



PROPOSED TEACHING GUIDE FOR PATTERNS AND ALGEBRA IN GRADE 10: ITS ACCEPTABILITY

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ABSTRACT

The lack of reference materials for Mathematics in Grade 10 paved the way for creating and designing the proposed teaching guide for Patterns and Algebra in Grade 10. This study evaluated the acceptability of the proposed teaching guide. The respondents and jurors were the 30 mathematics teachers from the Pili District and Baa District of the Division of Camarines Sur. Each respondent was randomly selected through the purposive random sampling method. Each was given an evaluation checklist that aimed to measure the acceptability of the proposed teaching guide based on the different attributes and criteria formulated by the researcher. It adopted the ADDIE model in the design, development, and evaluation of the teaching guide.

Keywords: *Teaching Guide in Mathematics 10, Acceptability of Teaching Guide, Patterns and Algebra*

INTRODUCTION

During his stay in the department of education as a Mathematics teacher, the researcher of this study realized that there is no available teaching guide for Mathematics 10. It urges him to initiate the development of a teaching guide that covers Patterns and Algebra lessons for

Grade 10. In this study, he measured the acceptability of the proposed teaching guide. Specifically, the following are the objectives of this study:

- (1) Identify and measure the validity of the content of the teaching guide for patterns and algebra in terms of; Lesson Objectives, Lesson Inputs, Lesson Learning Activities, and Lesson Enrichments;
- (2) Measure the acceptability of the teaching guide for Patterns and Algebra in Grade 10 in terms of: Clarity, Usefulness, Suitability, Adequacy, Timeliness, Language, Style and Format, Illustrations, and Presentations
- (3) Assess the significant agreement on the rank – orders of the respondent's assessment of the acceptability of the proposed teaching guide for Patterns and Algebra in Grade10
- (4) Generate pointers based from the findings of the study.

Several related literature and studies were reviewed by the researcher of this study to be guided accordingly on the design and development of the teaching guide and on the process of measuring the acceptability of the proposed teaching guide. The review was focused on the following areas of study: Curriculum materials, Acceptability of Teaching Guide and Instructional Materials, Teaching Guide, Strategic Intervention Materials, and Pointers.

Curriculum Materials

Yu (2011) led the formulation of the Mathematics Framework for Philippine Basic Education (MFPBE) through the concerted effort of the Philippine Council of Mathematics Educators (MATHTED) and the Science Education Institute of the Department of Science and Technology. The framework was a product of intense discussions with the best minds in mathematics education. They emphasized the importance of Mathematics in the lives of learners and the world as a whole. They imparted that Mathematics has the following roles in Philippine education: facilitating participation in productive life activities, providing a way of making sense of the world, serving as a means of communication, and operating as a gateway to national progress.

On the basis of the reviewed studies and literature, the present study is a modest attempt to fill the gap noted in the previous studies. Although there had been a number of studies presented that tackled the acceptability and validity of instructional materials in mathematics, it was noticeable that no research has been made that focused on the acceptability of teaching guide for Patterns and Algebra in Grade 10 in the Mathematics curriculum of the Department of Education in the public secondary schools. This was the gap the researcher bridged in this study.

Mahajan (2014) stated that understanding mathematics is essential for full participation in society. Yet mathematics is learned mostly by rote, with little understanding or possibility for transfer. Thus, PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy can provoke revolution in mathematics education worldwide — by focusing the mathematics assessment on distinguishing rote learning from true understanding. Assessment drives teaching and learning: What PISA measures, the mathematics curriculum worldwide will deliver.

Andaya (2014) identified the factors that affect the mathematics achievements of students of the Philippine Normal University – Isabela Campus. She attempted to determine the mathematics achievement of college students in fundamental mathematics and contemporary mathematics and the factors that affect their achievement. She found out that the poor achievement of students in mathematics is caused by four factors: individual (student), instructional (teacher), classroom management, and evaluation.

Ganal and Guia (2014) determined and analyzed the problems and difficulties encountered by Bachelor of Elementary Education sophomore students of the Philippine Normal University Isabela campus towards mastering learning competencies in mathematics. The problems and difficulties are categorized into personal problems, emotional problems, problems with the teacher's instruction, problems with school adjustment, problems in adjusting to classmates and boardmates, and problems arising from over-extended schedules/workloads for practice in different competitions.

Pascual (2014) attempted to determine if the curriculum and instructional practices employed by a school that serves as a clinical experience and practice site for pre - service teachers and experimental teaching activities, known as a laboratory school, affect the career choice of laboratory school graduates and its senior students' course preference. The findings revealed that instructional practices that engage students to actively participate in their own learning, teaching practices that enhance the development of complex cognitive skills, and processes used by the teachers together with a school curriculum that emphasizes the development of Science and Mathematics, affect the career choice of its graduates who mostly took Scientific and Professional courses.

De Filippis (2015) said that one of the causes for failing to meet proficiency levels on mathematics assessments could be the inconsistent use of teaching practices targeted at supporting lower-achieving students; according to such reasoning, a consistent use of research-supported practices could result in improved student performance. Research questions examined teachers' perceptions regarding implementing best instructional practices and regarding number sense, computational, problem-solving, working memory, and self-efficacy needs of lower-level basic skills of students.

Acceptability of Teaching Guide and Instructional Materials

Torre Franca (2017) developed and validated instructional modules on rational expressions and variations. Her modules attempted to individualize learning by allowing a student to achieve mastery of one unit of content before moving on to another. She developed instructional modules on two content areas of Algebra taught to second-year high school. Module 1 consisted of 11 lessons on Rational Expressions and Module 2 consisted of nine lessons on Variations. She utilized the ADDIE (Analysis, Design, Development, Implement, Evaluate) model in developing the instructional modules on Rational Expressions and Variations. In validating the modules, she employed the following instruments: (1) Expert's Evaluation Checklist of the Instructional Modules; (2) Pre-test and Post-test for each instructional module; and (3) Student's Evaluation Checklist of the Instructional Modules. She utilized descriptive statistics such as percentages, measures of central tendency, and standard deviation in analyzing the evaluation ratings of experts and student respondents.

Espinar and Ballado (2016) developed a Worktext in Basic Mathematics 2 utilized by their students at the University of Eastern Philippines. They tested the content validity and level of

acceptability of the developed work text. They also found a significant difference between the respondent's evaluations. The study utilized the descriptive comparative method in determining the validity and acceptability of the developed work text and the difference between the evaluation of experts/teachers and the student-respondents. The content validity of the work text was evaluated in terms of the following criteria: (1) Lesson Objectives; (2) Lesson Inputs; (3) Lesson Application; and (4) Lesson Enrichments. Meanwhile, the acceptability was evaluated in terms of its (1) Clarity, (2) Usefulness, (3) Suitability, (4) Adequacy, (5) Timeliness, (6) Language, (7) Style and Format, (8) Illustrations and (9) Presentations.

Birnie, et.al. (2015) focused their project on building and piloting models that can increase teacher and district capacity to adapt instructional materials with the intent of improving their alignment with the expectations of College and Career Ready Standards (CCRS). A team from Illustrative Mathematics worked with two pilot districts in order to develop teachers' content knowledge so they could adapt, build, and pilot test materials, with the end goal of creating a widely shareable process that can be used by teachers and districts across the country.

Teaching Guide

Piper et. al. (2018) reported the results of the Research Triangle Institute (RTI) International Education's study on teacher's guides across 10 countries and 19 projects. They used quantitative and qualitative methods to examine how teacher guides across the projects differ and find substantial variations in the design and structure of the documents. They developed a scripting index so that the scripting levels of the guides can be compared across projects. The impact results of the programs that use teacher's guides show significant impacts on learning outcomes, associated with approximately an additional half year of learning, showing that structured teacher's guides contribute to improving learning outcomes. During their observations, they found that teachers make a variety of changes in their classroom instruction from how the guides are written, showing that the utilization of structured teacher's guides does not create robotic teachers unable to use their own professional skills to teach children.

Lomibao (2016) said that lesson planning in the Philippines' teaching practice has been an isolated work. It is an individual teacher's responsibility to decide how the lesson will be delivered, what materials to use, and how students be evaluated. This indicates that the efficiency and effectiveness of the learning experience are dependent on the teacher's ability and quality. She further stated that enhancing teacher's quality is vital in improving the student's learning outcomes. And to realize this, she said there should be an intensive, ongoing professional development model provided to teachers. A development model that is connected to teaching practices focused on students learning and addresses the teaching of specific curriculum content aligned to school improvement priorities and goals, and which also build strong working relationship among teachers.

Laguador (2014) in his article discussed the option of utilizing the cooperative learning approach as a teaching and learning strategy in the classroom to encourage learners' active participation. Academic performance as an important measure of a student's learning experience should require evidence as output of the teaching and learning process. Students are guided with clear objectives on how to accomplish group goals and everyone is encouraged to take part in bringing about the required output of the assigned task.

Cooperation is an important aspect of unity, collaboration, and social obligation that creates an environment for a better learning experience.

The active participation of the students in classroom discussions is always being encouraged to strengthen not only the cognitive ability of the learners but also the affective and psychomotor domains. Students are involved in solving problems, brainstorming, formulating questions on their own, discussing ideas, and expressing opinions on debates. Giving them the chance to take part in team exercises enhances their capacity to become leaders and be responsible in performing their assigned tasks. Therefore, a cooperative learning approach may provide a better opportunity for learners to grow and achieve the course objectives as well as the student - outcomes.

Magayon and Tan (2016) found Differentiated Instruction (DI) to be effective in catering to the individuality of students and at the same time helping students to have positive attitudes about school, increased engagement in learning, and improved achievement. In the Philippines, 16 Focused Groups of Grade 7 students were interviewed regarding their experiences on the differentiation of instruction provided by their Mathematics teachers, in this study the most observed differentiations by the respondents are relating real - life situations to the lessons, modified learning activities, learning activities according to students' preference, teachers' assistance during learning activities, and grouping students based on projects and choice of students. Their verbalized experiences were transcribed as is with no restatement to conform with Marton's Phenomenological principles in characterizing the variations of experiences. Using thematic analysis, a dendrogram is used to cluster the conceptions of the experiences of the respondents in this study. A frequency table and a bar graph present the similarities and variations of the Grade 7 Filipino students' conceptions of their experiences on DI. Hence, this study argued that DI motivates students' interest, makes learning mathematics easier, and challenges students to learn and do more. However, the study also argued that students have difficulties in learning and doing mathematical tasks. The findings suggest that considering activities based on student's preferences, modified learning activities, variety of assistance provided to students during activities, and variety of relating real-life situations, and creating different groupings are not enough to ensure that differentiation results in effective instruction.

Bhatt (2017) surveyed the attitude of lower secondary and secondary level teachers of community and institutional schools and compared the attitude between community and institutional schools mathematics teachers towards the use of teachers' guide. He concluded that there is a positive attitude using the teacher's guide and no significant difference between the attitudes of mathematics teachers at lower secondary and secondary level community and institutional schools of Lalitpur district.

Strategic Intervention Materials

Torio (2015) determined the effectiveness of a developed instructional material on fractions with the use of Algebra as a tool in problem-solving. She utilized three instruments to achieve the objectives of her study. The instruments are (1) pre-test, (2) post-test, and (3) pre - pre-experimental design. No control group was used since there is only one section to participate in the study.

Her theoretical framework is based on the Adaptive Character of Thought (ACT) developed by John Anderson which focuses on memory processes. This theory made a distinction among three types of memory structures: declarative, procedural, and working memory. According to

ACT, all knowledge begins as declarative information; procedural knowledge is learned by making inferences from already existing factual knowledge and working memory is that part of long-term memory that is most highly activated.

Dacumos (2016) identified Strategic Intervention Materials (SIM) as one of the suggested various intervention form that can bridge learning gaps. SIM is a remediation aid for the students at the level of their understanding and thereby increasing their academic achievement.

SIM increases and deepens students' skills in manipulation, knowledge or thinking, understanding, and representation. SIM is an instructional material that is prescribed by the Department of Education (DepEd) to increase the level of proficiency of students in science subjects. Strategic Intervention Materials are aimed at helping teachers provide students with the needed reinforcement to make progress in their respective subjects. Various studies have particularly pointed out the effectiveness in the utilization of SIMs in their respective science lessons.

Dio and Diaz (2017) determined the effectiveness of the developed Tri – in - 1 Strategic Intervention Material (SIM) for Grade 9 Mathematics through Solomon Four - Group Design using a total of 60 subject participants that underwent matching under the quasi -experimental method of research. The SIM is incorporated with two - dimensional manipulatives and is composed of different activity cards about the parts of a right triangle, proportions of the corresponding parts of similar triangles, geometric mean in a right triangle, and word problems involving the right triangle similarity theorem. The study revealed that when students are exposed to Tri-in-1 SIM, their Mathematics achievements are better and higher.

The quasi-experimental method with matched subjects was used in identifying the respondents of their study. In a quasi-experimental design, pairs of individuals may be matched on certain variables to ensure group equivalence and to avoid its possible effect on the study. This is when random assignment is impossible because subjects are in intact groups. Solomon Four - Group Design, one of the most rigorous and prestigious designs that can be utilized in both true experimental and quasi-experimental studies, was likewise adopted in their study. This design is a combination of the pre-test - post-test control group design and the post-test-only control group design.

Saclao (2016) investigated the impact of Strategic Intervention Materials and Modules Combined (SIM – MOD) for Algebraic Rational Expressions in Grade 8. A descriptive method of research was employed for the development and evaluation of the SIM-MOD. To investigate the impact of these learning materials, a mixed method was used to provide more depth to the study by implementing more than one research method such as a quasi-experimental design (quantitative) along with an interview with open-ended questions (qualitative).

Kontas (2016) investigated the effect of manipulatives (concrete learning materials) both on the academic achievement of secondary school students in mathematics and on their attitudes towards mathematics. The pre-test – post-test control group experimental model, which is one of the quasi-experimental research designs, was used in his study.

Kratofil (2013) discovered and described the components of a “double-dose” math intervention that resulted in increased mathematics achievement for high school Algebra I intervention

participants in an effort to inform local decisions regarding program improvements and to provide insight to other educators investigating mathematics interventions.

During the 2011 - 2012 school year, a suburban, Midwestern school district implemented a math intervention called Math Lab for students with a history of failure in mathematics who were enrolled in grades six through eight and in Algebra I. The students selected for the intervention had been unable to master grade-level mathematics concepts and skills, as measured by state and local assessments, despite exhibiting positive attitudes and significant effort. Intervention participants were assigned to a heterogeneous ability-grouped math class on one day and assigned to a homogeneous ability-grouped math class on an opposite day. This approach referred to as “double-dosing”, placed students in heterogeneous classrooms for regular math instruction and in a homogeneously grouped math class for additional instruction and support.

Mercado and Tandog (2018) determined the efficacy of integrating MALMATH and DESMOS in Conversational Strategic Intervention Material (CSIM) on students achievement of Grade 9 students of Pedro “Oloy” N. Roa Sr. High School, Cagayan de Oro City. They employed a combination of pre-test – post test quasi - experimental control group and qualitative research design using a 17 - item teacher - made test to assess students achievement and retention in mathematics and structured interview questionnaire to determine their perception in using CSIM. Their study was set to collaborate the inclination of students in the use of mobile phones and their comfort to use their own language in learning mathematics into an instructional material that will capture their interests. This study was designed to determine the effectiveness of CSIM as a medium of instruction, to help improve retention and to alleviate students’ mathematics achievement.

The Theoretical Framework of this study is based on the following:

Metacognitive Theory (Flavell, 1976) described learning as a Cyclical process of metacognition. Metacognition is an intertwined network of knowing about and regulating our thinking. To engage in metacognitive regulation, metacognitive knowledge is accessed, applied, and refined.

Theory on Constructivism (Bruner, 1960) encompasses the idea of learning as an active process wherein those learning are able to form new ideas based on what their current knowledge is as well as their past knowledge. A cognitive structure is the mental process that offers the learner the ability to organize experiences and derive meaning from them. These cognitive structures allow the learner to push past the given information in constructing their new concepts.

Theory of nstruction (Bruner, 1915) described the key instructional components of the curriculum; and its sequence of activities in which learners become self-sufficient problem – solvers. Bruner (1915) stated the principles of instruction as; (1) Readiness - Instruction must be concerned with the experiences and context that makes the student willing and able to learn; (2) Spiral Organization - Instruction must be structured so that it can be easily grasped by the student; (3) Going Beyond the Information Given – Instruction should be designed to facilitate extrapolation and or fill in the gaps.

Theory of Three Modes of Learning (Rumelhart and Norman, 1978) stated that there are three modes of learning: accretion, structuring, and tuning. Accretion is the addition of new knowledge to existing memory. Structuring involves the formation of new conceptual structures or schema. Tuning is the adjustment of knowledge to a specific task usually through practice.

Elaboration Theory (Reigeluth, 1992) declared that instruction should be organized in increasing order of complexity for optimal learning. For example, when teaching a procedural task, the simplest version of the task is presented first; subsequent lessons present additional versions until the full range of tasks is taught. A key idea of elaboration theory is that the learner needs to develop a meaningful context into which subsequent ideas and skills can be assimilated. This theory proposes seven major strategy components: (1) an elaborative sequence, (2) learning prerequisite sequences, (3) summary, (4) synthesis, (5) analogies, (6) cognitive strategies, and (7) learner control.

With the insights gained from the above-mentioned theories, the researcher was able to theorize that analyzing the acceptability of the proposed teaching guide for Patterns and Algebra will lead to the formulation of pointers for quality education.

Research Questions

This study assessed the acceptability of the proposed teaching guide for Patterns and Algebra in the grade 10 school year 2019 – 2020.

It answered the following specific questions:

1. What is the content of the teaching guide for Patterns and Algebra in terms of:
 - 1.1. Lesson Objectives,
 - 1.2. Lesson Inputs,
 - 1.3. Lesson Learning Activities, and
 - 1.4. Lesson Enrichment?

2. How acceptable is the teaching guide for Patterns and Algebra in Grade 10 in terms of:
 - 2.1. Clarity,
 - 2.2. Usefulness,
 - 2.3. Suitability,
 - 2.4. Adequacy,
 - 2.5. Timeliness,
 - 2.6. Language,
 - 2.7. Style and Format,
 - 2.8. Illustrations, and
 - 2.9. Presentations?

3. How significant is the agreement on the rank-orders of the respondent's assessment of the acceptability of the proposed teaching guide for Patterns and Algebra in Grade 10?

4. What pointers can be generated based on the findings of the study?

METHODOLOGY

Locale of the study

The chosen locale of the study are Pili and Baao Districts. These two districts are within the Division of Camarines Sur. It is one of the biggest divisions in the Bicol Region.

Pili District covers 12 secondary public schools, four of which are national high schools. The district is divided into two clusters, Pili West and Pili East. Each cluster is headed by a Public Schools District Supervisor.

There were 63 Mathematics Teachers in Pili District. Twenty of them were assigned to teach Mathematics 10.

Baao District has five secondary public schools within its area. The district is also headed by a Public Schools District Supervisor. Three of the public schools are national high schools.

The total number of Mathematics teachers in Baao was 25. Seven of them are handling Mathematics 10 classes.

Within the chosen locale of the study, the juror–respondents of the present study were chosen randomly.

Research Design

The study utilized the developmental-correlational research method. Developmental research is defined as the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness. Correlational Research is a type of non – non-experimental research that assesses relationships between two or more variables.

The researcher adopted the ADDIE Model in developing the teaching guide for Patterns and Algebra in Grade 10.

The present study is likewise quantitative since it systematically investigates the acceptability of the proposed teaching guide for Patterns and Algebra in Grade 10 by employing statistical instruments and tools.

Sampling Technique

In choosing the samples and respondents of the study, purposive random sampling was used. All respondents were selected within the chosen locale of the study which are the Pili and Baao Districts of the Division of Camarines Sur. The further classification of the sample is discussed below.

Respondents of the Study

There were a total of 63 mathematics teachers in Pili District. Twenty (20) of them handle Mathematics 10. In Baao, there were 25 Mathematics teachers actively teaching within the

district. Seven (7) of them were assigned to teach Mathematics 10. There were nineteen (19) school heads considered as respondents of the study.

The respondents of the study were composed of; (1) Three School heads who were previously mathematics teachers, (2) Twelve Master teachers or Department Heads or Coordinators in Mathematics, and (3) Twenty Mathematics teachers.

Juror – respondents	Number	%
School Heads	3	10.00
Master Teachers/ Department Heads/ Coordinators	12	40.00
Mathematics Teachers	15	50.00
TOTAL	30	100.00

Research Instruments

An evaluation checklist is created by the researcher to determine the acceptability of the proposed teaching guide for Patterns and Algebra in Grade 10.

Table of Specifications of Evaluation Checklist

Content	Number of Items	Placement of Items	Percentage
Part I: Validity of the Content of the Proposed Teaching Guide for Patterns and Algebra in Grade 10			
A.1. Lesson Objectives	10	Part A :1 – 10	25
B.2. Lesson Inputs	10	Part B:11 - 20	25
C.3. Lesson Learning Activities	10	Part C:21 - 30	25
D.4. Lesson Enrichments	10	Part D:31 - 40	25
TOTAL	40		100
Part II: Acceptability of the Proposed Teaching Guide for Patterns and Algebra in Grade 10			
A.1. Clarity	10	Part A : 1 - 10	11.11
B.2. Usefulness	10	Part B: 11 - 20	11.11
C.3. Suitability	10	Part C: 21 - 30	11.11

D.4. Adequacy	10	Part D: 31 - 40	11.11
E.5. Timeliness	10	Part E: 41 – 50	11.11
F.6. Language	10	Part F: 51 – 60	11.12
G.7. Style and Format	10	Part G: 61 – 70	11.11
H.8. Illustrations	10	Part H: 71 - 80	11.11
I.9. Presentations	10	Part I: 81 - 90	11.11
TOTAL	90		100

Rating Scale

The researcher constructed a rating scale that was used in the evaluation checklist to interpret the level of acceptability of the proposed teaching guide within the specified criteria. It is shown below.

Adjectival Scale	Numerical Scale	Scale Code
Very Much Acceptable	4.20 – 5.00	VMA
Much Acceptable	3.40 – 4.19	MA
Acceptable	2.60 – 3.39	A
Fairly Acceptable	1.80 – 2.59	FA
Not Acceptable	1.00 – 1.79	NA

Validation of Instruments

The research instruments used in this study underwent four stages of validation. They were first submitted to a set of jurors: the Education Program Supervisor, School Head, and Department Head. The Dean of Graduate Studies of the University of North Eastern Philippines then revalidated them.

Statistical Treatment of the Data

The following statistical tools were used in interpreting the data gathered in this study:

Weighted Mean(\bar{x}). Weighted Mean is an average computed by giving different weights to the individual values. If all the weights are equal, then the weighted mean is the same as the arithmetic mean.

Frequency counts (f). A frequency count is a measure of the number of times that a data or score occurs in a given distribution.

Percentage. Percentage is calculated by taking the frequency in the category divided by the total number of participants and multiplying by 100.

Rank. In a Rank-Order scale, the respondents are given a set of items and asked to put the items in some form of order. The measure of order can include such as preference, importance, liking, effectiveness, and so on.

Kendall's Coefficient of Concordance (W). Kendall's coefficient of concordance is a non-parametric statistic. It was used for assessing agreement among jurors. Kendall's W ranges from 0 (no agreement) to 1 (complete agreement). It is shown by the formula

$$W = \frac{12S}{M^2(N^3 - N)}$$

Chi-Square Test. The significance of W is tested through the critical values in the chi-squared distribution. The Chi-square test is intended to test how likely it is that an observed distribution is due to chance. It is also called a "goodness of fit" statistic because it measures how well the observed distribution of data fits with the distribution that is expected if the variables are independent. The chi-square number (χ^2) can be found by using the formula

$$\chi^2 = M(N - 1)W$$

Scope and Delimitation

The study is focused on the assessment of the acceptability of the proposed teaching guide for Patterns and Algebra in Grade 10. It also identified and validated the content of the proposed teaching guide; The significant agreement among raters was also included in the scope of the study; and the generation of pointers to improve the instructional material was notably taken into account.

The sample size is delimited to 30 jurors, divided into three groups; (1) School Heads, (2) Department Heads/ Master Teachers/ Coordinators, and (3) Mathematics Teachers in different secondary public schools in Pili and Baao Districts in the Division of Camarines Sur during the school year 2019 to 2020. The measurement of the effectiveness of the utilization of the proposed teaching guide for Patterns and Algebra in Grade 10 was not a part of the present study. Thus, it does not include student – respondents.

RESULTS AND DISCUSSION

The findings of this study are summarized and presented based on the problems raised by the researcher.

1. On the content of the proposed teaching guide for Patterns and Algebra in Grade 10. The content of the proposed teaching guide is strongly acceptable to all the respondents. The assessment in all categories scored excellently. The rank orders of the weighted mean of the

four categories are as follows;(1) Lesson Enrichments (4.572), (2) Lesson Objectives (4.560), (3) Lesson Learning Activities (4.499), and (4) Lesson Inputs (4.461).

Overall, the four criteria assessed by the jurors are very strongly acceptable.

The lesson objectives are based solely on the curriculum guide prepared by the Department of Education. It was presented at the beginning of every lesson.

The content is in congruence with the curriculum designed by the Department of Education for Patterns and Algebra in Grade 10.

The parts of the teaching guide can be summarized as follows:

Chapter 1: SEQUENCES AND SERIES

Pre–Assessment

Lesson 1: Patterns and Sequences

Lesson 2: Arithmetic Sequences

Lesson 3: Arithmetic Means

Lesson 4: Sum of an Arithmetic Sequence

Lesson 5: Geometric Sequence

Lesson 6: The n th term of Geometric Sequence

Lesson 7: Geometric Means

Lesson 8: Sum of Geometric Sequence

Lesson 9: Harmonic and Fibonacci Sequence

Lesson 10: Solving Problems in Real-life Applications

Chapter 2: DIVISION OF POLYNOMIALS AND POLYNOMIAL EQUATIONS

Pre–Assessment

Lesson 1: Division of Polynomials (Long Division)

Lesson 2: Division of Polynomials (Synthetic Division)

Lesson 3: Remainder Theorem and Factor Theorem

Lesson 4: Factoring Polynomials

Lesson 5: Polynomial Equations

Lesson 6: Rational Root Theorem

Lesson 7: Polynomial Equations

Lesson 8: Real–Life Problems on Polynomials and Polynomial Equations

Chapter 3: POLYNOMIAL FUNCTIONS

Pre–Assessment

Lesson 1: Polynomial Functions

Lesson 2: Graph of Polynomial Functions

Lesson 3: Real–life Models of Polynomial Functions

At the end of every lesson, there are suggested learning activities that can be used as a tool to develop mastery of the concept.

Answer keys to all the suggested learning activities were provided in the last part of the teaching guide. Solutions were presented in detail.

A pre–assessment is included at the beginning of every chapter to serve as a baseline for measuring the proficiency level of the students at the end of every chapter.

Real-life applications are also essential features of the teaching guide. Part of each chapter is solved problems that have real-life connections. It is intended to connect the concepts to everyday activities and in turn provide a better understanding.

A glossary of terms is included in the last part of the teaching guide. Technical terms that were used and are often mentioned in mathematics were defined in it.

2. On the acceptability of the proposed teaching guide for Patterns and Algebra in grade 10. All the attributes of the teaching guide are very strongly acceptable to the groups of respondents. The weighted means of each attribute are arranged in rank-orders as follows: (1) Suitability ($\bar{x} = 4.605$); (2) Illustrations ($\bar{x} = 4.578$); (3) Presentations ($\bar{x} = 4.564$); (4) Timeliness ($\bar{x} = 4.542$); (5) Usefulness ($\bar{x} = 4.539$); (6) Style and Format ($\bar{x} = 4.527$); (7) Language ($\bar{x} = 4.502$); (8) Clarity ($\bar{x} = 4.477$); and (9) Adequacy ($\bar{x} = 4.446$).

3. On the significant agreement of the rank-orders of the respondent's assessment of the proposed teaching guide. The significant agreement on the rank-orders of the respondents' assessments were measured using Kendall's coefficient (W) of concordance and its corresponding chi-square (λ^2). The computed W on the rank-orders assessment of the content and acceptability of the proposed teaching guide in terms of the different attributes rated by jurors are as follows; (1) Clarity, $W = 0.6229$ and $\lambda^2 = 16.818$; (2) Usefulness, $W = 0.4650$ and $\lambda^2 = 12.555$; (3) Suitability, $W = 0.7653$ and $\lambda^2 = 20.664$; (4) Adequacy, $W = 1.00$ and $\lambda^2 = 27.755$; (5) Timeliness, $W = 0.4956$ and $\lambda^2 = 13.382$; (6) Language, $W = 0.5737$ and $\lambda^2 = 15.491$; (7) Style and Format, $W = 0.4936$ and $\lambda^2 = 13.327$; (8) Illustrations, $W = 0.7017$ and $\lambda^2 = 18.945$; and (9) Presentations $W = 0.6579$ and $\lambda^2 = 17.764$;

Four of the nine attributes of the proposed teaching guide rated by jurors have a strong agreement on their rank-order assessments. They are namely; (1) Suitability; (2) Illustrations; (3) Presentations; and (4) Clarity. The significance of the agreement is 0.025, 0.050, 0.050, and 0.10 respectively.

Four of them have a moderate agreement on their rank-orders assessment. They are as follows; (1) Language; (2) Timeliness; (3) Style and Format; and (4) Usefulness. Respectively, they have a significance of agreement of; 0.100, 0.200, 0.200, and 0.250.

Only one attribute has a perfect agreement on its rank-orders assessment and that is Adequacy.

4. On the pointers generated based on the findings of the study. There are fifteen pointers and suggestions that are generated based on the findings of this study. In the attempt to improve the final form of the teaching guide, all of them were considered.

The fifteen pointers were; (1) Make use of pictures depicting real-life situations to improve illustrations; (2) Provide answer keys for learning activities; (3) Add real-life applications of each topic; (4) Add a glossary of terms; (5) Use simple terms for better understanding; (6) Assess the reliability of the pre-assessments in each chapter; (7) Make sure that examples and learning activities are adaptable to actual classes; (8) Keep the delivery of instructions simple, direct and appropriate; (9) Provide visual clues to problems discussed and presented; (10) Make sure that the concepts are arranged logically in each lesson, examples or activities presented; (11) Use varied strategies in presenting the teaching guide; (12) Improve the cover of the book; (13) Allow rooms for differentiated instructions; (14) Incorporate the use of modern applications and technologies; and (15) Consult other experts to further improve the content of the teaching guide

Conclusions

The following conclusions were drawn:

1. The content of the proposed teaching guide for Patterns and Algebra in Grade 10 are very much acceptable
2. The proposed teaching guide for Patterns and Algebra in Grade 10 are very much acceptable
3. There are significant agreement on the rank orders of the respondents' assessment on the acceptability of the proposed teaching guide for Patterns and Algebra in grade 10 in all aspects considered in the study
4. There are pointers generated based on the findings of the study in improving the proposed teaching guide for Patterns and Algebra in Grade 10.

Recommendations

Based on the conclusions of the study, the following recommendations were offered:

1. The development of a teaching guide for Mathematics 10 should be encouraged.
2. Schools should be reminded and encouraged to apply the said guidelines of the teaching guide
3. There should be a training in conducting research for teachers.
4. The proposed teaching guide should be used by teachers in actual classes to further validate the effectiveness of the teaching guide.

Recommendations for Further Research

The following are recommendations for further research:

1. A study that will evaluate the effectiveness of the utilization of the proposed teaching guide is highly recommended. Since it was very strongly acceptable mathematics teachers, the next best part is to utilize it in actual classes.
2. Development of similar learning materials is also being suggested. There are a lot of areas in Mathematics that can be a topic for the development of new learning materials such as Statistics and Probability, Geometry and General Mathematics.
3. A feasibility study on the cost of developing and publishing teaching guide and other learning materials can also be a beneficial undertaking.
4. Profiles of all Mathematics Teachers in each districts of the division of Camarines Sur is an important data needed by researchers. A study that will collate such data is of great help to future researchers.
5. A study that will proof read the learning materials in Mathematics being utilized by secondary public schools is another research study that will greatly improve Mathematics education in the country.

6. One of the burden in designing learning materials is the design of the aesthetic components of the material. Research on how to creatively design the presentation, style and format of an instructional material is also recommended.

Compliance with Ethical Standards

I, Pablo Virgilio B. Bravo, hereby declared that all information gathered and made available in this study was obtained from the respondents with their consent. They were properly informed and was given the freedom to withdraw from the study anytime. Anonymity of the respondents were maintained, the respondents were not exposed to any form of harm, no conflict of interest exists in the conduct of the study, plagiarism was strictly avoided, and there was no bias in the interpretation of the findings and that the results was used purely for research.

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This is for YOU!

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