

# K-12 Mathematics Curriculum in Grade 7 learners: Basis for Instructional Material's Development

Emybel M. Alegre, PhD

DOI: 10.29322/IJSRP.8.9.2018.p8166

<http://dx.doi.org/10.29322/IJSRP.8.9.2018.p8166>

**Abstract:** The study was to determine the perceived difficulties of K-12 Mathematics Curriculum in Grade 7 students. The adoption of the new curriculum (K-12) is said to enhance the quality of basic education. Additionally, the K to 10 Mathematics Curriculum provides a solid foundation for Mathematics at Grades 11 to 12. It has composed of five content areas which are: (1) Numbers and Number Sense; (2) Measurement; (3) Geometry; (4) Patterns and Algebra; (5) Probability and Statistics. However, hypothesis the formulated, "Students-teachers' factors and utilization of instructional materials do not significantly influence the perceived difficulties of K-12 Mathematics Curriculum in the grade 7 students of Agusan National High School.

## I. Introduction

The K-12 Mathematics as one of the subject areas in the new implemented curriculum (K-12) is providing opportunities for the students to express ideas consisting of a deep understanding of the concept of quantities, shapes and figures, functions, logic and reasoning. That is, students must need to acquire sufficient knowledge of the concepts and well-comprehend the importance of Mathematics concerning with real life application especially in solving real life problems.

Yet today, as in the past, lots of student in all ages and levels of education find mathematics difficult to deal with. Usually, students lack the ability to easily connect the mathematical concepts of mathematics in day-to-day living.

According to Linther (2011), many learning and achievement difficulties are directly related to inherent mathematical difficulties within specified concepts. It is clear that students' concept images often differ substantially from the concept definitions, not only in the sense that they are incomplete but also in characteristics. It is also clear that a conceptual understanding is not sufficient for mathematical proficiency.

The idea is already widely known that one must have mathematical ability to deal the world inside in mathematics. The mathematical difficulty has something to do with the parts of the teachers and students themselves during the teaching and learning process.

Moreover, Bacalangco (2011) stated that it is a familiar notion that people learn mathematics in different ways. Some people remember best what they have seen. Others are good in words. Some may be competent in solving problems but have difficulty learning mathematics formulate. There are students who are good with their hands or who have creative, artistic talent and flair but who have difficulty with more formal mathematics learning and who do not see themselves as able learners at all.

Also, Onwumere (2009) said that every individual is unique and learns in a particular way. This implies that any teaching which does not take into account student limiting factors for learning rarely succeeds. Teachers who understand the learning needs of their students are more empowered to provide the kind of instruction their students need. Knowing why a student is struggling to learn provides a basis for understanding why particular strategy or approaches are effective for him or her.

Indeed, the researchers choose this study to find out the perceived difficulties of K-12 Mathematics Curriculum among grade 7 students in Agusan National High School. It also include the factors affecting them in acquiring learnings in the new Mathematics curriculum. Furthermore, this study will help every teacher not only in Agusan National High School but also in all educators in the country to enhance Agusan National High School but also in all educators in the country to enhance the teaching strategies and approaches towards excellent teaching-learning performances.

## Statement of the Problem

The main purpose of this study was to determine the perceived difficulties of K-12 Mathematics Curriculum in the grade 7 students of Agusan National High School.

Specifically, it aimed to answers the following questions:

1. What is the profile of the grade 7 students in terms of:
  - 1.1 Grade-VI math grade;
  - 1.2 types of school graduated in elementary;
  - 1.3 learning style; and
  - 1.4 study habits?
2. What are the teacher's teaching strategies and teacher's utilization of instructional materials as perceived by the grade 7 students in Agusan National High School?
3. What are the perceived difficulties among grade 7 students in the following math content areas:
  - 1.5 Numbers and number sense;
  - 1.6 Measurement;
  - 1.7 Geometry;
  - 1.8 Patterns and algebra; and
  - 1.9 Probability and statistics?
4. Do the student's profile, perceived teacher's teaching strategies and utilization of instructional materials that significantly influence the perceived difficulties of K-12 Mathematics Curriculum among grade 7 students?

## Hypothesis

Based on the problem presented above, a hypothesis was formulated:

**H<sub>01</sub>:** Students-teachers' factors and utilization of instructional materials do not significantly influence the perceived difficulties of K-12 Mathematics Curriculum in the grade 7 students of Agusan National High School.

## II. Theoretical and Conceptual Framework of the Study

This study is anchored on the theory of Jerome Bruner about learning is an active and dynamic process in which learners construct new ideas or concepts based upon their current/past knowledge. A learner is a purposive participant in the knowledge getting process that selects structures, retains, and transforms information.

Moreover, this study was supported by the concept of K to 12 Basic Education Curriculum specifically on K to 10 Mathematics Curriculum. The adoption of the new curriculum (K-12) is said to enhance the quality of basic education in the country. This is in fact in line with Article XIV, Section 2(1) of the 1987 Philippine Constitution which states that "The State shall establish, maintain, and support a complete, adequate, and integrated system of education relevant to the needs of the people and society."

Additionally, the K to 10 Mathematics Curriculum provides a solid foundation for Mathematics at Grades 11 to 12. It has composed of five content areas which are: (1) Numbers and Number Sense; (2) Measurement; (3) Geometry; (4) Patterns and Algebra; (5) Probability and Statistics.

Numbers and Number Sense as a strand include concepts of numbers, properties, operations, estimation, and their applications. Measurement as a strand includes the use of numbers and measures to describe, understand, and compare mathematical and concrete objects. It focuses on attributes such as length, mass and weight, capacity, time, money, and temperature, as well as applications involving perimeter, area, surface area, volume, and angle measure. Geometry as a strand includes properties of two- and three-dimensional figures and their relationships, spatial visualization, reasoning, and geometric modelling and proofs. Patterns and Algebra as a strand studies patterns, relationships, and changes among shapes and quantities. It includes the use of algebraic notations and symbols, equations, and most importantly, functions, to represent and analyze relationships. Statistics and Probability as a strand is all about developing skills in collecting and organizing data using charts, tables, and graphs; understanding, analyzing and interpreting data; dealing with uncertainty; and making predictions about outcomes.

In which, these areas are being taught all at the same time as opposed to the discipline-based Mathematics in the old curriculum (Basic Education Curriculum). Moreover, each content areas consist different learning competencies that designed to meet the objectives of the K-12 Mathematics curriculum.

Indeed, this study anchored on the concept that the teacher and the students are the contributory factors influencing the difficulties of the students in the K-12 curriculum. This further theorized some specific variables under the teacher and students' factors such as students' profile consisting of Grade-VI math grade which implies the students' performance in math and types of school graduated in elementary; student's leaning styles; student's study habits; teacher's teaching strategy; and teacher's utilization of instructional materials as mainly conceived that these influenced the difficulties of the students in the five content areas with selected learning competencies in K-12 Mathematics curriculum. Thus, according to Santos (2007), we need to know about students experiences along the way- about the curricula, teaching and kind of student effort that lead to particular outcomes.

### Research Paradigm

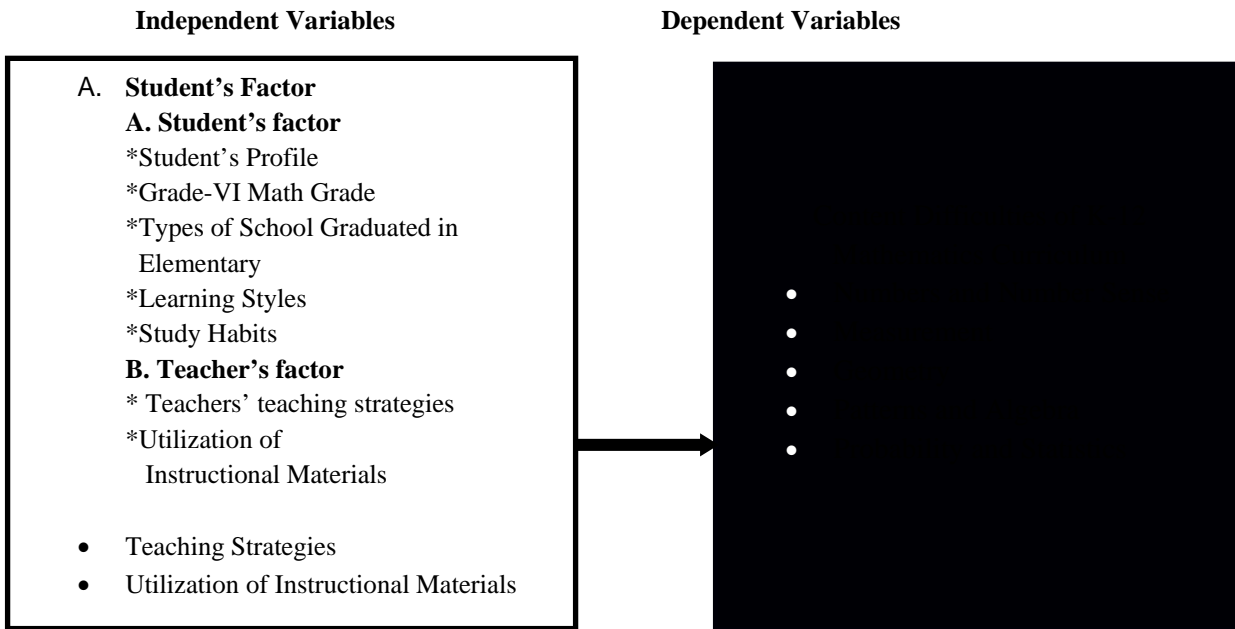


Figure 1. Schematic diagram showing the dependent and independent variables of the study.

## III. Research Methodology

### Research Design

The descriptive research design was used in this study in order to obtain the main objectives of the study. The descriptive method is basically a technique of quantitative description of the general characteristic of data elicited from the respondents. It served to present the appropriate information on the perceived difficulties of K-12 mathematics curriculum of the Grade 7 students.

### Research Locale

This study was conducted in Agusan National High School located at the city proper of Butuan, Caraga Region, Philippines which is 550 meters from the Guingona Park. Perhaps, it takes only 3 minutes to travel through multi-cab or motorcycle from the park to arrive at the said school. The school cite was bounded on the west by Barangay Golden Ribbon; on the north by Butuan Central Elementary School; on the south on Duranggo street; and on the east by Barangay Agao. The figure 2 shows the Map of Agusan National High School.

### Population and Participants of the Study

The respondents of this study were the Grade 7 students of Agusan National High School who were officially enrolled in the S.Y 2016-2017. The total population of Grade-VII students comprises with Science section, crack section, Heterogeneous section and

Special Program section is 2,221. Out of 2,221 grade 7 students, ten percent was taken for the sample size. Hence, selected 222 students were selected from heterogeneous section were taken as the sample of the study to answer the validated questionnaire.

### Sampling Design

This study utilized convenience random sampling design. The researchers selected from the list of the grade 7 sections of Agusan National High School as guide to determine the heterogeneous section where the students are vary. From the heterogeneous section, the researchers randomly selected the 222 students to represent the ten percent of the total population of the said grade level or as the sample of the study.

### Research Instrument

The questionnaire checklist was used as the research instrument of this study. The research instrument composed of three questionnaire checklist such as:

(1) Part I is the profile of the Grade 7 students in terms of Math grade in Grade 6 and types of school graduated in Elementary.

(2) Part II is about how much the students agree or disagree of each statement given in terms of:students' learning styles, students' study habits, teacher's teaching strategies and teacher's utilized instructional materials.

(3) Part III is about how difficult for the students is each of the question of K-12 Mathematics Curriculum in terms of the five content areas.

The participants were asked to choose their preferred response by checking the appropriate column that indicates their choice based on their personal feelings and decisions. The questionnaire had questions based on the selected learning competencies of each content area in the K-12 Mathematics Curriculum.

### Validation and Reliability of the Research

The Three-questionnaire checklists was prepared by the researchers and submitted to the experts for validation purposes. It was then pilot test to grade 7 students twice from two different school. First in Butuan City School of Arts and Trade (BCSAT) and another in Los Angeles National High School. The results of both schools were subjected for reliability index using the Cronbach Alpha. The reliability index of 0.830 and 0.870 were obtained.

### Data Gathering Procedure

Permission was secured from the school principal of Agusan National High School before administering the survey questionnaire. The researchers personally administered the distribution of questionnaire with the assistance of the respective advisers. During the actual distribution, the researchers gave a brief orientation to the respondents in order to obtain the accurate answers. After the brief orientation, the respondents were given 15 to 25 minutes to answer the survey questionnaire.

The retrieval of the questionnaire was done right after the respondent answered all the items or questions. The responses were scored, tallied and tabulated for statistical analysis.

### Scoring and Quantification of Data

The following qualification scales were used in scoring and quantifying of data. These might serve as the basis for the interpretation on the result of the study.

1. Math Grade in Grade VI

Scale	Range	Interpretation
4	90-100	Outstanding
3	85-89	Very Good
2	80-84	Good
1	75-79	Poor

2. Types of School graduated in Elementary

Scale	Description
2	Private
1	Public

3. Students' Learning Styles

Numerical Rating	Verbal Description	Mean Ranges	Interpretation
5	Strongly Agree	4.51-5.0	Very High
4	Agree	3.51-4.50	High
3	Neutral	2.51-3.50	Moderate
2	Disagree	1.51-2.50	Low
1	Strongly Disagree	1.0 -1.50	Very Low

4. Students' Study Habits

Numerical Rating	Verbal Description	Mean Ranges	Interpretation
5	Strongly Agree	4.51-5.0	Very Good
4	Agree	3.51-4.50	Good
3	Neutral	2.51-3.50	Fairly Good
2	Disagree	1.51-2.50	Bad
1	Strongly Disagree	1.0 -1.50	Very Bad

5. Teachers' teaching strategies

Numerical Rating	Verbal Description	Mean Ranges	Interpretation
5	Strongly Agree	4.51-5.0	Very Competent
4	Agree	3.51-4.50	Competent
3	Neutral	2.51-3.50	Fairly Competent
2	Disagree	1.51-2.50	Incompetent
1	Strongly Disagree	1.0 -1.50	Very Incompetent

6. Teachers' utilization of Instructional Materials

Numerical Rating	Verbal Description	Mean Ranges	Interpretation
5	Strongly Agree	4.51-5.0	Very Adequate
4	Agree	3.51-4.50	Adequate
3	Neutral	2.51-3.50	Fairly Adequate
2	Disagree	1.51-2.50	Inadequate
1	Strongly Disagree	1.0 -1.50	Very Inadequate

7. Perceived Difficulties of K-12 Mathematics Curriculum of Grade-VII students in the five content areas

Scale	Verbal Description
5	Very Difficult
4	Difficult
3	Moderately Difficult
2	Slightly Difficult
1	Not Difficult

**Statistical Treatment**

The data gathered was compiled, sorted out, organized and tabulated. The same would be subjected to statistical treatment to facilitate the presentation, analysis and interpretation.

These following statistical tools were employed in the study.

1. Percentage Computation was used to determine the number of students in terms of academic performance specifically on math grade of the respondents during Grade-6 and the type of school they graduated in elementary. At the same time, the perceived difficulties in K-12 Mathematics Curriculum of grade 7 students in terms of the five content areas.
2. Weighted mean was used to determine the students' learning styles, students' study habits, teacher's teaching strategies and teacher's utilization of instructional materials that can contribute to the content difficulties of K-12 Mathematics.
3. Pearson Correlation was used to determine the significant influence of independent variable such as the students' profile of Math VI grade, learning style, study habits, teachers' teaching strategies, and utilization of instructional materials to the dependent variable such as the content difficulties of 5 content areas in the K-12 Mathematics Curriculum.

#### IV. Presentation, Analysis and Interpretation of Data

Figure 1. The Percentage Distribution of the Respondents' Math Grade in Grade VI

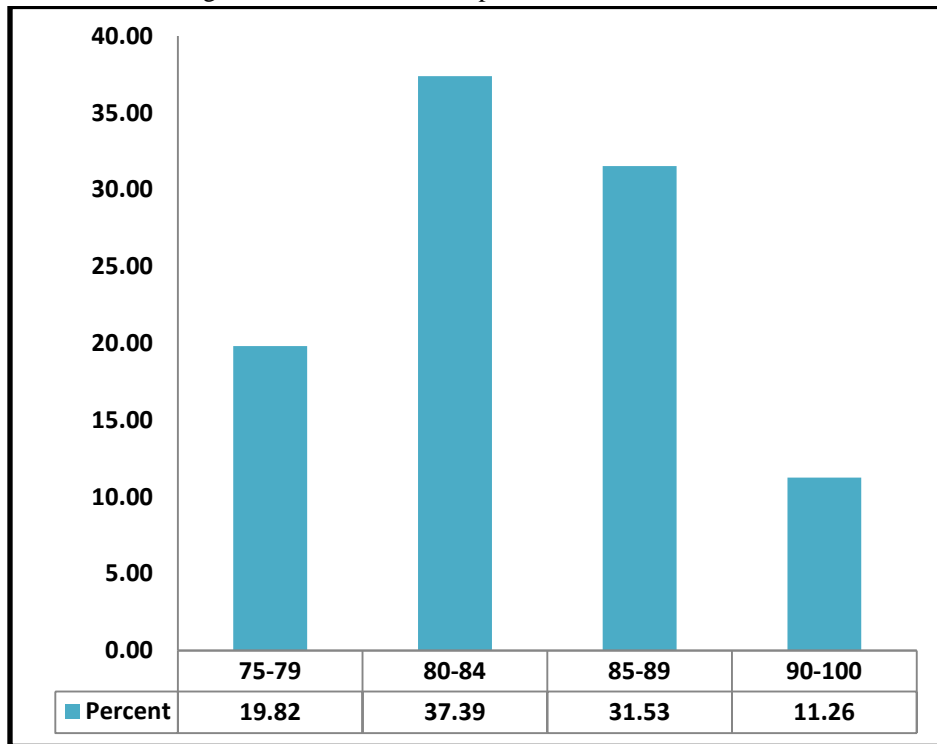
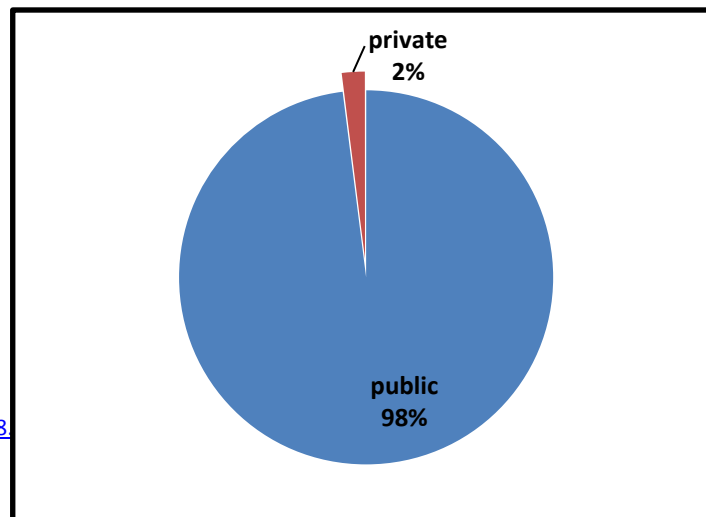


Figure 1 shows that there are 37.39 percent or 83 respondents who have math grade in grade VI from 80-84 that can be interpreted as good. However, there are only 11.26 percent or 25 of them who have the grade from 90-100 that can be interpreted as outstanding. This implies that most of the respondents of the study have good performance in mathematics on their previous grade and only few of them who have outstanding mathematics performance.

Figure 2. The Percentage School Graduated in



Distribution of Respondents' Elementary

Figure 2 shows that there are 98 percent or 218 respondents are graduated from public school and only 2 percent of them are graduated from private school. This means that majority of the respondents are graduated from public schools.

**Table 1. Correlation Analysis between the independent variable and dependent variable**

Factors	Statistic	Mathematical Competencies				
		Numbers and Number Sense	Measurement	Geometry	Patterns and Algebra	Probability and Statistics
Grade-VI Math Grade	Pearson Correlation	0.14	0.27	-0.07	0.24	0.20
	P-Value	<b>0.03</b>	<b>0.00</b>	<b>0.33</b>	<b>0.00</b>	<b>0.00</b>
Students' Learning Style	Pearson Correlation	0.19	0.31	0.11	0.26	0.18
	P-value	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.00</b>	<b>0.00</b>
Students' Study Habit	Pearson Correlation	0.19	0.21	0.16	0.17	0.11
	P-value	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>
Teacher's Teaching Strategies	Pearson Correlation	0.26	0.33	0.16	0.36	0.12
	P-value	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>	<b>0.00</b>	<b>0.08</b>
Teacher's Utilized Instructional Materials	Pearson Correlation	0.25	0.34	0.13	0.32	0.17
	P-Value	<b>0.00</b>	<b>0.00</b>	<b>0.06</b>	<b>0.00</b>	<b>0.01</b>

\*Interpretation of Pearson correlation (r): below-0.04= low correlation; 0.41-0.69= moderate correlation; 0.70- above= high correlation

\*P- Value Interpretation: less than 0.05= significant; greater than 0.05= not significant

Table 10 shows the correlation analysis between the independent variables and the dependent variable. As shown in the table, the respondents' math grade in Grade VI have positive low correlation to all mathematical competencies except geometry. In the same manner, it have significant influence to all mathematical competencies except geometry. This implies that the perceived difficulties of all the mathematical competencies, except geometry, of the grade 7 students are lowly affected by the students' mathematical intelligence determined by their math grade in Grade VI.

Moreover, students' learning style have positive low correlation to all mathematical competencies. Also, it have significant influence to all mathematical competencies. This implies that the perceived difficulties of all the mathematical competencies of the grade 7 students are slightly affected by the different ways of learning of the students determined through their learning styles. Sulit



(2005) states that students can learn any subject matter when they are taught with methods and approaches responsive to their learning style strengths.

Similarly, students' study habit have positive low correlation to all the mathematical competencies. It also have significant influence to all mathematical competencies. This indicates that the study habit of the students is a contributory factor to the perceived difficulties of all the mathematical competencies of the grade 7 students.

Moreover, teacher's teaching strategies have positive low correlation to all the mathematical competencies except probability and statistics. In the same case, it have significant influence to all mathematical competencies except probability and statistics. This signifies that the perceived difficulties of all the mathematical competencies, except probability and statistics, of the grade 7 students are lowly affected by various teaching strategies practiced by the teacher. According to Duze (2012), the effectiveness of the curriculum relies on the teacher's knowledge about the curriculum and his/her teaching strategies.

Lastly, teacher's utilized instructional materials have positive low correlation to all mathematical competencies except geometry. Then, it also have significant influence to all mathematical competencies except geometry. This implies that the perceived difficulties of all the mathematical competencies of the grade 7 students are slightly affected by the utilization of instructional materials of the teacher.

Therefore, the null hypothesis which states that students-teachers' factors and utilization of instructional material do not significantly influence the perceived difficulties of K-12 Mathematics Curriculum in the grade 7 students of ANHS is rejected. Indeed, Onwumere (2009) states that every individual is unique and learns in particular way. This implies that any teaching which does not take into account student limiting factors for learning rarely succeeds. Teachers who understand the learning needs of their students are more empowered to provide the kind of instruction their students need. Knowing why a student is struggling to learn provides a basis for understanding why particular strategy or approaches are effective for him or her. Consequently, this signify that the students, teachers and utilization of instructional materials are contributory factors that significantly influence the perceived difficulties of K-12 mathematics curriculum in Grade 7 students of ANHS.

## V. Conclusions

Based on the finding of this study the following conclusions are drawn.

The Grade 7 students in Agusan National High school are found that their performance in Mathematics are good based on their Math grades in Grade 6 and majority of them are graduated in elementary at public schools. Thus, the respondents have a good mathematical intelligence and they have deep understanding in the concepts of mathematics.

Also, there is no problem of their preferable learning styles since they are multi-learners and they have good study habits as well. Thus, highly different learning styles and good study habits have influenced the perceived difficulties in the different content areas in K-12 math. In addition, the teachers are competent in their teaching strategies which means that they practice various strategies in teaching and adequate in utilizing instructional materials particularly in hand-outs' photocopy from the textbook.

Finally, the difficulty of K-12 Mathematics Curriculum in the five (5) content areas with selected learning competencies is perceived with having different levels of difficulties. In which, Number and Number Sense, Measurement and Geometry are slightly difficult while Patterns and Algebra and Probability and statistics are moderately difficult, that is, it is significantly influenced by the students- teachers' factors and utilization of instructional material such as students' Math grade in their Grade-VI, student's leaning styles, student's study habits, teachers' teaching strategy; and teacher's utilized instructional materials.

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