International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 7 Issue 8, August 2020

ISSN: 2394-4404

Readiness Of Incoming Senior High Students In Statistics And Probability

Jomer Olayres Ruz

Sorsogon State University School of Graduates Studies, Sorsogon City, Philippines

Abstract: ***In the Philippines, the Department of Education (DepEd) is the agency that protects and promotes the right of every Filipino to quality, equitable, culture-based, and complete basic education, as stated in its mission. As promulgated by Republic Act No. 10533 or The Enhanced Basic Education Act of 2013, all secondary students were commissioned to go through the additional two years of schooling under Senior High School. However, readiness of the students is still a question. Thus, this descriptive-developmental study sought to determine the readiness of incoming senior high school students in Statistics and Probability in second district of Sorsogon province of school year 2018-2019. The study utilized the survey-questionnaire for the experts and assessment tool for the incoming senior high school students. The gathered data were treated through frequency count, percentage, performance level, mean percentage score, appropriate scales, and Kruskal-Wallis. Findings revealed that there were 28 prerequisite competencies of Statistics and Probability from junior high school mathematics. There were more not ready prerequisite competencies in the strands under TVL track and there were more moderately ready prerequisite competencies in the strands under academic track. Significant differences on the 21 prerequisite competencies were confirmed. Finally, there were not mastered prerequisite competencies in Statistics and Probability per strand. Thus, the proposed preparatory learning worksheets per strand were developed to recuperate the not mastered prerequisite competencies. Teachers, together with the school administrators, should conduct a pre-assessment on the readiness of the students prior to taking SHS Statistics and Probability.***

Keywords: ***Readiness, Senior High School, Statistics and Probability, Prerequisite Competency, Strands, Tracks, Sorsogon, Worksheets***

I. INTRODUCTION

At present, quality education had been the most sought-after of every government for the people within its territorial confines for its existence means worthwhile service followed by outgrowing triumph for the endeavors of the country.

Hence, UNESCO (2018) believes that education is a right of every person and it should be granted with excellence. Schools, as the executory institution of the government, are expected to provide the needs of the learners in their fullest capability considering diversity to be able to attain the maximum potential within every learner. According to Ng (2015), "Quality education is delivered by good teachers, enabled by good teaching and learning processes and facilitated by a conducive learning environment" (para. 1). Thus, these components should be given emphasis by school administrators to achieve the purpose of establishing education.

In the Philippines, the Department of Education (DepEd) is the agency that protects and promotes the right of every Filipino to quality, equitable, culture-based, and complete basic education, as stated in its mission. To ensure quality in the current Philippine Education, all secondary students were commission to go through the additional two years of schooling under Senior High School to complete the required number of years in Secondary Education as promulgated by Republic Act No. 10533 or The Enhanced Basic Education Act of 2013. With this, four tracks had been introduced namely, Academics Track, Technical Vocational Track, Sports Track, and Arts and Design Track. Thirty one subjects should

be taken by the students comprised by fifteen core subjects, sixteen track subjects, seven contextualized subjects, and nine specialization subjects (K to 12 Updates, 2014). All the mentioned tracks are incorporated with the core subjects. Within Mathematics discipline, there are two core subjects such as General Mathematics and Statistics and Probability which were taken during Grade 11 first semester and second semester respectively.

Mathematics had been one of the most significant disciplines in human development and advancement. The Times of India (2015) defined Mathematics as a methodical application of matter. It guides man to be systematic and not chaotic. It cultivates specific skills such power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability and even effective communication skills. Complete foundation on Mathematics is a must for every student to unfold the challenging world ahead which requires a tough decision making competence. However, according to Sherman, Richardson, and Yard (2014) undeveloped mathematical skill and understanding will affect one's capacity to make life changing decisions.

For the past years, it is a challenging subject in Philippine education. TIMSS (2003) reveals that Philippines' fourth-grade students score an average of 358 and tenth-grade students got 378 in Mathematics which didn't met the international average of 495 and 466 respectively. During the 2008, the Science High Schools of the country seated at the bottom most in Advanced Mathematics category (Mullis, I.V.S. et.al, 2009). National Achievement Test of the country in Secondary Mathematics for the last three consecutive school years of implementation such as 2012-2013, 2013-2014, and 2014-2015 denoted the following ratings; 46.83%, 51.94%, and 47.37% respectively. The Schools Division of Sorsogon is one of the divisions under the Department of Education which undergone this assessment. For the past three school years such as 2014-2015, 2014-2013, and 2013-2012, the division gained 47.73%, 52.28%, and 48.16% ratings in Secondary Mathematics. These ratings were far and below the required passing percentage of at least 75%. It can be gleaned that the performance of the students is below average. Hence, they are not on the mastery level of Junior High School Mathematics. This reality would greatly affect the achievement of the students as they traverse along higher concepts of Mathematics, especially in Senior High School.

This inconsistency among the learners is one of the reasons that drove the department to mandate teachers to conduct remedial classes within the school year or summer classes to ensure that every learner will receive an impartial and necessary basic education competence (DepEd Order Nos. 8, s 2015, 13, s 2018). Similarly, according to The Understood Team (2018), "remedial programs are designed to close the gap between what a student knows and what he's expected to know. They often target reading or math skills" (para. 4). Thus, it is believed to be the solution to the problem on the inconsistency of the learners.

Furthermore, remediation is creating learning experiences among students, especially on the not mastered competencies. Thus, the Philosophy of experiential learning stresses that, "educators should purposely engage students in direct experiences and focused reflection to continuously develop knowledge, develop skills, and clarify values" (Association for Experiential Education, 2018, para. 1). One of the learning materials that would lead students to this notion is the utilization of learning worksheets as a tool during remediation program. Wyels (2019) defined worksheets as a useful tool to engage and motivate learners' brain during classes. It is utilized also to guide learners' learning outside the classroom. She added that the following goals can be overcome through it: 1. Focus students on the general view of lesson; 2. Bridge the gap from visual learning to learning by doing; 3. Engage learners in lesson; 4. Generalize content efficiently; 5. Encourage students to translate understanding the content or lesson; 6. Teach learners to learn how to learn from textbooks; and 7. Bridge new resources from previously learned material. This material makes the learners ready for higher and related concepts. With it learners became ready for the other interrelated disciplines.

In addition, readiness matters. One cannot learn higher concepts if the prior ones are undeveloped. According to Thorndike (1932) the quality of response depends upon the state of readiness of the learner. Then, readiness influenced behavior and learning. It entails that the greater the level of readiness of the students, the greater the chance of learning new or higher concepts and skills. Readiness of students in a particular subject should be assessed to have a background of the prior experiences of the students and develop substantive plans to sustain the learning progress of every student.

This study focuses on Statistics and Probability as one of the subjects in Senior High School Education. It requires attention, especially when it comes to readiness of the learners for it is a newly added subject under the stage. Given the inconsistency projected for the past years under the junior high school Mathematics, students will have a hard time learning the competencies under this subject in senior high school. Since, the prerequisite competencies of Senior High School Statistics and Probability were from the curriculum guides of Grade 7, Grade 8, and Grade 10 Mathematics (Curriculum Guide, 2013). Likewise, Albacea, Ayaay, David, and de Mesa (2016) believed that the K-12 curriculum offers the basic lessons of Statistics and Probability from Elementary grade levels to Junior High School grade levels except during grade 9. In particular, they believed that the lessons Introducing Statistics, Data Collection Activity, Basic Terms in Statistics, Data Presentation, Measures of Central Tendency, Some Measures of Location, Measures of Variation, Describing Data: Summary Measures and Graphs, Probability, and Geometric Probability should be reinforced before learning Senior High School Statistics and Probability. In general, Cruz (2015) proclaimed that Mathematics from Grade 7 to Grade 10 make ready the learners for General Mathematics and Statistics and Probability of Senior High School.

Statistics and probability covers the topics such as, Random Sampling and Probability Distributions, Normal Distribution, Sampling and Sampling Distributions, Estimation of Parameters, Tests of Hypothesis, and Correlation and Regression Analyses. It is the prerequisite subject of Practical Research II which is the prerequisite of Inquiries, Investigations and Immersion of Grade 12 level (DepEd Curriculum Guide, 2013). Hence, it is a vital course

for the development of the two related subjects. It requires mastery of competence of Junior High School Mathematics to guarantee success to its crucial nature. As a teacher of the subject for two years, the researcher noticed that several students are having difficulties overcoming the challenges of the subject. The competencies belonging to the subject were not mastered by most of the students. The researcher has observed that most of them do not have mastery of the learning competencies of their previous Mathematics lessons. Those competencies were requirements to be able to comprehend the lessons of this higher branch of Mathematics. Inclination to junior high Mathematics is a must before entering senior high school. This had been the reason that drove the researcher to undertake the study. It is his duty to make the students assimilate and apply the subject. For, the essence of schooling is to be able to apply acquired learning in a settlement.

Dewey (1897) pronounced, "I believe that education which does not occur through forms of life, or that are worth living for their own sake, is always a poor substitute for the genuine reality and tends to cramp and deaden" (p.231). With this, he strongly believed that educators should bridge knowledge to its application for flaws exist when it is separated. He stated that separation between learning and its use is the biggest problem of our current education. Moreover, the researcher believes that educating young minds and developing their utmost potentials in Mathematics is noble and a contribution to providing quality education among the learners of Sorsogon Province. Thus, this study will determine the readiness of Incoming Senior High School Learners in Statistics and Probability in Second District of Sorsogon Province of school year 2018-2019.

OBJECTIVES

This study determined the readiness of Incoming Senior High School Students in Statistics and Probability in Second District of Sorsogon Province of school year 2018-2019. Specifically, this study sought answers to the following variables: (1) prerequisite competencies in Statistics and Probability for senior high school; (2) readiness of incoming grade 11 students per strand in Statistics and Probability of senior high school along the identified prerequisite competencies in TVL and Academic tracks; (3) significant difference in the level of readiness in Statistics and Probability when grouped according to strands along the identified pre-requisite competencies; (4)pre-requisite competencies in Statistics and Probability that where not mastered when grouped according to strand; (5) preparatory learning worksheets for Statistics and Probability that could be proposed based on the findings of the study.

II. METHODS

The researcher utilized descriptive-developmental research study. It is descriptive since the study determined the readiness of Incoming Senior High School Learners in Statistic and Probability. According to Sevilla (1992), descriptive research focused on describing the currently existing attributes or nature of the respondents and manipulation of variables is not included. Then, it developed a proposed instructional material from the identified not mastered prerequisite competencies of incoming senior high school learners to prepare them for Statistics and Probability. To gather the data documentary analysis, survey and test administration were conducted. The researcher utilized two instruments, the survey questionnaire for the experts of Statistics and probability and a test for the incoming senior high school learners of Division of Sorsogon Province. To treat the gathered data, frequency count, percentage, mean percentage score, performance level, and Kruskal-Wallis (H-Test) were the statistical tools employed.

RESPONDENTS OF THE STUDY

The respondents of the study were constituted by two groups of school entities. The first were the fifteen experts who validated the prerequisite competencies of Statistics and Probability. They were given similar questionnaires to identify the prerequisite competencies of Statistics and Probability of Senior High School. They were selected through purposive sampling through the qualification of having at least three years' experience teaching the subject Statistics and Probability in secondary level, tertiary level, or post graduate level.

The second group of respondents were the incoming senior high school students of the fifteen secondary schools of second district of the Division of Sorsogon Province with at least three offered strands considered in this study. For the student-respondents, the sample size was determined using Slovin's Formula and stratified sampling was employed. There were one thousand four hundred forty eight (1448) incoming senior high school students. In the Academic Track, there were three hundred (300) General Academic Strand (GAS) students, two hundred twenty six (226) Accountancy, Business and Management (ABM) students, and one hundred eighty six (186) Humanities and Social Sciences (HUMSS) students. In total, there were seven hundred twelve students (712) under the first track. In Technical Vocational and Livelihood Track, there are two hundred fifty seven (257) Electrical Installation Management (EIM) students, two hundred fifty five (255) Bread and Pastry Production (BPP) students, and two hundred twenty four (224) Computer Systems Servicing (CSS) students. A sum of seven hundred thirty six (736) students were under the second track.

THE INSTRUMENT

This undertaking used two instruments. The first is the questionnaire for the experts of Statistics and Probability who validated its prerequisite competencies. The author first work on the survey-questionnaire through identifying the tentative prerequisite competencies of each content of subject being considered using the curriculum guides of Junior High school Mathematics which had been prescribed by the Department of Education. After it was developed, the prerequisite competencies underwent validation from the educators with at least three-year experience teaching Statistics and Probability coming from various levels of institutions such as secondary

schools to graduate studies at Bicol region. The competencies under each content of the subject which gained at least twelve votes over the total number of fifteen experts or at least eighty (80) percent approval rating were considered to be the prerequisites of the each content. As a result, twenty eight (28) prerequisite competencies were approved.

The second instrument was the assessment tool that would determine the readiness and not mastered prerequisite competencies which were the basis for the development of the proposed preparatory learning worksheets for senior high school Statistics and Probability. Using the results of the administered questionnaires for experts, a table of specification and 80-item test draft of the tool was conceptualized. The test draft undergone dry-runs at the first congressional district of the Schools Division of Sorsogon, particularly at Salvacion National High School and Cumadcad National High School. The results were treated through Cronbach Analysis using SPSS application and obtained at least 0.6 reliability coefficient per identified prerequisite competency. According to Horodnic, Ursachi, Zait (2015), Cronbach's alpha within 0.6 and 0.7 is acceptable as general rule. Finally, face validity was employed. After the tests of reliability and validity, a forty-five item final assessment tool was constructed and prepared for the test administration.

INTERPRETATION OF DATA

The modified seven-descriptive equivalent of Achievement Level based on the National Education Testing and Research Center (NETRC) was adapted to identify the descriptive equivalent of the computed MPS which was used for determining the readiness of the learners on Statistics and Probability (Herrera, 2016).

MPS (%)	Remarks
86% - 100%	Ready
35% - 85%	Moderately Ready
0% - 34%	Not Ready

Lastly, the prerequisite competencies with the performance level having a remark as not mastered comprised a set of not mastered prerequisite competencies per content. These were the basis for crafting the Instructional Material for Statistics and Probability of senior high school. To interpretation of the performance level, the percentage equivalent (enclosure to DepEd order no. 39 s. 2004) guidelines for rating system in the secondary was utilized and showed below.

Performance Level	Description
75% and above	Mastered
25% - 74%	Nearly Mastered
below 25%	Not Mastered

STATISTICAL TOOLS USED

The proponent employed these procedures to determine the readiness of incoming senior high school learners in Statistics and probability of Senior high school. The result were tallied, tabulated, and analyzed. To determine the prerequisite competencies, frequency count and percentage were used. Their responses from the unstructured interview attested the analysis.

The mean percentage score of each prerequisite competency under every content was computed to determine the readiness of incoming grade 11 learners per strand in Statistics and Probability of senior high school along the identified prerequisite competencies in the following tracks: a. TVL and b. Academic. It can be done by getting the ratio of the mean per prerequisite competency to the number of items of the test. The performance level of each prerequisite competency under every content was computed to determine the mastery level of the learners. To determine if there is a significant difference in the level of readiness in Statistics and Probability when grouped according to strands along the identified pre-requisite competencies, Kruskal-Wallis (H-Test) was utilized after the test of normality was employed.

III. RESULT AND DISCUSSION

PREREQUISITE COMPETENCIES IN STATISTICS AND PROBABILITY FOR SENIOR HIGH SCHOOL

Table 2.a to Table 2.f present the prerequisite competencies in Statistics and Probability per content for the Incoming Senior High School learners as validated by the experts. The validators of the prerequisite competencies were those with at least three years' experience in teaching Statistics and Probability in senior high school and college levels in Bicol region. Some are pursuing their master's degree or doctoral degree, graduates of Masters, or graduates of doctoral degree. Each competency was approved by at least eighty percent (80%) or twelve members (12) of the experts as prerequisite competency per content.

			Identified Prerequisite Competencies	F
A			draws conclusions from graphic and tabular data and measures of central tendency and variability.	13
	a		calculates the measures of central tendency of ungrouped and grouped data.	15
		1	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	13
		2	evaluates a sum using sigma notation	13
	b		calculates the measures of variability of grouped and ungrouped data.	13
		1	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	12
	c		uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive.***	13
		1	organizes data in a frequency distribution table.	13
B			solves problems involving probability.	14
	a		illustrates mutually exclusive events.	13

b		finds the probability of A union B.	12
	1	finds the probability of a simple event.	13
	2	illustrates an experimental probability and a theoretical probability.	12
	3	counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle.***	13
	4	illustrates an experiment, outcome, sample space and event.***	15
C		performs operations on rational numbers	12

Table 2.a: Prerequisite Competencies in Random Variables and Probability Distributions of Statistics and Probability for Senior High School

In table 2.a, the content Random Variables and Probability Distributions has fifteen prerequisite competencies. The included prerequisite competencies with its corresponding number of approval are as follows: 1. draws conclusions from graphic and tabular data and measures of central tendency and variability (13); 2. Calculates the measures of central tendency of ungrouped and grouped data (15); 3. illustrates the measures of central tendency (mean, median, and mode) of a statistical data (13); 4. evaluates a sum using sigma notation (13); 5. calculates the measures of variability of grouped and ungrouped data (13); 6. illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data (12); 7. organizes data in a frequency distribution table (13); 8. solves problems involving probability; 9. illustrates mutually exclusive events (13); 10. finds the probability of A union B (12); 11. finds the probability of a simple event (13); 12. illustrates an experimental probability and a theoretical probability (12); 13. counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (13); 14. illustrates an experiment, outcome, sample space and event (15); and 15. performs operations on rational numbers (12). The fifteen (15) identified competencies were prerequisites of the competencies of Random Variables and Probability Distributions. The competency draws conclusions from graphic and tabular data and measures of central tendency and variability is a prerequisite of the competencies: 1) finds the possible values of a random variable; 2) constructs the probability mass function of a discrete random variable and its corresponding histogram; 3) interprets the mean and the variance of a discrete random variable; and 4) solves problems involving mean and variance of probability distributions. The competency calculates the measures of central tendency of ungrouped and grouped data is a prerequisite of 1) calculates the mean and the variance of a discrete random variable and 2) solves problems involving mean and variance of probability distributions. Illustrates the measures of central tendency (mean, median, and mode) of a statistical data is a prerequisite of the competency illustrates the mean and variance of a discrete random variable. The competencies evaluates a sum using sigma notation and calculates the measures of variability of grouped and ungrouped data are prerequisites of 1) calculates the mean and the variance of a discrete random variable and 2) solves problems involving mean and variance of probability distributions. Illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data is a prerequisite of the competency illustrates the mean and variance of a discrete random variable. Uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive is a prerequisite of constructs the probability mass function of a discrete random variable and its corresponding histogram. Organizes data in a frequency distribution table is a prerequisite of finds the possible values of a random variable. Solves problems involving probability is a prerequisite of 1. computes probabilities corresponding to a given random variable and 2. solves problems involving mean and variance of probability distributions. Illustrates mutually exclusive events is a prerequisite of finds the possible values of a random variable. Finds the probability of A union B and finds the probability of a simple event are prerequisites of 1. constructs the probability mass function of a discrete random variable and its corresponding histogram and 2. computes probabilities corresponding to a given random variable. Illustrates an experimental probability and a theoretical probability is a prerequisite of illustrates a probability distribution for a discrete random variable and its properties. counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle and illustrates an experiment, outcome, sample space and event are prerequisites of finds the possible values of a random variable. Finally, Performs operations on rational numbers is a prerequisite of 1) calculates the mean and the variance of a discrete random variable and 2) solves problems involving mean and variance of probability distributions. Thus, these respective prerequisite competencies should be mastered by the students before learning the competencies under the mentioned content.

Identified Prerequisite Competencies			**F**
A		performs operations on rational algebraic expressions.	12
	1	performs operations on rational numbers	13
B		calculates the measures of variability of grouped and ungrouped data.	13
	1	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	13
C		calculates the measures of central tendency of ungrouped and grouped data.	13
	1	evaluates a sum using sigma notation	13
	2	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	13
D		expresses rational numbers from fraction form to decimal form and vice versa.	12
E		translates English phrases to mathematical	12

	phrases and vice versa.	
F	interprets measures of position.	12

Table 2.b: Prerequisite Competencies in Normal Distribution of Statistics and Probability for Senior High School

In table 2.b, the content Normal Distributions has ten prerequisite competencies. The included competencies with the corresponding number of approval are as follows: 1. performs operations on rational algebraic expressions (12); 2. performs operations on rational numbers (13); 3. calculates the measures of variability of grouped and ungrouped data (13); 4. illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data (13); 5. calculates the measures of central tendency of ungrouped and grouped data (13); 6. evaluates a sum using sigma notation (13); 7. illustrates the measures of central tendency (mean, median, and mode) of a statistical data (13); 8. expresses rational numbers from fraction form to decimal form and vice versa (12); 9. translates English phrases to mathematical phrases and vice versa (12); 10. interprets measures of position (12). The specific competency with its prerequisite were as follows. Performs operations on rational algebraic expressions; performs operations on rational numbers; calculates the measures of variability of grouped and ungrouped data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; calculates the measures of central tendency ungrouped and grouped data; evaluates a sum using sigma notation; and illustrates the measures of central tendency (mean, median, and mode) of a statistical data were prerequisites of 1. converts a normal random variable to a standard normal variable and vice versa and 2. computes probabilities and percentiles using the standard normal table. Expresses rational numbers from fraction form to decimal form and vice versa; translates English phrases to mathematical phrases and vice versa; and interprets measures of position were prerequisites of computes probabilities and percentiles using the standard normal table. To understand fully competencies under Normal Distribution these prerequisite competencies should be mastered by the students.

Identified Prerequisite Competencies		F
A.	finds the probability of a simple event.	12
B.	calculates the measures of central tendency of ungrouped and grouped data.	12
C.	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	12

Table 2.c: Prerequisite Competencies in Sampling and Sampling Distributions of Statistics and Probability for Senior High School

In table 2.c, the third content is Sampling and Sampling Distributions which had three prerequisite competencies. The included prerequisite competencies with its respective number of approval are as follows: 1. finds the probability of a simple event (12); 2. calculates the measures of central tendency of ungrouped and grouped data (12); and illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data (12). These competencies were prerequisites of the competencies under the content Sampling and Sampling Distributions. Then, finds the probability of a simple event is a prerequisite competency of identifies sampling distributions of statistics (sample mean) and finds the mean and variance of the sampling distribution of the sample mean. Calculates the measures of central tendency of ungrouped and grouped data is the prerequisite of identifies sampling distributions of statistics (sample mean), finds the mean and variance of the sampling distribution of the sample mean, and solves problems involving sampling distributions of the sample mean. Finally, illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data is a prerequisite of finds the mean and variance of the sampling distribution of the sample mean, defines the sampling distribution of the sample mean for normal population when the variance is: (a) known (b) unknown, and solves problems involving sampling distributions of the sample mean. Success on these competencies shall lead to better understanding of the competencies under Sampling and Sampling Distributions.

In table 2.d, the fourth content Estimation of Parameters had eight prerequisite competencies. The included prerequisite competencies with its respective number of approval are as follows: 1. solves problems involving probability (12); 2. finds the probability of a simple event (12); 3. calculates the measures of central tendency of ungrouped and grouped data (12); 4. illustrates the measures of central tendency (mean, median, and mode) of a statistical data (13); 5. expresses rational numbers from fraction form to decimal form and vice versa (14); 6. performs operations on rational numbers (12); 7. illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data (12); and 8. estimates the square root of a whole number, rational number and

Identified Prerequisite Competencies		F
A.	solves problems involving probability	12
	a. finds the probability of a simple event.	12
B.	calculates the measures of central tendency of ungrouped and grouped data.	12
	a. illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	13
C.	expresses rational numbers from fraction form to decimal form and vice versa.	14
D.	performs operations on rational numbers	12
E.	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	12
F.	estimates the square root of a whole number, rational number and irrational number to the nearest hundredth.	12

Table 2.d: Prerequisite Competencies in Estimation of Parameters of Statistics and Probability for Senior High School

irrational number to the nearest hundredth (12). The mentioned competencies were prerequisites of the competencies under the content Estimation of Parameters. Solves problems involving probability is a prerequisite of computes for the point estimate of the population proportion and solves problems involving confidence interval estimation of the population proportion. Finds the probability of a simple

event is a prerequisite of computes for the point estimate of the population proportion and computes for the confidence interval estimate of the population proportion. Calculates the measures of central tendency of ungrouped and grouped data is the prerequisite of computes for the point estimate of the population mean, computes for the confidence interval estimate based on the appropriate form of the estimator for the population mean, solves problems involving confidence interval estimation of the population mean. Illustrates the measures of central tendency (mean, median, and mode) of a statistical data is the prerequisite of illustrates point and interval estimations, identifies point estimator for the population mean, computes for the point estimate of the population mean, identifies the appropriate form of the confidence interval estimator for the population mean when: (a) the population variance is known, (b) the population variance is unknown, and (c) the Central Limit Theorem is to be used and identifies regions under the t-distribution corresponding to different t-values. Expresses rational numbers from fraction form to decimal form and vice versa is the prerequisite of computes for the point estimate of the population mean, identifies the appropriate form of the confidence interval estimator for the population mean when: (a) the population variance is known, (b) the population variance is unknown, and (c) the Central Limit Theorem is to be used, draws conclusion about the population mean based on its confidence interval estimate, computes for the confidence interval estimate of the population proportion, solves problems involving confidence interval estimation of the population proportion, computes for an appropriate sample size using the length of the interval, and solves problems involving sample size determination. Performs operations on rational numbers is a prerequisite of computes

for the point estimate of the population mean, identifies regions under the t-distribution corresponding to different t-values, computes for the confidence interval estimate based on the appropriate form of the estimator for the population mean, solves problems involving confidence interval estimation of the population mean, computes for the point estimate of the population proportion, computes for the confidence interval estimate of the population proportion, solves problems involving confidence interval estimation of the population proportion, computes for an appropriate sample size using the length of the interval, solves problems involving sample size determination. Illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data is a prerequisite of illustrates point and interval estimations, computes for the point estimate of the population mean, identifies the appropriate form of the confidence interval estimator for the population mean when: (a) the population variance is known, (b) the population variance is unknown, and (c) the Central Limit Theorem is to be used, Identifies regions under the t-distribution corresponding to different t-values, Computes for the confidence interval estimate based on the appropriate form of the estimator for the population mean, Solves problems involving confidence interval estimation of the population mean, Draws conclusion about the population proportion based on its confidence interval estimate, identifies the length of a confidence interval, Computes for the length of the confidence interval, Computes for an appropriate sample size using the length of the interval, and Solves problems involving sample size determination. Estimates the square root of a whole number, rational number and irrational number to the nearest hundredth is a prerequisite of computes for the point estimate of the population mean, computes for the confidence interval estimate based on the appropriate form of the estimator for the population mean, solves problems involving confidence interval estimation of the population mean, computes for the confidence interval estimate of the population proportion, draws conclusion about the population proportion based on its confidence interval estimate, and solves problems involving sample size determination. Hence, to better understand the competencies under Estimation of Parameters the mentioned prerequisite competencies should be mastered.

In table 2.e, the fifth content Tests of Hypothesis had five prerequisite competencies. The included prerequisite competencies with its respective number of approval are as follows: 1. translates English sentences to mathematical sentences and vice versa (14); 2. Differentiates between equations and inequalities (13); 3. Performs operations on rational numbers (13); 4. Illustrates linear equation and inequality in one variable (13);

	Identified Prerequisite Competencies	F
A.	translates English sentences to mathematical sentences and vice versa.	14
B.	differentiates between equations and inequalities.	13
C.	performs operations on rational numbers	13
D.	illustrates linear equation and inequality in one variable.	13
E.	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	13

Table 2.e: Prerequisite Competencies in Tests of Hypothesis of Statistics and Probability for Senior High School

and 5.illustrates the measures of central tendency (mean, median, and mode) of a statistical data (13). These competencies are prerequisite of a specific competency belonging to the mentioned content. Translates English sentences to mathematical sentences and vice versa is a prerequisite of formulates the appropriate null and alternative hypotheses on a population mean, identifies the appropriate form of the test-statistic when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used, draws conclusion about the population mean based on the test-statistic value and the rejection region, solves problems involving test of hypothesis on the population mean, formulates the appropriate null and alternative hypotheses on a population proportion, draws conclusion about the population proportion based on the test-statistic value and the rejection region, solves problems involving test of hypothesis on the population proportion. differentiates between equations and inequalities is a prerequisite of: Illustrates: (a) null hypothesis, (b) alternative hypothesis, (c) level of significance, (d) rejection region; and (e) types of errors in hypothesis testing; formulates the appropriate null and alternative hypotheses on a

population mean; identifies the appropriate form of the test-statistic when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used; identifies the appropriate rejection region for a given level of significance when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used; computes for the test-statistic value (population mean; solves problems involving test of hypothesis on the population mean; formulates the appropriate null and alternative hypotheses on a population proportion; and solves problems involving test of hypothesis on the population proportion. Performs operations on rational numbers is a prerequisite of: calculates the probabilities of committing a Type I and Type II error; identifies the appropriate rejection region for a given level of significance when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used; computes for the test-statistic value (population mean); solves problems involving test of hypothesis on the population mean; computes for the test-statistic value (population proportion), and solves problems involving test of hypothesis on the population proportion. Illustrates linear equation and inequality in one variable is a prerequisite of: Illustrates: (a) null hypothesis, (b) alternative hypothesis, (c) level of significance, (d) rejection region; and (e) types of errors in hypothesis testing; calculates the probabilities of committing a Type I and Type II error; formulates the appropriate null and alternative hypotheses on a population mean; identifies the appropriate form of the test-statistic when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used; identifies the appropriate rejection region for a given level of significance when: (a) the population variance is assumed to be known, (b) the population variance is assumed to be unknown; and (c) the Central Limit Theorem is to be used; solves problems involving test of hypothesis on the population mean; formulates the appropriate null and alternative hypotheses on a population proportion; and solves problems involving test of hypothesis on the population proportion. Illustrates the measures of central tendency (mean, median, and mode) of a statistical data is a prerequisite of: Illustrates: (a) null hypothesis, (b) alternative hypothesis, (c) level of significance, (d) rejection region; and (e) types of errors in hypothesis testing; calculates the probabilities of committing a Type I and Type II error; formulates the appropriate null and alternative hypotheses on a population mean; computes for the test-statistic value (population mean); draws conclusion about the population mean based on the test-statistic value and the rejection region; solves problems involving test of hypothesis on the population mean; and formulates the appropriate null and alternative hypotheses on a population proportion. To ensure readiness on the competencies under the said content, these prerequisite competencies should be developed prior to learning the subsequent competencies.

Identified Prerequisite Competencies			F
A.	sketches the graph of linear functions		14
	a.	locates points in the Cartesian plane	15
	1	illustrates and finds the y-intercept of linear equation.	12
	2	finds the slope of a line given two points, equation, and graph.	15
B.	determines dependent and independent variables.		14

Table 2.f: Prerequisite Competencies in Correlation and Regression Analyses of Statistics and Probability for Senior High School

Table 2.f. presented the last content Correlation and Regression Analyses has seven prerequisite competencies. The included competencies were: describes the graph of a linear equation in terms of its intercepts and slope; sketches the graph of linear functions; locates points in the Cartesian plane; finds the slope of a line given two points, equation, and graph; illustrates the slope of a line; illustrates and finds the y-intercept of linear equation; determines dependent and independent variables. These competencies were prerequisite of the competencies under the said content. Sketches the graph of linear functions is a prerequisite of: constructs a scatter plot; calculates the Pearson's sample correlation coefficient; and draws the best-fit line on a scatter plot. Locates points in the Cartesian plane is a prerequisite of: constructs a scatter plot and calculates the Pearson's sample correlation coefficient. Illustrates and finds the y-intercept of linear equation is a prerequisite of: calculates the Pearson's sample correlation coefficient; calculates the slope and y-intercept of the regression line; and solves problems involving regression analysis. Finds the slope of a line given two points, equation, and graph is a prerequisite of: describes shape (form), trend (direction), and variation (strength) based on a scatter plot; calculates the Pearson's sample correlation coefficient; and calculates the slope and y-intercept of the regression line. Determines dependent and independent variables is a prerequisite of: illustrates the nature of bivariate data; constructs a scatter plot; describes shape (form), trend (direction), and variation (strength) based on a scatter plot; calculates the Pearson's sample correlation coefficient; identifies the independent and dependent variables; predicts the value of the dependent variable given the value of the independent variable; and solves problems involving regression analysis. Hence, evident success on the competencies of Correlation and Regression Analyses shall be achieve through developing mastery on these prerequisite competencies.

The prerequisite competencies of each content area belong to a particular topic from Grade 7 to Grade 10 Learners Modules in Mathematics. From Grade 7 module, the topic Operations of Rational Number covers the prerequisite performs operations on rational numbers. The topic Rational Numbers covers the prerequisite competencies expresses rational numbers from fraction form to decimal form and vice versa. The topic Square Roots of Positive Rational Numbers covers estimates the square root of a whole number, rational number and irrational number to the nearest hundredth. The topic Solution Set of a First Degree Equation or Equality in One Variable between equations and inequalities covers translates English sentences to mathematical sentences and vice versa and translates English phrases to mathematical

phrases and vice versa. Statistics covers the following: draws conclusions from graphic and tabular data and measures of central tendency and variability; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; evaluates a sum using sigma notation, calculates the measures of variability of grouped and ungrouped data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive; and organizes data in a frequency distribution table.

From Grade 8 module, the topic Linear Functions and its Applications holds the competencies: illustrates and finds the y-intercept of linear equation; finds the slope of a line given two points, equation, and graph; and sketches the graph of linear functions. Rectangular Coordinate System holds locates points in the Cartesian plane. Performs Operations on Rational Algebraic Expressions holds performs operations on rational algebraic expressions. Then, Representations of Relations and Functions holds determines dependent and independent variables.

From Grade 10 Mathematics Learners Module, the topic Probability of Compound Events covers the following: illustrates mutually exclusive events; finds the probability of A union B; finds the probability of a simple event; illustrates an experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; illustrates an experiment, outcome, sample space and event, and solves problems involving probability. And, the topic Measures of Position covers interprets measures of position.

The above validated prerequisite competencies of Senior High School Statistics and Probability were taken from the curriculum guides of Grade 7, Grade 8, and Grade 10 Mathematics (Curriculum Guide, 2013). Albacea, Ayaay, David, and de Mesa (2016) believed that the K-12 curriculum offers the basic lessons of Statistics and Probability from Elementary grade levels to Junior High School grade levels except during grade 9. In particular, they believed that the lessons Introducing Statistics, Data Collection Activity, Basic Terms in Statistics, Data Presentation, Measures of Central Tendency, Some Measures of Location, Measures of Variation, Describing Data: Summary Measures and Graphs, Probability, and Geometric Probability should be reinforced before learning Senior High School Statistics and Probability. In general, Cruz (2015) proclaimed that Mathematics from Grade 7 to Grade 10 make ready the learners for General Mathematics and Statistics and Probability of Senior High School.

READINESS OF INCOMING SENIOR HIGH SCHOOL LEARNERS PER STRAND IN STATISTICS AND PROBABILITY OF SENIOR HIGH SCHOOL ALONG THE IDENTIFIED PREREQUISITE COMPETENCIES

Table 3a and 3b present the extent of readiness of incoming senior high school learners per strand of the two tracks in statistics and probability of senior high school along the identified prerequisite competencies. The first column shows the identified prerequisite competencies of SHS Statistics and Probability. Then, the columns for the Mean Percentage Score (A) and remarks (B) of each strand follow, the latter can be classified as not ready (NR), moderately ready (MR), or ready (R).

The learners from the Home Economics (HE) strand were categorized as moderately ready on the nine prerequisite competencies. The nine prerequisite competencies are as follows: locates points in the Cartesian plane(36); performs operations on rational algebraic expressions(41); performs operations on rational numbers(35); expresses rational numbers from fraction form to decimal form and vice versa(51); estimates the square root of a whole number, rational number and irrational number to the nearest hundredth(53); differentiates between equations and inequalities(47); illustrates an experiment, outcome, sample space and event(36); illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data(38); uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive(37).

Meanwhile, nineteen over twenty-eight prerequisite competencies fell under not ready category. The nineteen prerequisite competencies are as follows: sketches the graph of linear functions(18); finds the slope of a line given two points, equation, and graph(17); illustrates and finds the y-intercept of linear equation(27); translates English sentences to mathematical sentences and vice versa (30); translates English phrases to mathematical phrases and vice versa(30); determines dependent and independent variables(34); solves problems involving probability(22); illustrates mutually exclusive events(22); finds the probability of A union B(25); finds the probability of a simple event(29); illustrates an experimental probability and a theoretical probability(17); counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle(19); draws conclusions from graphic and tabular data and measures of central tendency and variability(24); calculates the measures of central tendency of ungrouped and grouped data(33); illustrates the measures of central tendency (mean, median, and mode) of a statistical data(30); evaluates a sum using sigma notation(15); calculates the measures of variability of grouped and ungrouped data(32); organizes data in a frequency distribution table(34); interprets measures of position. This implies that the students were mostly not ready on the prerequisite competencies of Statistics and Probability. Thus, they arrived at the over-all Mean Percentage Score (MPS) of 31% with adjectival equivalent of not ready.

PREREQUISITE COMPETENCIES		HE		IA		ICT	
		A	B	A	B	A	B
A	sketches the graph of linear functions	18	NR	25	NR	28	NR
1	locates points in the Cartesian plane	39	MR	31	NR	50	MR
2	finds the slope of a line given two points, equation, and graph.	17	NR	24	NR	20	NR
3	illustrates and finds	27	NR	28	NR	32	NR

	the y-intercept of linear equation.						
B.	performs operations on rational algebraic expressions.	41	MR	35	MR	38	MR
1	performs operations on rational numbers	35	MR	33	NR	38	MR
C.	expresses rational numbers from fraction form to decimal form and vice versa.	51	MR	40	MR	50	MR
D.	estimates the square root of a whole number, rational number and irrational number to the nearest hundredth.	53	MR	46	MR	64	MR
E	differentiates between equations and inequalities.	47	MR	56	MR	60	MR
F.	translates English sentences to mathematical sentences and vice versa.	30	NR	35	MR	39	MR
1	translates English phrases to mathematical phrases and vice versa.	33	NR	36	MR	38	MR
H.	determines dependent and independent variables.	34	NR	42	MR	49	MR
I.	solves problems involving probability.	22	NR	30	NR	23	NR
1.	illustrates mutually exclusive events.	22	NR	22	NR	19	NR
2	finds the probability of A union B.	25	NR	26	NR	21	NR
a	finds the probability of a simple event.	29	NR	32	NR	28	NR
b	illustrates an experimental probability and a theoretical probability.	17	NR	21	NR	25	NR
c	counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle.***	19	NR	16	NR	19	NR
d	illustrates an experiment, outcome, sample space and event.***	36	MR	36	MR	44	MR
J.	draws conclusions from graphic and tabular data and measures of central tendency and variability.	24	NR	28	NR	26	NR
1.	calculates the measures of central tendency of ungrouped and grouped data.	33	NR	31	NR	36	MR
a	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	30	NR	33	NR	38	MR
b	evaluates a sum using sigma notation	15	NR	19	NR	14	NR
2.	calculates the measures of variability of grouped and ungrouped data.	32	NR	24	NR	28	NR
a	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	38	MR	34	NR	39	MR
3.	uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive.***	37	MR	35	MR	45	MR
a	organizes data in a frequency distribution table.	34	NR	33	NR	25	NR
K.	interprets measures of position.	25	NR	22	NR	19	NR
	Total	31	NR	30	NR	34	NR

Table 3.a: Readiness of Incoming Senior High School Learners per Strand of TVL Track in Statistics and Probability of Senior High School along the Identified Prerequisite Competencies

The Industrial Arts (AI) Learners were moderately ready on the nine over twenty-eight prerequisite competencies. The nine prerequisite competencies are as follows: performs operations on rational algebraic expressions; expresses rational numbers from fraction form to decimal form and vice versa; estimates the square root of a whole number, rational number and irrational number to the nearest hundredth; differentiates between equations and inequalities; translates English sentences to mathematical sentences and vice versa; translates English phrases to mathematical phrases and vice versa; determines dependent and independent variables; illustrates an experiment, outcome, sample space and event; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive. They were under not ready category on nineteen over twenty-eight prerequisite competencies. The nineteen prerequisite competencies are as follows: sketches the graph of linear functions; finds the slope of a line given two points, equation, and graph; illustrates and finds the y-intercept of linear equation; solves problems involving probability; locates points in the Cartesian plane; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; performs operations on rational numbers; illustrates mutually

exclusive events; finds the probability of A union B; finds the probability of a simple event; illustrates an experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; draws conclusions from graphic and tabular data and measures of central tendency and variability; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; evaluates a sum using sigma notation; calculates the measures of variability of grouped and ungrouped data; organizes data in a frequency distribution table; interprets measures of position. The over-all Mean Percentage Score of the students is 30% which means that they are not ready.

The Information and Communication Technology (ICT) Learners were moderately ready on the fourteen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. The fourteen prerequisite competencies are as follows: locates points in the Cartesian plane; performs operations on rational algebraic expressions; performs operations on rational numbers; expresses rational numbers from fraction form to decimal form and vice versa; estimates the square root of a whole number, rational number and irrational number to the nearest hundredth; differentiates between equations and inequalities; translates English sentences to mathematical sentences and vice versa; translates English phrases to mathematical phrases and vice versa; determines dependent and independent variables; illustrates an experiment, outcome, sample space and event; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive. Then, fourteen over twenty-eight prerequisite competencies fell under not ready category. The eleven prerequisite competencies are as follows: sketches the graph of linear functions; finds the slope of a line given two points, equation, and graph; illustrates and finds the y-intercept of linear equation; solves problems involving probability; finds the probability of a simple event; illustrates mutually exclusive events; finds the probability of A union B; illustrates an experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; draws conclusions from graphic and tabular data and measures of central tendency and variability; evaluates a sum using sigma notation; calculates the measures of variability of grouped and ungrouped data; organizes data in a frequency distribution table; interprets measures of position. The over-all Mean Percentage Score of learners is 34% which means that they are not ready.

For the TVL track, the learners from Accountancy, Business, and Management (ABM) strand were moderately ready on the seventeen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. The seventeen prerequisite competencies are as follows: locates points in the Cartesian plane; illustrates and finds the y-intercept of linear equation; performs operations on rational numbers; expresses rational numbers from fraction form to decimal form and vice versa; estimates the square root of a whole number, rational number and irrational number to the nearest hundredth; differentiates between equations and inequalities; translates English sentences to mathematical sentences and vice versa; translates English phrases to mathematical phrases and vice versa; determines dependent and independent variables; finds the probability of a simple event; illustrates an experiment, outcome, sample space and event; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive; organizes data in a frequency distribution table. On the other hand, eleven over twenty-eight prerequisite competencies fell under not ready category. The eleven prerequisite competencies are: sketches the graph of linear functions; finds the slope of a line given two points, equation, and graph; solves problems involving probability; illustrates mutually exclusive events; finds the probability of A union B; illustrates an experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; draws conclusions from graphic and tabular data and measures of central tendency and variability; evaluates a sum using sigma notation; calculates the measures of variability of grouped and ungrouped data; interprets measures of position. The over-all Mean Percentage Score of Accountancy, Business, and Management (ABM) Learners is 44% which means that they are moderately ready.

The General Academic Strand (GAS) learners were moderately ready on the fourteen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. The fourteen prerequisite competencies are as follows: locates points in the Cartesian plane; performs operations on rational algebraic expressions; performs operations on rational numbers; expresses rational numbers from fraction form to decimal form and vice versa; estimates the square root of a whole number, rational number and irrational number to the nearest hundredth; differentiates between equations and inequalities; translates English sentences to mathematical sentences and vice versa; translates English phrases to mathematical phrases and vice versa; determines dependent and independent variables; illustrates an experiment, outcome, sample space and event; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive. Then, fourteen over twenty-eight prerequisite competencies fell under not ready category. The eleven prerequisite competencies are as follows: sketches the graph of linear functions; finds the slope of a line given two

points, equation, and graph; illustrates and finds the y-intercept of linear equation; solves problems involving probability; finds the probability of a simple event; illustrates mutually exclusive events; finds the probability of A union B; illustrates an

experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; draws conclusions from graphic and tabular data and measures of central tendency and variability; evaluates a sum using sigma notation; calculates the measures of variability of grouped and ungrouped data; organizes data in a frequency distribution table; and interprets measures of position. The over-all Mean Percentage Score of General Academic Strand (GAS) Learners is 36% which means that they are not ready.

PREREQUISITE COMPETENCIES		ABM		GAS		HUMSS	
		A	B	A	B	A	B
A	sketches the graph of linear functions	19	NR	22	NR	15	NR
1	locates points in the Cartesian plane	66	MR	55	MR	58	MR
2	finds the slope of a line given two points, equation, and graph.	22	NR	21	NR	20	NR
3	illustrates and finds the y-intercept of linear equation.	36	MR	34	NR	39	MR
B	performs operations on rational algebraic expressions.	64	MR	49	MR	55	MR
1	performs operations on rational numbers	57	MR	41	MR	44	MR
C	expresses rational numbers from fraction form to decimal form and vice versa.	75	MR	35	MR	70	MR
D	estimates the square root of a whole number, rational number and irrational number to the nearest hundredth.	84	MR	70	MR	73	MR
E	differentiates between equations and inequalities.	75	MR	55	MR	65	MR
F	translates English sentences to mathematical sentences and vice versa.	62	MR	42	MR	62	MR
1	translates English phrases to mathematical phrases and vice versa.	51	MR	48	MR	47	MR
H	determines dependent and independent variables.	44	MR	46	MR	49	MR
I	solves problems involving probability.	28	NR	29	NR	33	NR
1	illustrates mutually exclusive events.	19	NR	29	NR	31	NR
2	finds the probability of A union B.	21	NR	22	NR	25	NR
a	finds the probability of a simple event.	39	MR	29	NR	27	NR
b	illustrates an experimental probability and a theoretical probability.	22	NR	22	NR	26	NR
3	counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle.***	15	NR	19	NR	19	NR
4	illustrates an experiment, outcome, sample space and event.***	50	MR	38	MR	47	MR
J	draws conclusions from graphic and tabular data and measures of central tendency and variability.	31	NR	24	NR	26	NR
1	calculates the measures of central tendency of ungrouped and grouped data.	53	MR	41	MR	57	MR
a	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	56	MR	51	MR	66	MR
b	evaluates a sum using sigma notation	17	NR	17	NR	16	NR
2	calculates the measures of variability of grouped and ungrouped data.	28	NR	30	NR	38	MR
a	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	39	MR	38	MR	39	MR
3	uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive.***	65	MR	53	MR	62	MR

a	organizes data in a frequency distribution table.	41	MR	32	NR	45	MR
K	interprets measures of position.	32	NR	27	NR	26	NR
TOTAL		44	MR	36	MR	42	MR

Table 3.b: Readiness of Incoming Senior High School Learners per Strand of Academic Track in Statistics and Probability of Senior High School along the Identified Prerequisite Competencies

The Humanities and Social Science (HUMSS) Learners were moderately ready on the seventeen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. The seventeen prerequisite competencies are as follows: locates points in the Cartesian plane; illustrates and finds the y-intercept of linear equation; performs operations on rational algebraic expressions; performs operations on rational numbers; expresses rational numbers from fraction form to decimal form and vice versa; estimates the square root of a whole number, rational number and irrational number to the nearest hundredth; differentiates between equations and inequalities; translates English sentences to mathematical sentences and vice versa; translates English phrases to mathematical phrases and vice versa; determines dependent and independent variables; illustrates an experiment, outcome, sample space and event; calculates the measures of central tendency of ungrouped and grouped data; illustrates the measures of central tendency (mean, median, and mode) of a statistical data; calculates the measures of variability of grouped and ungrouped data; illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data; uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive; and organizes data in a frequency distribution table. While, eleven over twenty-eight prerequisite competencies fell under not ready category. The eleven prerequisite competencies are as follows: sketches the graph of linear functions; finds the slope of a line given two points, equation, and graph; solves problems involving probability; illustrates mutually exclusive events; finds the probability of A union B; finds the probability of a simple event; illustrates an experimental probability and a theoretical probability; counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle; draws conclusions from graphic and tabular data and measures of central tendency and variability; evaluates a sum using sigma notation; and interprets measures of position. The over-all Mean Percentage Score of the Humanities and Social Science (HUMSS) Learners is 42% which means that they are moderately ready.

Under the Technical Vocational and Livelihood Track (TVL), the learners from the HE strand were categorized as moderately ready on the nine prerequisite competencies; the IA Learners were moderately ready on the nine over twenty-eight prerequisite competencies; the ICT Learners were moderately ready on the fourteen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. It can be gleaned that the learners under this track had only few moderately ready prerequisite competencies.

Under the Academic Track, the learners from Accountancy, Business, and Management (ABM) strand were moderately ready on the seventeen over twenty-eight prerequisite competencies; the General Academic Strand (GAS) learners were moderately ready on the fourteen over twenty-eight prerequisite competencies and; the Humanities and Social Science (HUMSS) Learners were moderately ready on the seventeen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. The learners under this track got more moderately ready prerequisite competencies than the learners from TVL track.

These means that the learners taking the mentioned strands had reached the required mastery level for these prerequisite competencies. This could be attributed to the awareness beforehand of the not mastered prerequisite competencies which were addressed through appropriate remediation due to the encouragement to the teachers to enhance the mastery level of the least learned competencies in Mathematics (Erlano, 2012). According to Firmanes (2006), the probable reasons for this was the students were motivated thoroughly and encouraged while on discussion. With this, learning the subsequent competencies belonging to Statistics and Probability will be at spontaneous rate and at ease.

However, the strands under TVL track had not ready prerequisite competencies: the HE learners fell under not ready category on the nineteen over twenty-eight prerequisite competencies; the IA learners were under not ready category on nineteen over twenty-eight prerequisite competencies and; the ICT learners fell under not ready category on fourteen over twenty-eight prerequisite competencies. Thus, the learners under this track had many not ready prerequisite competencies.

On the other hand, the strands on the academic track had also not ready prerequisite competencies: the ABM learners fell under not ready category on the eleven over twenty-eight prerequisite competencies; the GAS learners fell under not ready category on fourteen over twenty-eight prerequisite competencies and; the HUMSS learners were not ready on eleven over twenty-eight prerequisite competencies.

This means that the students did not reach the required mastery level for the prerequisite competencies. Hence, they are not ready on the subsequent competencies belonging to Statistics and Probability. Possible reasons can be linked to lack of motivation and support to reach the required mastery level. Also, the students were at the beginning level only and half of the contents considered, including Statistics and Probability, were not mastered by the students (Capate and Lapinid, 2015). Since, most of the prerequisite competencies of Statistics and Probability were at the third quarter or fourth quarter of the Curriculum Guide (Curriculum Guide, 2013). Thus, low performance in the prerequisite subjects can be equated to future failure in subsequent subject (Zakariya, 2016). Teachers should be mindful of the prerequisite competencies, together with the educational heads, and mastery of the prerequisite competencies should be established before imparting the new competencies to secure readiness (Dio and Herrera, 2016). Er (2017) affirmed that remediation should be undertaken prior to taking the higher Mathematics.

TEST THE SIGNIFICANT DIFFERENCE IN THE LEVEL OF READINESS IN STATISTICS AND PROBABILITY WHEN GROUPED ACCORDING TO STRANDS ALONG THE IDENTIFIED PRE-REQUISITE COMPETENCIES

The table 4 shows the result of the test of significant difference in the level of readiness in Statistics and Probability when grouped according to strands along the identified prerequisite competencies through the H test or Kruskal-Wallis Test. The following prerequisite competencies, with its respective H-computed values, had H-computed values which are greater than H-critical value of 11.070 at 0.05 level of significance with 5 degree of freedom, therefore the null hypothesis is disconfirmed which means that there is a significant difference in the level of readiness in Statistics and Probability when grouped according to strands along the identified prerequisite competencies: 1. Sketches the graph of linear functions (14.644); 2. locates points in the Cartesian plane (120.686); 3. performs operations on rational algebraic expressions (57.384); 4. performs operations on rational numbers (86.581); 5. expresses rational numbers from fraction form to decimal form and vice versa (124.562); 6. estimates the square root of a whole number, rational number and irrational number to the nearest hundredth (98.874); 7. differentiates between equations and inequalities (45.61); 8. translates English sentences to mathematical sentences and vice versa (82.977); 9. translates English phrases to mathematical phrases and vice versa (29.156); 10. determines dependent and independent variables (14.827); 11. solves problems involving probability (333.714); 12. illustrates mutually exclusive events (363.933); 13. finds the probability of a simple event (16.817); 14. illustrates an experiment, outcome, sample space and event (17.954); 15. draws conclusions from graphic and tabular data and measures of central tendency and variability (11.404) ; 16. calculates the measures of central tendency of ungrouped and grouped data (180.102); 17. illustrates the measures of central tendency (mean, median, and mode) of a statistical data (91.062); 18. calculates the measures of variability of grouped and ungrouped data (126.629); 19. uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive (126.629); 20. organizes data in a frequency distribution table (22.857); and 21. interprets measures of position (20.571). On the other hand, seven prerequisite competencies entail no significant differences on the readiness of the groups of strands under study which means the six groups of respondents performed at the same rate along the prerequisite competencies. The following prerequisite competencies were as follows with its respective H-computed value: 1. finds the slope of a line given two

PREREQUISITE COMPETENCIES		H-Value	Decision on Ho	Conclusion
A.	sketches the graph of linear functions	14.644	Reject	Significant
1	locates points in the Cartesian plane	120.686	Reject	Significant
2	finds the slope of a line given two points, equation, and graph.	4.478	Accept	Not Significant
3	illustrates and finds the y-intercept of linear equation.	10.352	Accept	Not Significant
B.	performs operations on rational algebraic expressions.	57.384	Reject	Significant
1	performs operations on rational numbers	86.581	Reject	Significant
C.	expresses rational numbers from fraction form to decimal form and vice versa.	124.562	Reject	Significant
D.	estimates the square root of a whole number, rational number and irrational number to the nearest hundredth.	98.874	Reject	Significant
E	differentiates between equations and inequalities.	45.61	Reject	Significant
F.	translates English sentences to mathematical sentences and vice versa.	82.977	Reject	Significant
1	translates English phrases to mathematical phrases and vice versa.	29.156	Reject	Significant
H.	determines dependent and independent variables.	14.827	Reject	Significant
I.	solves problems involving probability.	333.714	Reject	Significant
1	illustrates mutually exclusive events.	363.933	Reject	Significant
2	finds the probability of A union B.	3.2	Accept	Not Significant
a	finds the probability of a simple event.	16.817	Reject	Significant
b	illustrates an experimental probability and a theoretical probability.	6.425	Accept	Not Significant
c	counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle.***	5.852	Accept	Not Significant
d	illustrates an experiment, outcome, sample space and event.***	17.954	Reject	Significant
J.	draws conclusions from graphic and tabular data and measures of central tendency and	11.404	Reject	Significant

	variability.			
1.	calculates the measures of central tendency of ungrouped and grouped data.	180.102	Reject	Significant
a	illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	91.062	Reject	Significant
b	evaluates a sum using sigma notation	2.976	Accept	Not Significant
2.	calculates the measures of variability of grouped and ungrouped data.	16.991	Reject	Significant
a	illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data.	5.751	Accept	Not Significant
3.	uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive.***	126.629	Reject	Significant
a	organizes data in a frequency distribution table.	22.857	Reject	Significant
K.	interprets measures of position.	20.571	Reject	Significant

df = 5, a = 0.05, H-Tabular = 11.070

Table 4: Significant Difference in the Level of Readiness in Statistics and Probability when Grouped According to Strands along the Identified Prerequisite Competencies

points, equation, and graph (4.478); 2. illustrates and finds the y-intercept of linear equation (10.352); 3. finds the probability of A union B (3.2); 4. illustrates an experimental probability and a theoretical probability (6.425); 5. counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (5.852) 6. evaluates a sum using sigma notation (2.976); and 7. illustrates the measures of variability (range, average deviation, variance, standard deviation) of a statistical data (5.751). The test revealed that there are twenty-one over twenty-eight prerequisite competencies which entail having significant differences in the level of readiness in Statistics and Probability of the considered strands of senior high school. This means that the groups of students per strand differ in terms of their readiness along the identified twenty-one prerequisite competencies.

According to Bahceci and Gurol (2016), "One of the most important problems of education is the increase in the number of students parallel to the global population growth. Because of this problem, teachers are forced to apply method whose instructional aims are same and teaching is performed in line with these aims to all students having different levels, interests, and capabilities. This method in which Individualization Instruction cannot be achieved bring about some problems such as not providing enough feedbacks and not determining the strengths and weaknesses of the students" (p. 2). Hence, Thorndike (1932) asserts that the quality of response depends upon the state of readiness of the learners and readiness influenced behaviour and learning. This could be due to the differences that exist among students which were not given much attention during the planning and implementation of teaching and learning processes.

PRE-REQUISITE COMPETENCIES IN STATISTICS AND PROBABILITY THAT WERE NOT MASTERED WHEN GROUPED ACCORDING TO STRAND

Table 5 shows the Prerequisite Competencies that were not mastered among the Identified Prerequisite Competencies of SHS Statistics and Probability when Grouped According to Strand. Under TVL track, the HE strand had seven (7) not mastered prerequisite competencies. These competencies with its performance level were: 1) solves problems involving probability (22); 2) illustrates mutually exclusive events (22); 3) illustrates an experimental probability and a theoretical probability (17); 4) counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (19); 5) draws conclusions from graphic and tabular data and measures of central tendency and variability (24); 6)

Prerequisite Competencies	Technical Vocational and Livelihood Track			Academic Track		
	HE	IA	ICT	GAS	HUMSS	ABM
solves problems involving probability.	22	-	23	-	-	-
illustrates mutually exclusive events.	22	22	19	-	-	19
finds the probability of A union B.	-	-	21	22	-	21
illustrates an experimental probability and a theoretical probability.	17	21	-	22	-	22
counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle.***	19	16	19	19	19	15
draws conclusions from graphic and tabular data and measures of central tendency and variability.	24	-	-	24	-	-

evaluates a sum using sigma notation	15	19	14	17	16	17
calculates the measures of variability of grouped and ungrouped data.	-	24	-	-	-	-
interprets measures of position.	-	22	19	-	-	-
sketches the graph of linear functions	18	-	-	22	15	19

Table 5: Pre-Requisite Competencies in Statistics and Probability that where Not Mastered when Grouped According to Strand

evaluates a sum using sigma notation (15); and; 7) sketches the graph of linear functions (18). The IA strand had six (6) not mastered prerequisite competencies. These competencies with its performance level were as follow: 1) illustrates mutually exclusive events (22); 2) illustrates an experimental probability and a theoretical probability (21); 3) counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (16); 4) evaluates a sum using sigma notation (19); 5) calculates the measures of variability of grouped and ungrouped data (24) and; 6) interprets measures of position (22). Lastly, the ICT strand had seven (7) not mastered competencies. The competencies with its respective performance level were as follow: 1.) solves problems involving probability (23); 2) illustrates mutually exclusive events (19); 3) finds the probability of A union B (21); 4) counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (19); 5) evaluates a sum using sigma notation (14); 6) interprets measures of position (19) and; 7) solves problems involving probability (23).

Under academic track, the GAS strand had six (6) not mastered prerequisite competencies. The GAS strand had the following not mastered prerequisite competencies with its respective performance level: 1) finds the probability of A union B (22); 2) illustrates an experimental probability and a theoretical probability (22); 3) counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (19); 4) draws conclusions from graphic and tabular data and measures of central tendency and variability; 5) evaluates a sum using sigma notation (17) and; 6) sketches the graph of linear functions. The HUMSS strand had three (3) not mastered prerequisite competencies. The competencies with its respective performance level were: 1) counts the number of occurrences of an outcome in an experiment: (a) table; (b) tree diagram; (c) systematic listing; and (d) fundamental counting principle (19); 2) evaluates a sum using sigma notation (16) and; 3) sketches the graph of linear functions (15). Finally, the ABM strand had six (6) not mastered prerequisite competencies. These were: 1) illustrates mutually exclusive events (19); 2) finds the probability of A union B (21); 3) illustrates an experimental probability and a theoretical probability (21); 4) illustrates an experimental probability and a theoretical probability (17) and; 5) evaluates a sum using sigma notation (17) and; 6) sketches the graph of linear functions (19). Hence, the HUMSS strand had the lowest number of not mastered prerequisite competencies.

The subject matter under study had six contents. The groups of learners per strand had mastered and nearly mastered the prerequisite competencies that belongs to the contents Sampling and Sampling Distributions and Tests of Hypothesis. While, the not mastered prerequisite competencies belong to the remaining contents. Under Random Variables and Probability Distributions, there were seven not mastered prerequisite competencies. These were: 1) solves problems involving probability; 2) illustrates mutually exclusive events; 3) finds the probability of A u B; 4) illustrates an experimental probability and a theoretical probability; 5) draws conclusions from graphic and tabular data and measures of central tendency and variability; 6) evaluates a sum using sigma notation; 7) calculates the measures of variability of grouped and ungrouped data. For the content Normal Distribution, three prerequisite competencies were not mastered by the learners. These were: 1) evaluates a sum using sigma notation; 2) calculates the measures of variability of grouped and ungrouped data; 3) interprets measures of position. For Estimation of Parameters, there is only one not mastered competency. 1. solves problems involving probability. The content Correlation and Regression Analyses had only one not mastered competency. 1) sketches the graph of linear functions.

It can be observed that the strands under TVL track had more not mastered prerequisite competencies than the strands under academic strand. The existence of not mastered skills from Junior High School Mathematics which were also the prerequisite competencies of the SHS Statistics and Probability was evident. According to Capate and Lapinid (2015) students were only at the beginning level only and half of the contents considered, including Statistics and Probability, were not mastered by the students. This was supported by the study of Pura (2015), she found out that the students were only at the beginning level only in the five mathematics skills, namely describing, identifying, performing operations, solving worded problems and illustrating. And, these mathematical skills were the least learned skills. Mayer (1975) believed that prerequisites are vital for holistic learning as he asserts that, "the importance of prerequisite knowledge is a variable in learning, and points to the fact that new nodes cannot be connected to existing structure if the knowledge required to support new information does not exist in the learner" (p. 540). This was also concluded by Hubilla (2013) in his study as he said that, mathematical skills are built on one another and pupils need to build a strong mathematical skill or concept that they learn will be built on that foundation.

PROPOSED INTERVENTION MATERIALS

The Statistics and Probability Worksheets (TVL and Academic) for Senior High School was the output of this study**.** The main purpose of this was to prepare the incoming Senior High School learners per strand in Statistics and Probability. It was developed after identifying the not mastered prerequisite competencies of respondents categorized by strands. These worksheets were embedded with special features to guarantee its effectiveness. First,

contextualization of the worksheets was made to cater the needs of each strand, specifically on understanding and relating to the concepts of the lessons. Second, self-referencing was integrated which is one of the levels of personalization intended to make the worksheet individualized and differentiated to allow learners to put their selves as characters on the storyline of the activities. Third, made user friendly through the interactive activities, pictures, colorful layouts and designs. This will attract the users and catch their interests. Lastly, it has an indicator that evaluates the readiness level of the learner upon checking of the activity to lead students and teacher to reflect to be able to plan continuous learning activities or actions.

This can be used as an instructional material in a remedial program. This can be a homework to be accomplished before teaching the subsequent competencies of Statistics and Probability for retention of learning and development of connections or bridging the gaps on the concepts from prerequisite competency to the subsequent one. This can also be used as a motivation or preliminary activity to introduce the lessons or recall the basic concepts of the lesson. Thus, it is hereby proposed as an intervention material.

IV. CONCLUSIONS AND RECOMMENDATIONS

Based from the findings, the following conclusions were drawn: (1) the experts who validated the prerequisite competencies identified twenty eight prerequisite competencies for Senior High School Statistics and Probability; (2) Under TVL track, the learners from the Home Economics (HE) strand were categorized as moderately ready on the nine prerequisite competencies. Meanwhile, nineteen over twenty-eight prerequisite competencies fell under not ready category. The Industrial Arts (AI) Learners were moderately ready on the nine over twenty-eight prerequisite competencies. They were under not ready category on nineteen over twenty-eight prerequisite competencies. The Information and Communication Technology (ICT) Learners were moderately ready on the fourteen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. Then, fourteen over twenty-eight prerequisite competencies fell under not ready category. Under Academic track, the learners from Accountancy, Business, and Management (ABM) strand were moderately ready on the seventeen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. On the other hand, eleven over twenty-eight prerequisite competencies fell under not ready category. The General Academic Strand (GAS) learners were moderately ready on the fourteen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. Then, fourteen over twenty-eight prerequisite competencies fell under not ready category. The Humanities and Social Science (HUMSS) Learners were moderately ready on the seventeen over twenty-eight prerequisite competencies of Statistics and Probability of Senior High School. While, eleven over twenty-eight prerequisite competencies fell under not ready category; (3) There are significant differences among the level of readiness of the strands considered in this study, particularly on the twenty-one over twenty-eight prerequisite competencies of SHS Statistics and Probability; (4) There are prerequisite competencies that were not mastered among the identified Prerequisite Competencies of SHS Statistics and Probability when Grouped According to Strand; (5) The Statistic and Probability Worksheets (TVL and Academic Track) can be an aid to recuperate the not mastered prerequisite competencies of the learners.

This study recommends the following: (1) Teachers should conduct a pre-assessment on the readiness of the learners prior to taking SHS Statistics and Probability; (2) The school teachers and administrators should ensure the readiness on the prerequisite competencies from junior high school Mathematics of the incoming senior high school learners before learning the subsequent competencies of Statistics and Probability; (3) Remedial classes should be planned and implemented to prepare the learners for the competencies of Statistics and Probability and ensure attainment of learning objectives; (4) Validation of the Statistics and Probability Worksheets (for TVL and Academic Track) is hereby suggested to guarantee evident success from the utilization of the instructional material; (5) Further studies considering the gaps of the study is being recommended.

REFERENCES

[1] What You Need To Know About The Right To Education. (n.d.). http:// en.unesco.org. Date Retrieved: April 6, 2018.
[2] Ng, P. T. (2015). What Is Quality Education? How Can It Be Achieved? The Perspectives of School Middle Leaders in Singapore. http://www.researchgate.net. Date Retrieved: April 6, 2018.
[3] The DepEd Mission. http://www.deped.gov.ph. Date Retrieved: April 6, 2018.
[4] Republic Act No. 10533. http:// officialgazette.gov.ph. Date Retrieved: May 11, 2018.
[5] K to 12 Updates.(n.d.). http www.ceap.org.ph. Date Retrieved: April 7, 2018.
[6] The Importance of Maths in Everyday Life. http://m.timesofindia.com. Date Retrieved: April 7, 2018.
[7] Richardson, L. I., Sherman, H. J., & Yard, G. J. (2014). Why Do Students Struggle With Mathematics. http://www.scribd.com. Date Retrieved: April 7, 2018.
[8] TIMSS 2003 International Mathematics Report (n.d.). https://timss.bc.edu. Date Retrieved: May 5, 2018.
[9] Mullis, I.V.S., Arora, A., & Foy, P. (2009). TIMSS Advanced 2008 International Report: Findings from IEA's Study of Achievement in Advanced Mathematics and Physics in the Final Year of Secondary School. http://www.timssandpirls.bc.edu. Date Retrieved: August 25, 2018.
[10] DepEd Order No. 8, s 2015 – Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program. http://www.deped.gov.ph. Date Retrieved: May 16, 2018.
[11] DepEd Order No. 13, s. 2018 – Implementing Guidelines on the Conduct of Remedial and Advancement Classes

During Summer for the K to 12 Basic Education Program. http://www.deped.gov.ph. Date Retrieved: May 16, 2018.
[12] The Understood Team. (n.d.). Remedial Programs: What You Need to Know. http://www.google.com. Date Retrieved: May 2, 2018.
[13] Association for Experiential Education. (2010). What is Experiential Education?. http://www. aee.org. Date Retrieved: May 5, 2018.
[14] Wyels, C. (2019). Engaging Students via In-Class Worksheets. http://www.maa.org. Date Retrieved: August 25, 2018.
[15] Thorndike, E. L. (1932). The Fundamentals of Learning. New York. Teachers College Columbia University. http://www.babel.hathitrus.org. Date Retrieved: August 25, 2018.
[16] Department of Education's Curriculum Guide. http://www.deped.gov.ph. Date Retrieved: May 16, 2018
[17] Albacea, Z. JV., Ayaay, M. J. V., David, I. P., & de Mesa I. E. Teaching Guide for Senior High School Statistics and Probability. Diliman, Quezon City. Commission on Higher Education.
[18] Cruz, I. (2015). Mini Critique, the Philippine Star. http://www.philstar.com. Date Retrieved: August 25, 2018
[19] Dewey, J. (1897). The Essentials Dewey Volume 1 Pragmatism, Education, Democracy. Bloomington, USA. Indiana University Press. http:// www.books.google.com. Date Retrieved: August 25, 2018.
[20] Sevilla, Consuelo G. (1992). Research Methods. Manila: Rex Books Store.
[21] Horodnic, I. A., Ursachi, G., & Zait, A. (2015). How reliable are measurement scales? External factors with indirect influence on reliability estimators.http// www.sciencedirect.com. Date Retrieved: May 20, 2020.
[22] Herrera, C. D. 2016. Extent of Readiness of Grade 10 Students for General Mathematics of Senior High School in Sorsogon City, Philippines. Master's Thesis. Sorsogon State College - School of Graduate Studies, Sorsogon City.
[23] Deped Order No. 39, s. 2012 - Policy Guidelines on Assessing Learning Gaps and Implementing a Reading and Writing Program in Secondary Schools Effective School Year (SY) 2012-2013. http://www.deped.gov.ph. Date Retrieved: May 16, 2018.
[24] Erlano, R. C. (2002). The Performance of Students in Mathematics IV Based on Strategies Utilized by Teachers. Master's Thesis. Sorsogon State College - School of Graduate Studies, Sorsogon City.
[25] Firmanes, J. G. (2006). Attitudes of Students towards Problems Solving in Relation to Their Performance in Mathematics. Master's Thesis. Sorsogon State College - School of Graduate Studies, Sorsogon City.
[26] Capate, R. N. A., & Lapinid M. R. C. (2015). Assessing the Mathematics Performance of Grade 8 Students as Basis for Enhancing Instruction and Aligning with K to 12 Curriculum. http://xsite.dlsu.edu.ph. Date Retrieved: May 2, 2018.
[27] Zakariya, Y. F. (2016). Validity of Math 105 as Prerequisite to Math 201 among Undergraduate Students. Department of Science Education, Ahmadu Bello University, Zaria, Nigeria. Retrieved from the ERIC database. (EJ1086952)
[28] Herrera C. and Dio, R. V. (2015). Extent of Readiness of Grade 10 Students for General Mathematics of Senior High School in Sorsogon City, Philippines. http:// apjeas.apjmr.com. Date Retrieved: May 2, 2018.
[29] Er, S. N. (2017). Mathematics Readiness of First-Year College Students and Missing Necessary Skills: Perspectives of Mathematics Faculty. http:// www.tandfonline.com. Date Retrieved: May 2, 2018.
[30] Bahceci, F., & Gurol, M. (2016). The Effect of Individualized Instruction System on the Academic Achievement Scores of Students. http:// www.hindawi.com. Date Retrieved: January 20, 2020.
[31] Pura, G. E. 2014. Least Learned Mathematical Skills of Grade 7 Students. Master's Thesis. Sorsogon State College - School of Graduate Studies, Sorsogon City.
[32] Mayer, R. E. (1975). Information Processing Variables in Learning to Solve Problems. www.citeseerx.ist.psu.edu. Date Retrieved: May 2, 2018.
[33] Hubilla, L. J. (2013). Extent of Readiness of Incoming Grade & Students in Mathematics at Jupi National High School. Master's Thesis. Sorsogon State College - School of Graduate Studies, Sorsogon City.