank you for your kind approval and More Power!

Very respectfully,

(SGD.) JULIE G. MARANAN
Researcher

Recommending Approval:

LETICIA P. ATIENZA, Ed.D., DBA, Ph.D.

Program Coordinator

APPENDIX B. SURVEY QUESTIONNAIRE

PART I. PROFILE SURVEY QUESTIONNAIRE FOR SCHOOL ADMINISTRATORS AND MATHEMATICS TEACHERS OF SELECTED ELEMENTARY SCHOOLS, IN DISTRICT 4, DIVISION OF CITY SCHOOLS (DCS), MANILA

Dear Sir/Madam:

Please provide the legitimate answers to the following questions by checking your choice. All data gathered will be treated with "strict confidentiality." Thank you very much for your kind indulgence.

Part I: Personal Data

A. Name: ____(OPTIONAL)___ _____

B. School: _____

C. Position: _____

D. Sex: _____ Male _____ Female

E. Age

_____ above 65 years old
_____ 56 – 60 years old
_____ 51 – 55 years old
_____ 46 – 50 years old
_____ 41 – 45 years old
_____ 36 – 40 years old
_____ 26 – 35 years old
_____ Below 25 years old

F. Civil Status

_____ Single
_____ Married
_____ Widow/Widower
_____ Separated

G. Highest Educational Attainment

_____ Doctor of Education or any doctoral degree
_____ Master's Degree with Doctoral Units
_____ Master's Degree
_____ BSE w/ Masteral Units
_____ BSE
_____ Other Courses (please specify)

H. Number of Years Teaching Mathematics

_____ Above 25 years
_____ 24 – 20 years
_____ 19 – 15 years
_____ 14– 10 years
_____ 9 – 5 years
_____ below 5 years

I. Civil Service Eligibility

_____ Professional Board Exam
_____ Licensure Exam for Teachers
_____ Senior Teachers
_____ Career Service Professional Exam
_____ Others (please specify)

J. Subjects Taught Aside from Mathematics

_____ English
_____ Filipino
_____ Science
_____ HEKASI
_____ Others TLE (please specify)

K. Number of Seminars Attended in Mathematics _____

L. Number of Years in Teaching

_____	5 years and above	_____	21 – 25
_____	6 - 10	_____	26 - 30
_____	11 - 15	_____	31 – 35
_____	16 - 20	_____	36 and above

PART II. ASSESSMENT OF THE PROPOSED ONLINE INSTRUCTIONAL MATERIALS IN MATHEMATICS VI BY THE SCHOOL ADMINISTRATORS AND EXPERTS; AND MATHEMATICS TEACHERS

Directions:

Please indicate your assessment on the following criteria on the proposed sets of online instructional materials in Mathematics VI for the use of the pupils in selected elementary schools in District 4 of the DCS, Manila.

Please be guided by the 5-Likert Scale below.

5 - Very highly acceptable (VA)

4 - Highly acceptable (HA)

3 - Moderately acceptable (MA)

2 - Least acceptable (LA)

1 - Not acceptable (NA)

Criteria	**5**	**4**	**3**	**2**	**1**
A. Relevance of Objectives					
1. Objectives are measurable and attainable. The contents are relevant to the existing course outline	__	__	__	__	__
2. The contents are relevant to the learning activities	__	__	__	__	__
3. Activities provide opportunities for the students to achieve the goals of the subject	__	__	__	__	__

	5	4	3	2	1
4. Activities provide opportunities for the students to be creative and resourceful	___	___	___	___	___
5. Topics reflect the objectives of the subject	___	___	___	___	___
6. The activities are relevant to the objectives being developed in each lesson	___	___	___	___	___

B. Relevance of Contents

1. Directions on how to use the module are provided	___	___	___	___	___
2. Directions on how to go about the learning activities are provided	___	___	___	___	___
3. There is proper sequencing in the presentation of each lesson	___	___	___	___	___
4. Time allotment is provided	___	___	___	___	___
5. Illustrations are properly drawn and labeled	___	___	___	___	___
6. Overview is provided	___	___	___	___	___
7. The contents provide sufficient information for the student to understand concepts	___	___	___	___	___
8. The contents prepare the student for the practical application	___	___	___	___	___

C. Clarity

1. Introduction provides a clear

overview of the module	___	___	___	___	___
2. Directions are clear and simple and can easily be understood	___	___	___	___	___
	5	4	3	2	1
3. Minimum time allotment is provided	___	___	___	___	___
4. Resources and other references are provided	___	___	___	___	___
5. Specific behavior is stated on what to do is provided	___	___	___	___	___
6. Objectives are clear	___	___	___	___	___
7. Directions are easy to follow even without the help of the teacher	___	___	___	___	___
8. Contents are presented in simple language and can be easily understood by the students	___	___	___	___	___

D. Adequacy

1. Expected learning is provided	___	___	___	___	___
2. Contents provide adequate information to establish needed principles and concepts	___	___	___	___	___
3. Key points are emphasized	___	___	___	___	___
4. Skill lessons are presented in logical order	___	___	___	___	___
5. Illustrations are provided and well laid out	___	___	___	___	___

	5	4	3	2	1
6. There are enough activities at the end of each lesson	__	__	__	__	__
7. The activities and practice exercises are more than adequate	__	__	__	__	__

E. Suitability

1. There is a proper sequencing in the presentation of each lesson	__	__	__	__	__
2. The content-based module makes use of the strong features of the computer	__	__	__	__	__
3. It holds the attention of the students	__	__	__	__	__
4. The information is appropriate	__	__	__	__	__
5. Test items are constructed in accordance with the type of test intended for	__	__	__	__	__
6. The feedback measures the different aspects of learning	__	__	__	__	__

F. Usefulness

1. The content - based module can increase interest in studying	__	__	__	__	__
2. It can motivate students to study independently	__	__	__	__	__
3. The content - based module is a good instructional material in the					

absence of textbooks	__	__	__	__	__
4. The module helps developed knowledge and skills	__	__	__	__	__
5. Concepts and principles can be learned easily through the use of the modules	__	__	__	__	__

Please list down below other comments you have regarding the proposed online tools in Mathematics. Give your suggestions for its improvement.

1. _____
2. _____
3. _____
4. _____
5. _____

Thank you for your cooperation!

(SGD.) JULIE G. MARANAN
Researcher

APPENDIX C

Preliminary Test in Mathematics VI
2022

Directions:

Read each item carefully. Write the letter of your choice/answer on your answer sheet.

1. It is an exact position or location in space.

   A. point C. ray
   B. line D. line segment

2. It is made up of the union of two rays.

   A. line C. point
   B. angle D. ray

3. These are lines on the same plane that do not intersect.

   A. intersecting C. parallel
   B. horizontal D. straight

4. This angle has a square corner.

   A. acute C. congruent
   B. obtuse D. right

5. A line is determined by _____ points.

   A. one C. three
   B. two D. five

6. Each ray is called a _____ of the angle.

   A. vertex C. side
   B. point D. square

7. It is the common point of an angle.

A. ray C. side
B. vertex D. point

8. This has a definite length and distance.

A. ray C. line segment
B. line D. point

9. A right angle measures _____^{0}.

A. 90^0 C. 45^0
B. 180^0 D. 135^0

10. Which is a plane figure?

A. cylinder C. square
B. cube D. reflex

11. These are lines that cross or meet at a certain point.

A. parallel C. straight
B. intersecting D. vertical

12. Tommy is building a toy house using 12 alphabet blocks. Each block is 8 cm on each side. What is the volume of each block? Which is the irrelevant information?

A. 8 cm C. 4 sides
B. 4 edges D. 12 blocks

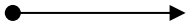
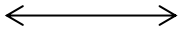
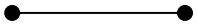
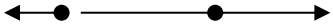
13. Yesterday, Candy's temperature ran to 40.5^0 C. How much was this higher from the normal body temperature?

A. 3.5^0 C C. 35^0 C
B. 0.35^0 C D. $.03^0$ C

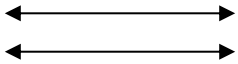
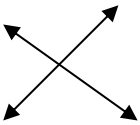
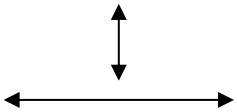
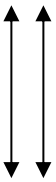
14. A sack of rice weighs 50 kgs. How may grams does each sack of rice weigh in gram?

A. 500 g
B. 5 000 g
C. 50 000 g
D. 1 500 g

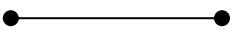
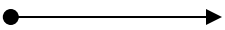
15. Which among this figure is a ray?

A. 
B. 
C. 
D. 

16. Which among this figure is an example of intersecting lines?

A. 
B. 
C. 
D. 

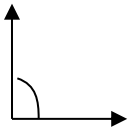
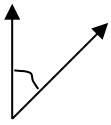
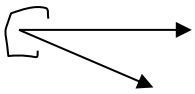
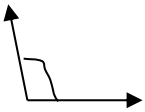
17. Which is a line segment?

A. 
B. 
C. 
D. 

18. An angle that measures 180^0.

A. right
B. obtuse
C. straight
D. acute

19. Which are congruent angles?

A. 
B. 
C. 
D. 
E. 

A. C and D
B. D and E
C. B and A
D. A and E

20. What do we call a distance around a polygon?

A. circumference
B. radius
C. perimeter
D. diameter

21. How many centimeters are there in 9 meters?

A. 9
B. 900
C. 90
D. 9 000

22. Find the perimeter of a rectangle table with a length of 20.5 dm. and width of 100.5 dm

A. 62 dm
B. 620 dm
C. 31 dm
D. 41 dm

23. A triangle box with a base of 5 dm. and height of 3 dm. was placed in the school library. What is the area of the box?

A. 75 dm
B. 7.5 dm^2
C. 75 dm^2
D. 7.5 dm

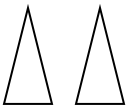
24. A seedbox made by Mrs. Luna's class measures 80 cm. by 50 cm. by 20 cm. How much soil can it contain?

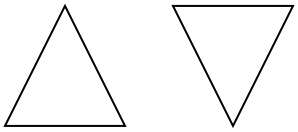
A. 8 000 cm^3
B. 8 000 cm^2
C. 80 000 cm^3
D. 80 000 cm

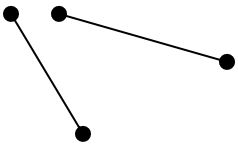
25. One square meter of prime land cost P20 000. How much will one hectare cost?

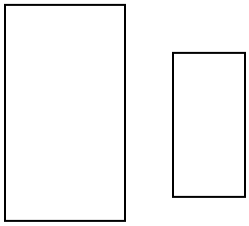
A. P 200 000 000
B. P 200 000
C. P 2 000 000
D. P 220 000

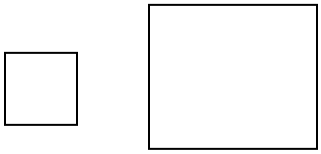
The figures below are congruent?

a. 

c. 

b. 

d. 

e. 

26. _____

27. _____

28. What unit of measurement is used to weigh a new born baby?

A. meter C. gram
B. kilogram D. ton

29. There are 4 000 g. in _____ kg.

A. 40 C. 440
B. 4 D. 400

30. What is the basic measurement of length in the metric system?

A. metre C. centimetre
B. millimetre D. decimetre

31. How big is a hectare?

a. 100 sq. m. c. 10 000 sq. m.
b. 1 000 sq. m. d. 100 000 sq. m.

Which unit is appropriate to measure the following: Write L for liter; and ml for millimeter

32. a cup of coffee _____

33. a can of juice _____

In 24 hours Tito takes about 1, 360 g. of food and drink. How much is his food and drink intake in kilograms?

34. What is the capacity of 5 liters of gasoline in milliliter?

A. 50 C. 500
B. 5 000 D. 550

35. The freezing point of seawater is _____.

A. 0^0 C C. 29^0 C

B. 19^0 C D. 15^0 C

36. A cube with sides 10 cm long holds how many litre?

A. 10 C. 1
B. 100 D. 1 000

37. Jeffrey's temperature is 38.2^0 C while Zeny's is 37.9^0 C. What is the difference?

A. $.02^0$ C C. 2^0 C
B. 0.3^0 C D. 3^0 C

38. Christine went to a nearby sari-sari store and bought 6 pounds 3 ounces of sugar, 4 pounds 8 ounces of flour, and 3 pounds 7 ounces of lard. These were placed in 3 separate packages. How much did the 3 packages weigh?

A. 13 lbs. 8 oz. C. 13 lbs. 18 oz.
B. 14 lbs. 14 oz. D. 13 lbs. 15 oz.

39. Mrs. Reyes went to the grocery store and bought the following: 4 kilos of flour, 1 kilo and 750 grams of sugar, 700 grams of garlic, and 600 grams of lard. What is the weight of the basket together with all its contents?

A. 5 kg. 2050 g. C. 5 kg. 1450 g.
B. 7 kg. 1450 g. D. 7 kg. 2450 g.

40. What is the volume in cubic centimeter of a box which holds 125 litres of rice?

A. 1 250 dm^3 C. 12 500 cm^3
B. 125 dm^3 D. 125 dm

APPENDIX D

Index of Discrimination as Reflected in the Pre-Test
(First Trial Run) in Mathematics VI
Schoolyear 2022-2023

Level of Discrimination	Range of Discrimination	Item Number	No. of Items	%
High	.40 and above	1, 2, 14, 15	4	10.00
Satisfactory	.30 to .39	3, 4, 5, 6, 7, 13, 16, 17, 18 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34	20	50.00
Marginal	.20 to.29	11, 12, 19, 20, 23, 23, 30, 35, 36, 38, 39	11	27.50
Poor	.19 and above	8, 9, 10, 37, 40	5	12.80
TOTAL			40	100.00

APPENDIX E

Index of Difficulty as Reflected in the Pre-Test
in Mathematics VI
Schoolyear 2022-2023

Level of Difficulty	Range of Difficulty	Item Number	No. of Items	%
Easy	.76 and above	1, 2, 3, 4, 12 and 15	5	12.50
Average	.25 to .75	4, 5, 6, 7, 8, 12, 13, 14 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39	31	77.50
Difficult	.24 and below	9, 10, 11, 19, 40	5	12.50
TOTAL			40	100.00

APPENDIX F

Index of Discrimination as Reflected in the Pre-Test
in Mathematics VI
Schoolyear 2022-2023

Level of Discrimination	Range of Discrimination	Item Number	No. of Items	%
High	.40 and above	1, 2, 3, 12, 13 and 15	5	12.50
Satisfactory	.30 to .39	4, 5, 6, 7, 8, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39	31	77.50
Marginal	.20 to.29	9, 18, 31	3	7.5
Poor	.19 and above	40	1	2.50
TOTAL			40	100.00

APPENDIX G

Index of Difficulty as Reflected in the Posttest
in Mathematics VI
Schoolyear 2022-2023

Level of Difficulty	Range of Difficulty	Item Number	No. of Items	%
Easy	.76 and above	1, 3	2	5.00
Average	.25 to .75	2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	37	92.50
Difficult	.24 and below	37	1	2.50
TOTAL			40	100.00

APPENDIX H

Index of Discrimination as Reflected in the Posttest
in Mathematics VI
Schoolyear 2022-2023

Level of Discrimination	Range of Discrimination	Item Number	No. of Items	%
High	.40 and above	1	1	2.50
Satisfactory	.30 to .39	2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	37	92.50
Marginal	.20 to.29	17	1	2.50
Poor	.19 and above	3	1	2.50
TOTAL			40	100.00