

Students' Mathematical Skills and Performance

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Abstract— *The ability to develop, apply, and interpret Mathematics to solve issues in a range of real-world contexts is known as skills in Mathematics. This study was undertaken to identify the level of the students' Mathematical skills; reasoning, communication, and ability to solve Mathematical problems and competencies, and performance. The study was conducted at the Schools in Alubijid West District with one hundred seventy-five (175) grade 7 students as actual respondents. The study employed descriptive survey research method which includes quantitative approach in collecting numerical data through questionnaire. Additionally, it utilized the mean, standard deviation, and frequency and percentage distribution. The link between the variables was also determined using the Pearson product-moment correlation coefficient. The result shows that Students' Mathematical Skills on reasoning was found on High Level while Mathematical Ability to Solve Problem and Competencies were found on Moderate Level. It was concluded that Mathematical Skills is significantly correlated to Mathematics Performance. Thus, it must be given consideration and attention. The researcher recommends that the students should develop Mathematical Skills and teachers should be trained for additional teaching strategies.*

Keywords— *Mathematical Performance: Mathematical Skills: Students.*

I. INTRODUCTION

The ability to develop, apply, and interpret Mathematics to solve issues in a range of real-world contexts is known as skills in Mathematics. It contains ideas, methods, information, and resources that can be used to define, clarify, and evaluate phenomena. It enables people to understand the role that Mathematics plays in the world and to form the sound conclusions and choices that 21st Century citizens who are productive, involved, and reflective need to make. Skills play a very vital role in a Mathematics classroom. It is necessary in order for teachers to help students to make connections between the various Mathematical concepts and the terminology associated with those concepts.

The study of patterns and correlations is Mathematics (Admin, 2023). The definition of Mathematics is given as the "Science of space, patterns, change, relationships, number, quantity, and arrangement," and it typically employs Mathematical system in its methods. Mathematical reasoning and abstract concepts are at the core of the subject. There are numerous symbols, patterns, formulas, rules, calculations, and equations used in Mathematics. Number and Algebra, measurement and Geometry, and Statistics and Probability make up the three branches of Mathematics. Typically, Mathemate is taught in a classroom setting.

The quality of education in the Philippines was questioned in 2019 due to Filipino students' poor performance in national

and international assessments of student success. Even if the outcomes were unsatisfactory, the Department of Education (DepEd) saw a bright spot: this will serve as a wake-up call for all parties involved in education to work together in order to reach one common goal: quality education for every student.

In addition, DepEd also released the most recent PISA results from the Organization for Economic Co-operation and Development (OECD), in which Filipino students scored at the bottom in Science and Mathematics and last overall among the 79 participating nations. PISA is an international evaluation given every three years to a representative sample of 15-year-old students in order to assess their level of competency in Reading, Science, and Mathematics. There were worrying indications of an education crisis in the Philippines even before the pandemic. This result speaks of a need to identify specific determinants of students' poor performance in Mathematics. The country's participants performed the worst among the 58 nations taking part in the Trends in International Mathematics and Science Study (TIMSS) 2019 report, which was another international test. The decline from 2013 to 2019 was evident. Even though the PISA 2018 findings were disappointing, DepEd views them as a beginning point for determining where Filipino students are at the moment. By taking part in PISA, DepEd "takes advantage of an exam designed and continuously updated by education professionals around the world to supplement its own national assessment.

Since there have been schools, teachers have used a variety of tests to assess students' understanding of the topic, their level of learning, and the effectiveness of their instruction. The reasons for testing, however, serve a variety of important functions, including identifying students' individual strengths and weaknesses, putting more emphasis on learning and instruction on requirements and key concepts, inspiring students to improve their performance and assessment for the acknowledgment of high schools and colleges, and assessing the effectiveness of school activities and suggesting changes inside of a classroom (Astriani, et al, 2017). Teachers can create meaningful learning objectives and present them in a way that promotes students' resilience and long-term success in a classroom environment that encourages a growth mindset. Some teachers make students' progress explicit by giving pre-tests at the beginning of a unit that purposely covers materials that students do not know. Students learn that they can grow smarter with practice when they contrast their unavoidably subpar performance on these pre-tests with their increased performance on unit post-tests (Almond, 2022).

Mathematical skills are essential for comprehending many concepts, including Mathematics. The growth of Mathematical competence depends on using and mastering the Mathematics language. The growth, knowledge, and aptitude of students in Mathematics are significantly influenced by their Mathematics skills. For some learners, Mathematics can sound like a different language. Mathematics is unlike any other language that learners are familiar with since it includes vocabulary words as well as symbols, numbers, and figures. In daily life, many of the vocabulary words used in Mathematics are rarely used. As a result, the learners typically only hear these words in their Mathematics classes.

Moreover, there are many challenges for students in their learning of the language of Mathematics. The ability to effectively communicate through the language of Mathematics requires Mathematical understanding. Many students struggle with some or all of the important Mathematical concepts. Developing skills in Mathematical reasoning can help greatly to students general critical thinking skills. It is also essential for becoming proficient in Mathematics and being able to answer questions regarding Mathematics.

Communication is an essential part of Mathematics and Mathematical education. It is a method for sharing ideas and making comprehension evident. Through communication, ideas become topics of reflection, improving the purpose of discussions and revisions. Understanding vocabulary is a key component of general comprehension in many subject areas, including Mathematics (Bulos, 2021). There are many well-established and effective strategies for teaching vocabulary across all subject areas.

The growth of Mathematical proficiency depends on the teaching and learning of the Mathematical language. Learning Mathematical vocabulary is an important factor of students' language development and, ultimately, of their Mathematical performance (Almond, 2022). The importance of problem-solving in learning Mathematics starts from the idea that Mathematics is mostly about reasoning, not memorizing. Instead than memorizing and using a set of procedures, problem-solving allows students to develop understanding and describe the processes used to arrive at solutions. Thus, with the above premise, the researcher is interested to investigate in the Mathematical skills and Mathematical performance being learned and acquired by the learners.

This study was anchored on Abraham Maslow's Hierarchy of Needs as cited by Aruma and Hanachor (2017) that the lower need in the hierarchy must be satisfied first before trying to satisfy higher-level needs. Learning Mathematics implies that everything should start from the basics before going to the most complex problems. Mastery of the basic concepts is definitely a must so that an individual will have better chances of solving higher or many more difficult problems.

Additionally, this was also anchored on Gardner's Theory of Multiple Intelligences. Individuals do not have all of their potential intelligence at birth, according to Howard Gardner's theory of multiple intelligences. The idea that there is just one sort of intelligence, commonly abbreviated "g" for general intelligence and focusing solely on cognitive abilities, was

challenged by this concept. Linguistic, Logical/Mathematical, Spatial, Bodily-Kinesthetic, Musical, Interpersonal, Intrapersonal, and Naturalist are the eight forms of intelligence that Gardner identified in order to widen this concept of intelligence. According to Gardner, the modalities that are most highly valued in education and society are linguistic and logical-Mathematical (Michele, 2020).

Both writers agree that teaching and learning techniques can be used to help children develop their talents and interests. The teacher must utilize a variety of techniques that are complementary to the subject matter and to each student's unique learning ability and personality because the method is evident in the child's very character. Additionally, they agree that rather than focusing solely on the memorization of data, teachers should instead employ strategies that encourage students' higher-level thinking. Gardner only provides broad principles that let educators devise a wide range of methods to promote the growth of various bits of intelligence. His theory is that many students do not demonstrate their strengths in other areas because traditional teaching prioritizes approaches that encourage language and mathematical-logical intelligence.

II. METHODOLOGY

A. Research Design

The study's design used descriptive-correlational research design that investigated the students' Mathematical skills and Mathematics performance of Grade 7 students of Alubijid West District Schools. This is a non-experimental study of the significance of the variables with the help of statistical analysis.

This study employed a descriptive-correlational research design to characterize the variables and the interactions that naturally exist between and among them. Since it was descriptive, it helped gather information about the present existing condition. This research was carried out to measure two variables. The goal of this design was to investigate relationships between variables without the research controlling or manipulating any of them. Moreover, documentary analysis was also done to gather the data for the students' performance in Mathematics (Bulos, 2021).

B. Respondents and Sampling Procedure

The participants of this study were the one hundred seventy-five (175) Grade 7 students from Alubijid West District which included Sungay, Taparak, Sampatulog Integrated School and Lourdes Alubijid National High Schools for the school year 2022-2023. The researcher utilized purposive sampling as it took all the possible respondents for this study considering that the selected schools are in the hinterlands wherein its number of students is small compared to those in big schools and school located in much accessible places.

C. Statistical Treatment

Descriptive statistics such as frequency, percentage, mean, and standard deviation were employed to describe the study's variables. In addition, the Pearson Product Moment

Correlation Coefficient (r) was utilized to determine the significant relationship between Students’ Mathematical Skills and Mathematics Performance.

III. RESULTS AND DISCUSSION

Problem 1. What is the students’ level of Mathematical Skills in terms of:

- 1.1 Reasoning;
- 1.2 Communication;
- 1.3 Ability to Solve Problems; and
- 1.4 Competencies?

TABLE 1. Overall Students’ Mathematical Skills

Variables	Mean	SD	Description	Interpretation
Mathematical Reasoning	3.55	0.88	Agree	High
Mathematical Communication	3.40	0.75	Agree	High
Mathematical Ability to Solve Problems	3.35	0.74	Moderately Agree	Moderately High
Mathematics competencies	3.36	0.72	Moderately Agree	Moderately High
Overall Mean	3.42	0.77	Agree	High
Note:	4.20-5.00 Very High 1.80-2.59 Low	3.40-4.19 High 1.00-1.79 Very Low	2.60-3.39 Moderately High	

Table 1 presents overall students’ Mathematical skills. It registered an overall mean of 3.42 with SD=0.77 described as agree and with interpretation of high. This implies that the students’ level of Mathematical Skills on Reasoning and Communication is at High level while Ability to Solve Problems and Competencies is at Moderate level. The students still have room to improve on specially that they did not reach the highest level of skills which are the skill on mathematical ability to solve problem and mathematics competencies. Moreover, teachers should provide resources and activities to ensure that students can improve their least improved skills and continue to value the importance of Mathematics.

Mathematical skills assist people in managing simple, everyday tasks, such as paying bills and arriving to work on time. These skills are taught to students in the classroom, and when they grow older and land a job, they usually use them more frequently. Mathematical skills are vital for the workplace and personal life. Regardless of the size of the organization or its field, everyone who works must be able to perform basic math operations. These skills prove valuable in unexpected places as well (Indeed Editorial Team, 2023).

In the same table, the highest Mathematical skill is on reasoning with the mean score of 3.55 and SD=0.88 which is described as Agree and with the interpretation of High level. This means that the students were able to acquire Mathematical skills on reasoning. This means that the reasoning skill of the student is well-developed. Developing skills in reasoning can help immensely to students general critical thinking skills. It is also crucial for becoming knowledgeable in Mathematics and being able to answer inquiries related Mathematics. Reasoning has become of increasing importance in Mathematics education. It has become part of educational programs and the numbers of real-world investigations are increasing. Reasoning is an important

topic in Mathematics instruction—both in studies and practical applications (Herbert, 2021).

Meanwhile, the lowest Mathematical skill is the Ability to Solve Problems with the mean of 3.35 with SD=0.74 which is described as Moderately Agree and interpreted as Moderately High. This implies that the students have only Moderate level of Ability to Solve Problems. This means that Mathematical skill on ability to solve problem need to be improved. Students should have the skills to solve problems. Problem-solving teaches students how to use their understanding and skills in Mathematics to solve real-world problems. Word problem solving is one of the essential elements of Mathematical problem-solving that integrates applications with real-world problems (Shah, 2022).

Problem 2. What is the students’ level of Mathematics Performance for the First Quarter of School Year 2022-2023?

TABLE 2. Students’ Mathematics Performance

Level of Mathematics Performance	F	P
Outstanding	26	16
Very Satisfactory	49	28
Satisfactory	85	48.57
Fairly Satisfactory	13	7.43
Did not meet Expectations	0	0
Total	175	100
Note:	90-100 Outstanding 75-79 Fairly Satisfactory	85-89 Very Satisfactory Below 75 Did not meet Expectations

Table 2 presents students’ level of Mathematics Performance. It shows that 85 at 48.57% out of 175 students are at the Satisfactory level. It is the level which most of the students belong to. This implies that students really achieved the learning competencies for the First Quarter. They attained the goal satisfactorily. However, it is not the highest level of performance. Learning is still achieved (Gálvez & Toro, 2018). Only a few of the students got the higher level of performance which are the Outstanding (26) and Very Satisfactory (49).

Based on the Table, there are students who got the Fairly Satisfactory (13). This level of performance is lesser than Satisfactory. This means that students still need mastery over these Mathematical Skills. It is important to fill in this gap in the teaching-learning process. It is important to fill in this gap in the teaching-learning process. Cresswell and Speelman (2020) claimed that studying and mastering Mathematics can help students think logically, critically, analytically, and abstractly. Fundamental concepts in Mathematics such as the ability to think critically, make connections between occurrences, reason, estimate, and solve problems in addition to learning how to calculate and teaching Mathematical concepts (Umay et al., 2017). In addition, Mathematics plays a helpful role in comprehending and mastering further fields of Science and Art (Siaw et al., 2020).

Problem 3. Is there a significant relationship between students’ Mathematical skills and Performance?

TABLE 3. Test Correlation on Level of Math Skills and Math Performance

Variables	Mean	SD	r-value	P-value	Interpretation	Decision
Reasoning	3.55	0.88	0.508	0.011	Significant	Reject Ho
Communication	3.40	0.75	0.562	0.001	Significant	Reject Ho
Ability to Solve Problems	3.35	0.74	0.714	0.000	Significant	Reject Ho
Competencies	3.36	0.72	0.701	0.000	Significant	Reject Ho

Table 3 presents Test Correlation on Level of Mathematical Skills and Mathematics Performance. Mathematical Skills showed significant correlation on Reasoning with r-value of 0.508 (p-value = 0.011). This implies that Mathematical skills on Reasoning have significant relationship to the Mathematics Performance. This means that if students are good at reasoning, their Mathematics Performance. Students' general critical thinking abilities can benefit greatly from developing their mathematical reasoning abilities. It is also crucial to become knowledgeable in Mathematics and being able to answer inquiries related to Mathematics. Mathematical reasoning has become increasing importance in Mathematics education. It has become part of educational programs and the numbers of real-world investigations are increasing. Mathematical reasoning is an important topic in Mathematics instruction—both in studies and practical applications (Admin, 2023).

Mathematical Skills showed significant correlation on Communication also with r-value of 0.562 (p-value = 0.001). This implies that Mathematical skills on Communication have significant correlation on their Mathematics Performance. The foundation of Mathematical learning is communication. From the perspective of multi-literacy, Mathematics in the classroom is a written work that students will interpret (Tiffany et al., 2017). The term "Mathematical Communication skills" refers to the ability of students to organize and connect their Mathematical thinking through communication, to express their logical and clear Mathematical thinking to friends, teachers, and others, to analyze and evaluate the Mathematical thinking and strategies used by others, and to use mathematical language to express their ideas accurately (Rohid & Rusmawati, 2019).

Mathematical skills also showed significant correlation on Mathematical Ability to Solve Problems with r-value of 0.714 (p-value = 0.000). This implies that Mathematical skills on Mathematical Ability to Solve Problem have significant correlation on their Mathematics Performance. Mathematical problem-solving fosters the growth of the capacity for creative, critical, and rational thinking. One essential talent that everyone should possess is problem-solving. Students learn how to apply their Mathematical expertise and abilities to real-world problems through problem-solving in Mathematics. One of the essential components of Mathematical problem-solving is word problems, which integrate applications and real-world issues (Osman et al., 2018).

Mathematical skills showed significant correlation on Competencies with r-value of 0.701 (p-value = 0.000). This

implies that Mathematical skills on Competencies to Solve Problem have significant correlation on their Mathematics Performance. Mathematics is a subject that all students should study since it can aid in the development of reasoning and critical thinking skills. Knowledge, comprehension, application, use, and opinion of Mathematics and Mathematical activity in a range of circumstances where mathematics plays or can play a role are all components of mathematical competence (Niss & Højgaard, 2019).

All of which were significant at 0.05 level of significance. The null hypothesis of no significant correlation is rejected. This implies that Mathematical skills have significant correlation on Mathematics Performance. Thus, this implies that students' Mathematical Skills have a significant relationship on their Mathematics Performance.

Students' mastery in Mathematics can be measured through their Mathematics Performance. Mathematics Performance, according to Gopal et al (2021) is the knowledge learned as assessed by a teacher's evaluations and/or educational goals set by students and teachers to be achieved over a specified period of time. It is indicated in their study that mathematics performance measures education outcome and emphasized that it demonstrates and assesses the amount to which a school, teachers, and students have met their educational goals.

Students should acquire these Mathematical skills to be able to achieve Very satisfactory or Outstanding Mathematics performance. According to Kumar et al. (2021), the academic success or failure of any academic institution is determined by the performance of the students. Student academic achievement has a direct bearing on a nation's socioeconomic progress. Thus, if there are more outstanding students it is the result of outstanding educational system and outstanding economic progress.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the findings of this study, the following are concluded:

1. The students' levels in Mathematical skills were at high level.
2. The students' level in Mathematics performance was at a satisfactory level. This indicates that all of the respondents did pass their first quarter final assessment but still need interventions and remedial activities.
3. The students' Mathematical skills were significantly correlated to their Mathematical performance. Therefore, the null hypothesis is rejected.

Recommendations

Based on the findings and conclusions of the study, the following are recommended;

1. Though the students' Mathematical skills are high, it is good to have more training to Mathematics teachers to enhance their instructional skills in order to improve the students' level of Mathematical skills from high to higher level.

2. Teachers should use higher order thinking skills (HOTS) strategies, activities, innovations and motivations to address the needs of the students especially those that are still in fairly satisfactory level which can be at risk of failing the subject.
3. Students' Mathematical skills are correlated to their Mathematical performance. Therefore, teachers and parents may collaborate on making follow-up on assignments and may provide activities that can enhance both Mathematical skills to improve Mathematical Performance.
4. Future researchers may use a wider scope of respondents from other School District for results and findings confirmation as well as much deeper understandings.

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