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Academic Performance and Numeracy Level of Grade 10 Students in Mathematics

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Abstract: ***The main purpose of this study is to determine the Academic Performance and Numeracy Level of Grade 10 students in Mathematics. Specifically the numeracy level along Integers, Fractions, Decimals, Algebraic expressions, and Ratio and Proportion in the standardized numeracy assessment tool of grade 10 students at San Juan National High School for the S. Y.2021-2022. The respondents of the study were the 110 students or the total population of the grade 10 who took limited face-to-face instruction. The Mean Performance of the grade 10 students in Mathematics belongs to the bracket of 80-84. This result belongs to satisfactory performance meaning their performance is not bad but average performance. It implies that students' Academic performance in Mathematics needs to be improved in most of the competencies in Mathematics 10. The number of numerates in integers is 41 out of 110 or 37.27% of the respondents and the moderately numerates is 56 out of 110 or 50.91% while the non-numerates is 13 or 11.82%. The number of numerates in fractions is 42 out of 110 or 38.18% of the respondents and the moderately numerates is 49 out of 110 or 44.55% while the non-numerates is 19 or 17.27%. The number of numerates in decimals is 69 out of 110 or 62.73% of the respondents and the moderately numerates is 36 out of 110 or 32.72% while the non-numerates is 5 or 4.55%. The number of numerates in algebraic expressions are 47 out of 110 or 42.73% of the respondents and the moderately numerates are 40 out of 110 or 36.36% while the non-numerates are 23 or 20.91%. And the number of numerates in Ratio and Proportion is 15 out of 110 or 13.64% of the respondents and the moderately numerates is 62 out of 110 or 56.36% while the non-numerates is 33 or 30%. Based from the results it shows that some of the students fall under Numerates which means that those students performed well in the topics identified in the assessment tool, but there are still some students who fall under moderately numerates which means that they still need enhancement activities because they incurred mistakes on those topics. And those who fall under non-numerates means that they need intervention to improve their numeracy level in the identified topics, the result implies that they don't clearly understand the concept. There may be factors affecting their performance in Integers, Fractions, Decimals, Algebraic Expressions, Ratio and Proportion. Based on the findings, it can be concluded that the performance of the students belongs to the bracket of 80-84. This result belongs to satisfactory performance meaning their performance is not bad but average performance. There may have factors that affect students' performance specifically in integers, fractions, decimals, algebraic expressions, ratio and proportion. There is a significant relationship between the academic performance and numeracy level of grade 10 students. The numeracy level of the students has a role in their academic performance because numeracy assessment focuses on the application of mathematical concepts learned across multiple subjects from kindergarten to Grade 10. The researcher recommended that the teachers may conduct enhancement activities specifically in mathematics to help the learners master and improve the numeracy skills of grade 10 students. Design training and workshops to the teachers in secondary to improve the new techniques in teaching numeracy to the students. Training and seminar workshop should impose to the students in order for them to alleviate their performance in Mathematics as a whole. Research parallel to this may also be conducted in other subjects and on wider scope.***

Keywords: Academic Performance, Numeracy Level

1. Introduction

Every student can learn, just not on the same day or the same way (George Evans). Learning Mathematics is not as easy as 1, 2, 3. Some students considered it as a difficult subject. Learners have their own way of learning concepts which is why, teachers should consider and/or address the needs and individual differences. If the needs and the individual differences of the students will not be considered and/or addressed, it will result to failure of teaching and learning process.

Teaching and learning process is a shared responsibility between the teacher and the learner. Learners must participate, involve and/or engage themselves in the learning process. There are a lot of factors that cause failure of teaching and learning process such as teacher, student, and environment factor. Teacher factor including the delivery of the lesson and the like. Learner factor like lack of interest, readiness and the like. And environmental factor such as socio-economic status of the family and the like.

Comprehension is an essential part of solving mathematical problems. Most of the learners can read mathematical problems but not all learners' possess reading comprehension. Poor in reading comprehension leads to poor performance level. The poor performance level of learners is one of the most challenging issues that the education sector should resolve or address.

The Academic Performance is the measurement of students' achievement across various academic subjects. Students' Academic Performance is being assess based on the Deped Order no.31 s.2020 " Interim Guidelines for Assessment and Grading in Light of the Basic Education Learning Continuity Plan" Students' academic achievement has a role in the success of the society. Students who do great in school have more chances of achieving occupational and economic success.

Numeracy skill is one of the fundamental skills that the learner must develop. From kindergarten to 6th grade in primary school, learners are being taught of the fundamental operations of adding, subtracting, multiplying and dividing. These skills are very important in our daily activities. It must be developed in the early stage and must be enhanced and strengthen along the secondary and tertiary school.

In the recent student assessment of 15-year-old learners across 79 countries done by the Organization for Economic Co-operation and Development (OECD), the Philippines ranked in the low 70s in the 2018 Programme for

International Student Assessment (PISA) in Mathematics and Science. This is very alarming because the number of non-numerates is increasing. As educators, we can innovate, make intervention programs, or create instructional materials to capacitate the students in the different mathematical skills.

The trends in International Mathematics and Science Study 2019 shows the Philippines scored significantly lower than any other country that participated in grade 4 math and science assessments. Filipino students lagged behind other countries in the international assessment for Mathematics and Science for grade 4 revealed by the Trends in International Mathematics and Science Study 2019 (TIMSS). In Mathematics, only 19% of Filipino students were on the Low benchmark, which means that they had "some basic mathematical knowledge, " while 81% did not even reach this level. Study says that "They can add, subtract, multiply and divide one-and two-digit whole numbers. They can solve simple word problems. They have some knowledge of simple fractions and common geometric shapes. Students can read and complete simple bar graphs and tables."

The Department of Education said that it welcomes the 2019 TIMSS results, saying that it "values the immense data it can offer" on literacy of students on Mathematics and Science. And said that participation in international assessments is a step forward towards addressing curriculum and learning gaps in the country's basic education. Deped also added that it will continue to reform and upgrade its education curriculum.

Being numerates means you have the confidence to use basic fundamental operations (4Fs) and problem solving to use basic concepts in understanding complex topics. Mastering these are the keys to understand and progress in Mathematics especially the complex topics like algebra. It is one of the main focus of the teachers along with the literacy since these two are the emerging problems of the Department of Education in the Philippines. (Gigante, 2020)

The Department of Education has its project called "Project (AN) All Numerates". It aims to improve the numeracy skills of all learners across grade levels and improve learning outcomes in Mathematics with the aid of intervention program and best practices that highly promote sustainable quality instruction of the K-12 Curriculum. It is undertaken every school year in all public schools to monitor numeracy skills acquired by the learners, and develop intervention program to improve the numeracy level of the learners. The project begins by administering pre-test in the last week of the month after the opening of the classes to assess the learners' numeracy level within a time limit and the post -test after the quarterly examination. If learner falls under non-numerates category that learner will undergo remediation/intervention program to improve numeracy level and learner falls under nearly numerates/moderately numerates learner will undergo remediation in the area in which they incurred mistakes.

It is very challenging to teach students other areas in Mathematics if they can't simply understand the basic fundamental operations. It is a challenge for the teachers on how to improve the numeracy level of the non-numerates students. There are varieties of intervention which teachers can offer, but it all depends on the type of learners that the teachers have.

In San Juan National High School, the students are experiencing difficulties in some concepts in Mathematics especially the Grade 10 students. As observed and experienced by the researcher and as a Mathematics teacher, most of the students are having difficulties in understanding concepts in Mathematics which results to a poor performance level and poor numeracy level. In connection with this, the researcher conducted remediation way back 2019 when the researcher taught grade 9 students in previous school year, the low performing grade 9 students were being taught of the least learned concepts/competencies every 12: 30 nn-1: 00 pm to enhance the skills in that particular competency. And this is also the reason why the researcher was motivated to pursue the study and know the numeracy level of the Grade 10 students along Integers, Fractions, Decimals, Algebraic expressions, Ratio and Proportion in the standardized numeracy assessment tool and its relationship to their academic performance level.

2. Statement of the Problem

This study aimed to determine the Academic Performance and Numeracy Level of Grade 10 students in Mathematics at San Juan National High School, Casiguran District II Division of Sorsogon, School Year 2021-2022.

Specifically, it sought answers to the following questions:

1) What is the Academic Performance of the Grade 10 students in Mathematics?
2) What is the Numeracy Level of the Grade 10 students along:
   a) Integers
   b) Fractions
   c) Decimals
   d) Algebraic expressions
   e) Ratio and Proportion
3) Is there a significant relationship between Academic Performance and Numeracy Level of the Grade 10 students?
4) What Simplified Learning Materials may be proposed based on the results of the study?

3. Methodology

3.1 Research Design

This study determined the Academic Performance and Numeracy Level of grade 10 students in Mathematics. Specifically the numeracy level along Integers, Fractions, Decimals, Algebraic expressions, and Ratio and Proportion in the standardized numeracy assessment tool of grade 10 students at San Juan National High School for the S. Y.2021-2022.

The descriptive-correlational method was employed in this research because it determined the relationship between Academic Performance in Mathematics and the Numeracy

Level along with then identified topics in the standardized numeracy assessment tool of the 110 grade 10 students who took limited face-to-face instruction were involved in this study those who took distance learning modality/modular learning were not included as respondents of the study. The statistical tools used in the study are frequency and Spearman rho.

The researcher prepared a letter to solicit approval from the school head before conducting the numeracy assessment to the grade 10 students of San Juan National High School for School Year 2021-2022. The researcher also ask permission to the parents/guardians of the learners before conducting the numeracy assessment.

To determine the Academic Performance of the students in Mathematics the researcher computed the final rating of the students based on the Deped Order no.31 s.2020 "Interim Guidelines for Assessment and Grading in Light of the Basic Education Learning Continuity Plan". After the numeracy assessment the results were tallied, tabulated and textually interpreted with accuracy and precision using the appropriate statistical tool which is the frequency count and also with the use of interpretation table presented in the data analysis procedure. Spearman rho was used to determine the relationship between Academic Performance and Numeracy Level of Grade 10 Students in Mathematics.

The Sample

Purposive sampling technique was employed in the study. The respondents of the study were the 110 students from four sections of the grade 10 students of San Juan National High School of S. Y.2021-2022 who attended the limited face-to-face instruction. There were 41 students from grade 10-freedom, 27 from grade 10-Justice, 26 were from grade 10-Perseverance and 16 were from grade 10-Valor. Students who took distance learning modality/modular learning were not involved in the study.

The Instrument

The Department of Education aims to improve the numeracy skills of the students. To help the Mathematics teachers and curriculum implementers get an idea about the numeracy skills and the level of the students in the four fundamental operations the Department of Education crafted the Standardized Numeracy assessment tool.

The researcher administered pre-test using the standardized numeracy assessment tool adopted from the Department of Education (DepEd) to gather the needed data to answer the questions that are being sought by the study. The standardized numeracy assessment tool is composed of twenty items which are all about the basic concepts and operations on integers, decimals, fractions, algebraic expressions, and ratio and proportion. The Standardized numeracy assessment tool is being used in all schools in the province of Sorsogon.

Data Collection Procedures

The researcher prepared a request letter addressed to the school head where the researcher conducted the study. Upon approval, the researcher administered the Numeracy assessment to the target respondents in the fourth week of May 2022 with the help of grade 10 teacher advisers.

Prior to the actual administration of the numeracy test the students were oriented by the researcher about the objectives and the general instructions in taking numeracy test. The instructions were clearly discussed by the researcher to the respondents. Students were oriented about do's and don'ts during the test like, they are not allowed to use calculators, cell phones or any other gadgets during the test. It took 45 minutes for the students to finish the test. The test was administered after the last period/subject of the students during the limited face-to-face instruction. The researcher herself retrieved the answered sheets with 100% retrieval rate. The answers of the students were tallied, analysed and interpreted with the help of the researcher's statistician.

4. Data Analysis Procedures

The data were tabulated, analysed, and interpreted with the use of appropriate statistical tools and measures such as Frequency count and Spearman rho.

The academic performance or final rating in Mathematics of the grade 10 students were computed and were interpreted based on the Deped Order no.31 s.2020 " Interim Guidelines for Assessment and Grading in Light of the Basic Education Learning Continuity Plan" in which the final rating is interpreted using on the grading scale, descriptors and remarks below.

Description	Grading Scale	Remarks
Outstanding	90-100	Passed
Very Satisfactorily	85-89	Passed
Satisfactorily	80-84	Passed
Fairly Satisfactorily	75-79	Passed
Did not meet Expectations	Below 75	Failed

The numeracy level of the grade 10 students along Integers, Fractions, Decimals, Algebraic expressions, Ratio and Proportion in the standardized numeracy assessment tool were tallied, tabulated, analysed and interpreted using the interpretation table attached in the appendices which is adapted from the DepEd regional memorandum 280 series of 2021 "Re: Institutionalization of the conduct of the Unified Numeracy Test" of region 8.

Spearman rho was used to determine the relationship between the Academic performance and Numeracy level along the identified topics in the standardized numeracy assessment tool.

5. Results and Discussions

5.1 Findings

Based on the data gathered, the following findings were revealed:

1) The Academic Performance of the grade 10 students in Mathematics as presented in the table above, 9 out of 110 or 8.18% of grade 10 students got a 90-100 final rating who showed outstanding performance in Mathematics, 14 out of 110 or 12.73% of grade 10 students got 85-89 final rating who showed very

satisfactorily performance in the subject, 46 out of 110 or 41.82% of grade 10 students got 80-84 final rating who showed satisfactory performance in the subject, 38 out of 110 got 75-79 or 34.55% of grade 10 students final rating who showed fairly satisfactorily performance in the subject, and 3 out of 110 got 75-79 or 2.72% of grade 10 students final rating who did not meet expectation in Mathematics.

2) The number of numerates in integers is 41 out of 110 or 37.27% of the respondents and the moderately numerates is 56 out of 110 or 50.91% while the non-numerates is 13 or 11.82%. Based on the result it means that most of the students fall under moderately numerates in which they are performing averagely and still need to undergo enhancement activities in Integers. While those 13 students need intervention and it means that those 13 students do not understand integers clearly. The number of numerates in fractions is 42 out of 110 or 38.18% of the respondents; the moderately numerates is 49 out of 110 or 44.55% while the non-numerates is 19 or 17.27%. Based on the result it means that most of the students fall in Numerates and Moderately Numerates. Those 42 students performed excellently in Fractions. However, those students who fall under Moderately numerate and non-numerates still need to undergo enhancement and intervention in Fractions.

   The number of numerates in decimals is 69 out of 110 or 62.73% of the respondents and the moderately numerates is 36 out of 110 or 32.72% while the non-numerates is 5 or 4.55%. Based from the result it means that most of the students fall under Numerates which means that most of the students clearly understand the concept. But then there are still Moderately Numerates and non-numerates students who need to undergo enhancement and intervention in Decimals. The number of numerates in algebraic expressions are 47 out of 110 or 42.73% of the respondents and the moderately numerates are 40 out of 110 or 36.36% while the non-numerates are 23 or 20.91%. Based on the result shows that 47 students which are Numerates clearly understand the concept. But then there are still Moderately Numerates and non-numerates students who need to undergo enhancement activities and intervention in Decimals. The number of numerates in Ratio and Proportion is 15 out of 110 or 13.64% of the respondents; the moderately numerates is 62 out of 110 or 56.36% while the non-numerates is 33 or 30%. Based from the result it means that most of the students fall under Moderately Numerates which means that most of the students need enhancement activities to improve their numeracy level, and there are 33 non-numerates who need intervention in the particular concept. There may be factors affecting their performance in ratio and proportion.

3) Using degrees of freedom of 16 and a level of significance of 5% then a critical value of 26.30, the computed value is 105.73 for the correlation of academic performance and numeracy level of the grade 10 students.

6. Conclusions

Based on the findings, the following conclusions are drawn:

1) The mean performance of the students belongs to the bracket of 80-84. This result belongs to satisfactory performance meaning their performance is average which implied that students' Academic performance in Mathematics needs to be improved by means of giving students supplemental reading materials in Mathematics.
2) There are factors that affect students' performance specifically in integers, fractions, decimals, algebraic expressions, ratio and proportion.
3) There is a significant relationship between the academic performance and numeracy level of grade 10 students. The numeracy level of the students has a role in their academic performance because numeracy assessment focuses on the application of mathematical concepts learned across multiple subjects from kindergarten to Grade 10. Without numeracy skills students may struggle in learning higher math concepts that is why numeracy plays vital role in the academic performance of the students in Mathematics.

7. Recommendations

Based on the conclusions of the study, the following recommendations are made:

1) The teachers may conduct enhancement activities specifically in mathematics to help the learners master and improve the numeracy skills of grade 10 students.
2) Design training and workshops to the teachers in secondary to improve the new techniques in teaching numeracy to the students
3) Training and seminar workshop should impose to the students in order for them to alleviate their performance in Mathematics as a whole.
4) Research parallel to this may also be conducted in other subjects and on wider scope.

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