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Senior High School Learner's Difficulties in Statistics and Probability

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Abstract:

This study investigates the learning difficulties encountered by senior high school learners in Statistics and Probability, focusing on the area of content knowledge and pedagogy, learning environment, and teacher's competence when grouped according to sex, track, school of origin, and average family monthly income. The research reveals a predominance of male learners, primarily from the academic track and private schools, with many belonging to higher-income families. Key findings indicate that students struggle significantly with memorizing formulas and computing test statistics while they experience less difficulty in differentiating variables. The learning environment is identified as a critical factor, with fluctuating classroom temperatures and noise levels hindering concentration, particularly for female learners. Additionally, challenges in note-taking due to fast-paced and poorly organized lectures highlight the need for improved teacher competence through professional development. The study finds no significant differences in difficulties among learners based on demographic variables, suggesting that all students face similar challenges in mastering Statistics and Probability. These findings emphasize the need for targeted instructional strategies and enhanced learning conditions to support student success in this important subject.

Keywords: Learning Difficulties, Statistics and Probability, Senior High School Students

Introduction:

Nature of the Problem

Learning difficulty refers to challenges that children and adolescents encounter in acquiring, retaining, organizing, and using skills in areas such as listening, speaking, reasoning, reading, spelling, writing, and mathematics. While the term learning difficulty is not a formal diagnosis, it is frequently used in educational settings to describe students who struggle to learn in multiple areas. Learning difficulties can stem from internal factors, such as neurodevelopmental differences, sensory impairments, behavioral challenges, and psychological issues, as well as external factors, including the school or home environment, available opportunities, and relationships. Children and adolescents with learning difficulties may exhibit characteristics such as slower processing of classroom information, poorer retention of facts and processes, inconsistent performance in class activities and assessments, and lower self-esteem and confidence related to learning (Learning Links, 2025). Statistics and Probability is a branch of Mathematics and one of the five learning domains in the Philippines' K to 12 Basic Education Curriculum (Reston, 2023). It emphasizes the spiral progression of topics on simple data presentations. Learning statistics and probability was difficult for students before the pandemic, but it became more visible during the pandemic. As a result of online, synchronous, asynchronous, and modular teaching, students have been struggling to learn statistics and probability. Learning difficulties are very observable to the students, especially during the discussions of the lesson. Students have been experiencing difficulties coping with the lesson when doing school activities related to the lesson discussed.

As a member of the academe, the researcher had to investigate the learner's difficulties in Statistics and Probability in content knowledge and pedagogy, learning environment, and teacher's competence. Furthermore, the result of this study will be a basis for an intervention plan that can help teachers lessen the difficulties encountered by the learners in learning Statistics and Probability.

Current State of Knowledge

Cognitive challenges associated with learning mathematics, particularly focusing on terms such as "Mathematical Learning Disability," "Developmental Dyscalculia," and "Mathematical Learning Disorder," were explored by Baccaglini-Frank and Di Martino (2020). These concepts came from cognitive psychology and referred to various cognitive deficits that hinder students' ability to process numerical information, leading to difficulties in mathematics. In the research, it was discussed that the historical context of these terms, noting that early studies were connected to cognitive deficits to low performance in arithmetic. Such disorders imply that they can significantly impact students' academic performance in subjects like statistics and probability.

These cognitive challenges were further studied in Kurdistan by Waswa & Al-kassab (2023), where results show three primary sources of difficulty in learning mathematics: learners' cognitive abilities, problem-solving processes, and external factors such as overcrowded classrooms, fear and anxiety, weak foundational knowledge, and the quality of instructors and instructional materials. Flores (2018) studied the phenomenon in Iba, Zambales where the findings indicated that while students demonstrated proficient academic performance throughout the year, they faced moderate difficulties in understanding Patterns and Algebra and significant challenges in Geometry, Trigonometry, Probability, and Statistics.

Overcrowded classrooms is one of the contributing factors to learner's difficulties in probability and statistics as outlined by Waswa & Al-kassab (2023), but on a broader scale, the learning environment has a significant impact, as examined by Rusticus et al. (2023) in Canada. The findings indicate that high levels of engagement, a positive emotional climate, peer support, strong faculty-student relationships, meaningful experiences, and smaller class sizes improve the learning environment. On further discussion on peer support, Moldes et al. (2019) highlighted the tendency for peer pressure to significantly impact the academic performance in their research in Jagobiao, Mandaue. The results indicate a correlation between the perceived levels of peer pressure in the identified categories, suggesting encouraging students in adopting an optimistic outlook to mitigate the negative effects of peer pressure on their studies.

Deficiencies in the foundational knowledge of statistics is another contributor to learner's difficulties. In Indonesia, difficulties primarily arise from conceptual weakness, including errors in process skills, misunderstandings of questions, and mistakes in notation as studied by Kurniawan (2019). Similar research in Indonesia by Puspitasari et al. (2019) shows that there are still many students who get poor grades in statistics and probabilities due to difficulties in probabilistic reasoning, combinatoric reasoning, and proof of variability in random variables. Senior high school students in Magalang, Pampanga also exhibited similar difficulties in rudimentary concepts of statistics and probability. Calma et al. (2022) found that while students generally held positive attitudes towards the subject, they experienced anxiety and performed unsatisfactorily, particularly in fundamental concepts, random variables, normal distribution, and hypothesis testing.

Theoretical Underpinnings

This study is anchored to the Theory of Perkins (2017), both educational researchers and experienced teachers develop what might be called theories of difficulty. A strong theory of difficulty identifies learners' characteristic trouble spots for a particular area of instruction and includes some causal analysis of why they occur toward improved teaching and learning. In a number of studies, a strong theory of difficulty has led to improved learning. In everyday teaching, teachers' responses to recurrent difficulties may fall short. One not-uncommon reaction is to blame the learners' weaknesses and simply keep teaching in the same way. Another better reaction is to 'teach harder,' lavishing more time and attention on characteristic difficulties without any causal analysis of what makes them problematic.

The theory mentioned is related to this study because the researcher's goal was to determine what are the learning difficulties encountered by the learners. It provides an overview of the difficulties that the students commonly experience. According to Perkins, teachers need to identify the methods used, understand the theories of difficulties, and know different approaches and modified approaches to address difficulties. This research aimed to propose an intervention plan that can be proposed and used by teachers to help learners with difficulties.

Objectives

This study aimed to determine the level of senior high school learner's difficulties in Statistics and Probability in a private school in the National Capital Region for the School Year 2023-2024 as a basis for an intervention plan. Specifically, the study sought to answer the following questions: 1) level of senior high school learner's difficulties in Statistics and Probability according to the following areas of content knowledge and pedagogy, learning environment, and teachers competence; 2) the level of senior high school learner's difficulties in Statistics and Probability when grouped according to the aforementioned variables; 3) the significant difference in the level of senior high school learners' difficulties in Statistics and Probability when grouped and compared according to the aforementioned variables.

Methodology

This chapter presents the methodology of the study. It discusses the research design, locale of the study, subject, and the participants. This data-gathering procedure includes the research instrument and the test of its validity and reliability, the data-processing procedure, the analytical schemes, and the statistical tools.

Research Design

Given the nature of the data, this study utilized a descriptive research design. Descriptive research design aims to describe a population, situation, or phenomenon accurately and systematically. It could use a wide variety of research methods to investigate one or more variables. In this type of research design, the researcher does not control or manipulate any of the variables but only observes and measures them. It is appropriate to use this type of design to identify characteristics, frequencies, trends, and categories (McCombes, 2023).

Study Respondents

The total population of senior high school learners is 707 and 250 learners was included in the study. Stratified random sampling technique was used in collecting data. Stratified random sampling is a sampling technique wherein the population is divided into strata based on their characteristics or profile variables, and then random samples are taken from each subgroup (Hassan, 2024). This method was used to get a fair number of learners per stratum to avoid an imbalance in the distribution of the learners.

Instruments

The researcher gathered the needed data for this study by constructing a researcher-made survey questionnaire to determine the level of senior high school learners' difficulties in statistics and probability. The questionnaire was divided into two parts, in which I dealt with the profile of learners in terms of sex, track, school of origin, and average monthly family income. Part II of the questionnaire covered 30 items for senior high school learners' difficulties in Statistics and Probability, with 10 items for each area of Content Knowledge and Pedagogy, Learning Environment, and Teachers Competence. Each item will be rated on a scale of 1 to 5, using a 5-point Likert scale rating with 5 as always, 4 as often, 3 as sometimes, 2 as rarely, and 1 as Almost never.

Data Gathering Procedure

The researcher began by drafting a formal letter to the Principal and School Administrator, requesting permission to conduct the study. Upon receiving approval, the researcher then coordinated with the School Principals to set a convenient schedule for data gathering. The researchers randomly selected 30 learners to participate in the survey for the reliability test. This test was done to ensure that the questionnaire was tested for consistency and reliability. The consent form was given to the learners before the survey questionnaire was provided. The researcher distributed the questionnaires to the selected learners, providing clear instructions on how to complete them. The data collected was then encoded into a spreadsheet. Finally, the researcher summarized the result of the study in a clear and concise report, explaining each analysis and interpretation of the data.

Data Analysis and Statistical Treatment

Objective No. 1 descriptive analytical scheme was used to determine the level of Senior High School Learner’s Difficulties in Statistics and Probability according to Content Knowledge and Pedagogy, Learning Environment, and Teachers Competence.

Objective No. 2 descriptive analytical scheme was used to determine the level of Senior High School Learner’s Difficulties in Statistics and Probability when grouped according to the aforementioned variables.

Objective No. 3 A comparative analytical scheme was used to determine whether there is a significant difference in the level of senior high school learners' difficulties in statistics and probability when grouped and compared according to the aforementioned variables.

Ethical Consideration

The research study followed strict ethical considerations to ensure that the rights and personal information of all learners were kept at utmost confidentiality. One key protocol was informed consent, ensuring learners fully understood the study's purpose and potential impact. Their participation was entirely voluntary, free from any form of coercion, allowing them to make an informed decision. Confidentiality and anonymity were strictly maintained by the researcher. All personal data was securely protected under privacy regulations, ensuring that respondents' identities remained unknown. Their responses were used solely for the intended research purposes.

Results and Discussion

This section deals with the presentation, analysis, and interpretation of data gathered to conduct the objectives of this study.

Table 1

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy

Items	Mean	Interpretation
As a learner, I am having difficulties in…		
1. relating the lesson on Statistics and Probability to daily life experiences.	3.02	Moderate
2. providing an understanding of the application of Analysis of Variance to different fields (ex., medicine, finance, etc.).	3.15	Moderate
3. differentiating independent and dependent variables.	2.73	Moderate
4. memorizing the meaning of terminologies used in Statistics and Probability.	2.96	Moderate
5. computing test statistics using longer formulas.	3.26	Moderate
6. memorizing formulas used in Statistics and Probability.	3.44	Moderate
7. following the steps in hypothesis testing.	3.12	Moderate
8. performing correlation and regression analysis on real-life problems.	3.11	Moderate
9. explaining the solution for the problems solved.	3.02	Moderate
10. determining the appropriate statistical tool to be used.	3.16	Moderate
Mean	**3.10**	**Moderate**

Table 1 shows the level of senior high school learners' difficulties in Statistics and Probability in the area of content knowledge and pedagogy. The overall mean score is 3.10, interpreted as "moderate level." The results show that the learners are facing moderate difficulty in both memorizing formulas and distinguishing between independent and dependent variables. While the overall difficulty level is also moderate, specific challenges in formula memorization and variable differentiation are evident, suggesting potential areas for targeted instructional strategies. The results imply that the learners need to improve their understanding of the concept and determine how to apply the formula for each word problem. These are in line with the conclusions from the study (Arum, 2018), p. 21 where one of the three categories of difficulties in solving probabilistic problems includes the difficulty in choosing and using the appropriate strategy.

Table 2

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment

Items	Mean	Interpretation
As a learner, I am having difficulties in…		
1. listening to the class discussion because of the noise inside the classroom.	2.96	Moderate
2. finding a quiet place to focus on my schoolwork.	3.34	Moderate
3. using the school eLMS (eLearning Management System) due to the complexity of accessing the hand-outs.	2.73	Moderate
4. accessing the technology (laptops, calculators) and resources (books, eBooks) I need to learn effectively.	2.87	Moderate
5. solving word problems and reading the presentation due to inadequate lighting.	2.81	Moderate
6. Concentrate effectively due to sudden changes in temperature inside the classroom (sometimes too hot, sometimes too cold).	3.46	Moderate
7. Ask questions in class due to peer pressure or fear of judgment.	3.38	Moderate
8. looking at the writing on the board because of the classroom layout.	2.95	Moderate
9. balancing between physical space and class size.	2.69	Moderate
10. adjusting to uninviting or discouraging classmates' behavior.	3.00	Moderate
Mean	**3.02**	**Moderate**

Table 2 shows the level of senior high school learner's difficulties in Statistics and Probability in the area of the learning environment. The overall mean score is 3.02, interpreted as "moderate level." The results show that learners encounter moderate difficulty in concentrating due to fluctuating classroom temperatures. This suggests that classroom environmental factors, such as temperature control, may impact on the learning experiences of the learners. Additionally, while learners perceive moderate difficulty in balancing physical space and class size, this issue appears to be less significant compared to temperature-related concerns. The results justify the need to follow ISO 7730:2005, which suggests maintaining a classroom temperature of 23 to 26 °C in summer, with 40 to 60% relative humidity, to maintain optimal thermal comfort (Makaremi, 2024).

Table 3

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teacher's Competence

Items	Mean	Interpretation
As a learner, I am having difficulties in…		
1. applying the concepts learned because my teacher does not provide clear real-world examples.	2.62	Moderate
2. following the flow of the lessons because my teacher's explanations are confusing or unclear.	2.77	Moderate
3. staying engaged in class because my teacher's teaching style is monotonous or uninspiring.	2.57	Moderate
4. taking effective notes because the pace of the lecture is too fast and lacks clear organization.	3.05	Moderate
5. asking questions in class because my teacher seems unapproachable or dismissive.	2.35	Low
6. understanding the lesson because the teachers' grammar is wrong.	1.98	Low
7. looking for additional learning resources because my teacher has fewer resources for reference.	2.48	Low
8. feeling motivated or interested in the subject matter because the teacher does not encourage active participation.	2.52	Moderate
9. developing critical thinking skills because the class activities are not designed to foster deeper understanding.	2.58	Moderate
10. keeping up with the class material because the lessons are not adapted to different learning styles.	2.69	Moderate
Overall Mean	**2.56**	**Moderate**

As revealed in Table 3 in the area of Teacher Competence. The overall mean score is 2.56, interpreted as "moderate level." This implies that learners encounter moderate difficulty in taking notes due to the rapid lecture pace and lack of clear organization. Additionally, learners reported low levels of difficulty in understanding lessons due to teachers' grammatical errors, suggesting that this issue may have a less significant impact on learning outcomes compared to note-taking challenges. This study was supported by Salame (2020), and highlights the importance of notetaking, as it could lead to an improvement in the overall performance of the subject.

Table 4

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy When Grouped According to Sex

Items	Male		Female	
	Mean	Interpretation	Mean	Interpretation
As a learner, I am having difficulties in…				
1. relating the lesson on Statistics and Probability to daily life experiences.	3.00	Moderate	3.04	Moderate
2. providing an understanding of the application of Analysis of Variance to different fields (ex., medicine, finance, etc.).	3.11	Moderate	3.19	Moderate
3. differentiating independent and dependent variables.	2.64	Moderate	2.82	Moderate
4. memorizing the meaning of terminologies used in Statistics and Probability.	2.96	Moderate	2.95	Moderate
5. computing test statistics using longer formulas.	3.30	Moderate	3.21	Moderate
6. memorizing formulas used in Statistics and Probability.	3.51	High	3.37	Moderate
7. following the steps in hypothesis testing.	3.11	Moderate	3.14	Moderate
8. performing correlation and regression analysis on real-life problems.	3.10	Moderate	3.12	Moderate
9. explaining the solution for the problems solved.	3.00	Moderate	3.05	Moderate

10. determining the appropriate statistical tool to be used.	3.15	Moderate	3.17	Moderate
Overall Mean	**3.00**	**Moderate**	**3.11**	**Moderate**

The table above indicates the level of senior high school learners' difficulties in statistics and probability according to content knowledge when grouped according to sex. The overall mean is 3.00 for males and 3.11 for females with the interpretation of "moderate level." The study of Calma, et al. (2022) states that students have anxious feelings when they study Statistics and Probability. Students were found to perform unsatisfactory in Statistics and Probability. It also indicates that the students' strong knowledge is on the estimation of parameters and sampling distribution categories, but they are weak on fundamentals, random variables, normal distribution, and tests of hypothesis categories.

Table 5

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy When Grouped According to Track

Items	**Academic**		**TVL**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. relating the lesson on Statistics and Probability to daily life experiences.	2.98	Moderate	3.12	Moderate
2. providing an understanding of the application of Analysis of Variance to different fields (ex., medicine, finance, etc.).	3.12	Moderate	3.23	Moderate
3. differentiating independent and dependent variables.	2.67	Moderate	2.89	Moderate
4. memorizing the meaning of terminologies used in Statistics and Probability.	2.92	Moderate	3.06	Moderate
5. computing test statistics using longer formulas.	3.24	Moderate	3.32	Moderate
6. memorizing formulas used in Statistics and Probability.	3.44	Moderate	3.43	Moderate
7. following the steps in hypothesis testing.	3.14	Moderate	3.09	Moderate
8. performing correlation and regression analysis on real-life problems.	3.12	Moderate	3.07	Moderate
9. explaining the solution to the problems solved.	3.02	Moderate	3.04	Moderate
10. determining the appropriate statistical tool to be used.	3.16	Moderate	3.18	Moderate
Overall Mean	**3.08**	**Moderate**	**3.14**	**Moderate**

The result highlights differences in learner's difficulties based on their academic track. Item no. 3 shows a notable gap, with the academic track scoring 2.67 and the TVL track scoring 2.89, both interpreted as a "moderate level" of difficulty. This suggests that while both groups struggle with differentiating variables, TVL students find it slightly more difficult. Additionally, both tracks experience greater difficulty memorizing formulas used in Statistics and Probability, emphasizing the need for teaching strategies that support retention and conceptual understanding across all learners. According to Ruz (2020), 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 the TVL track and there were more moderately ready prerequisite competencies in the strands under the academic track. There were prerequisite competencies in Statistics and Probability per strand that were unmastered. Thus, the proposed preparatory learning worksheets per strand were developed to recuperate the not-mastered prerequisite competencies.

Table 6

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy When Grouped According to School of Origin

Items	Public Mean	Interpretation	Private Mean	Interpretation
As a learner, I am having difficulties in…				
1. relating the lesson on Statistics and Probability to daily life experiences.	3.08	Moderate	3.00	Moderate
2. providing an understanding of the application of Analysis of Variance to different fields (ex., medicine, finance, etc.).	3.32	Moderate	3.08	Moderate
3. differentiating independent and dependent variables.	2.65	Moderate	2.76	Moderate
4. memorizing the meaning of terminologies used in Statistics and Probability.	2.94	Moderate	2.97	Moderate
5. computing test statistics using longer formulas.	3.46	Moderate	3.18	Moderate
6. memorizing formulas used in Statistics and Probability.	3.46	Moderate	3.43	Moderate
7. following the steps in hypothesis testing.	3.19	Moderate	3.10	Moderate
8. performing correlation and regression analysis on real-life problems.	3.15	Moderate	3.09	Moderate
9. explaining the solution for the problems solved.	3.02	Moderate	3.02	Moderate
10. determining the appropriate statistical tool to be used.	3.19	Moderate	3.15	Moderate
Overall Mean	**3.15**	**Moderate**	**3.08**	**Moderate**

Based on Table 6, the level of senior high school learners' difficulties in statistics and probability according to content knowledge when grouped according to the school of origin got an overall means scores are 3.15 for the learners from the public school, and 3.08 for the learners from the private school, interpreted as "moderate level. The result also implies that the learners who finish in a public school are more challenged than the ones who graduated in a private school in computing for test statistics and understanding its application. Learners from public school encounter difficulties in using longer formulas in solving word problems. According to the study by Bernardo et al. (2022), students from public schools also performed worse compared to private schools. Filipino students performed poorly in the Programmed for International Student Assessment (PISA) mathematics assessment, with more than 50% of the participants obtaining scores below the lowest proficiency level. The study points to a cluster of resource constraint-related variables that include motivational and social cognitive elements, and possible distinct convergences of factors for those in public and private schools.

Table 7

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy When Grouped According to Average Family Monthly Income

Items	Lower Mean	Interpretation	Higher Mean	Interpretation
As a learner, I am having difficulties in…				
1. relating the lesson on Statistics and Probability to daily life experiences.	2.98	Moderate	3.06	Moderate
2. providing an understanding of the application of Analysis of Variance to different fields (ex., medicine, finance, etc.).	3.22	Moderate	3.09	Moderate
3. differentiating independent and dependent variables.	2.77	Moderate	2.68	Moderate
4. memorizing the meaning of terminologies used in Statistics and Probability.	2.98	Moderate	2.94	Moderate
5. computing test statistics using longer formulas.	3.29	Moderate	3.23	Moderate
6. memorizing formulas used in Statistics and Probability.	3.45	Moderate	3.43	Moderate

7.	following the steps in hypothesis testing.	3.17	Moderate	3.08	Moderate
8.	performing correlation and regression analysis on real-life problems.	3.09	Moderate	3.12	Moderate
9.	explaining the solution to the problems solved.	3.13	Moderate	2.93	Moderate
10.	determining the appropriate statistical tool to be used.	3.19	Moderate	3.14	Moderate
Overall Mean		3.13	**Moderate**	3.07	**Moderate**

Table 7 shows the level of senior high school learners' difficulties in statistics and probability according to content knowledge when grouped according to average family monthly income with overall mean scores of 3.13 for the lower group, interpreted as "moderate level" and 3.07 for the higher group, interpreted as "moderate level." Item No. got the difference of 0.20 in the mean score indicating that the learners from the lower group whose family is earning below Php 30,000 find it difficult to explain the solution for the word problems. Learners from this group encounter difficulties in understanding the solution and the method used in computing, that is why the learners find it difficult to explain. Based on the study of Casas (2023), it states that the family income classification of the respondents is a low-income class (but not poor), the academic performance is very satisfactory and there is no significant relationship between the two variables. The findings indicate that students do not see the status of their family income as an obstacle to getting exceptional academic achievement.

Table 8

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment When Grouped According to Sex

Items	**Male**		**Female**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. listening to the class discussion because of the noise inside the classroom.	3.21	Moderate	2.70	Moderate
2. finding a quiet place to focus on my schoolwork.	3.44	Moderate	3.25	Moderate
3. using the school eLMS (eLearning Management System) due to the complexity of accessing the handouts.	2.67	Moderate	2.79	Moderate
4. accessing the technology (laptops, calculators) and resources (books, eBooks) I need to learn effectively.	2.84	Moderate	2.91	Moderate
5. solving word problems and reading the presentation due to inadequate lighting.	2.91	Moderate	2.70	Moderate
6. concentrating effectively due to sudden changes in temperature inside the classroom (sometimes too hot, sometimes too cold).	3.62	High	3.29	Moderate
7. asking questions in class due to peer pressure or fear of judgment.	3.53	High	3.21	Moderate
8. looking at the writing on the board because of the classroom layout.	2.99	Moderate	2.91	Moderate
9. balancing between physical space and class size.	2.64	Moderate	2.73	Moderate
10. adjusting to uninviting or discouraging classmates' behavior.	3.14	Moderate	2.85	Moderate
Mean	3.10	**Moderate**	2.93	**Moderate**

Table 8 shows the level of senior high school learners' difficulties in statistics and probability according to the learning environment when grouped according to sex. The overall mean for the male group is 3.10 with the interpretation of "moderate level" while for the female group, the overall computed mean is 2.93 with the interpretation of "moderate level." The results imply that the male learners have trouble focusing during discussion when the temperature inside the classroom suddenly changes. Sudden changes can affect the learners' focus on the lessons because they can

cause discomfort for them. When the temperature suddenly changes it can be a factor that learners have encounter difficulty in paying attention to the lesson discussed. It indicates also that the male learners were afraid to ask question during discussion due to fear of judgement or peer pressure. Learners were hesitant to ask questions because of the fear of being judged as slow learner. On the contrary to the study by van Es and Weaver (2018), showed that female students had significantly lower average scores than their male counterparts in affect, cognitive competency, and subject difficulty. In addition, they expected lower average final course grades. When expected and achieved grades were compared, both male and female students overestimated their final scores, but female students did so to a lesser extent.

Table 9

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment When Grouped According to Track

Items	**Academics**		**TVL**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. listening to the class discussion because of the noise inside the classroom.	2.89	Moderate	3.16	Moderate
2. finding a quiet place to focus on my schoolwork.	3.31	Moderate	3.43	Moderate
3. using the school eLMS (eLearning Management System) due to the complexity of accessing the handouts.	2.68	Moderate	2.87	Moderate
4. accessing the technology (laptops, calculators) and resources (books, eBooks) I need to learn effectively.	2.77	Moderate	3.15	Moderate
5. solving word problems and reading the presentation due to inadequate lighting.	2.81	Moderate	2.81	Moderate
6. concentrating effectively due to sudden changes in temperature inside the classroom (sometimes too hot, sometimes too cold).	3.49	Moderate	3.35	Moderate
7. asking questions in class due to peer pressure or fear of judgment.	3.39	Moderate	3.33	Moderate
8. looking at the writing on the board because of the classroom layout.	2.97	Moderate	2.87	Moderate
9. balancing between physical space and class size.	2.65	Moderate	2.80	Moderate
10. adjusting to uninviting or discouraging classmates' behavior.	3.03	Moderate	2.89	Moderate
Overall Mean	3.00	**Moderate**	3.07	**Moderate**

As shown in Table 9, level senior high school learners' difficulties in Statistics and Probability in the area of learning environment when grouped according to track. The overall mean score is 3.00, interpreted as a "moderate level," for the academic track. Meanwhile, the overall mean score for the TVL track is 3.07, interpreted also as a "moderate level." This result implies that learners in both academic and TVL tracks encounter moderate levels of difficulty in specific areas. Academic track learners found the most difficulty in concentration due to fluctuating classroom temperatures, while TVL track learners identified finding a quiet study space as the most difficult. Both tracks reported moderate levels of difficulty in balancing physical space and class size, suggesting that this issue may be less impactful compared to the aforementioned challenges. ISO 7730:2005 on optimal thermal comfort is important, as fluctuations in temperature do impact Academic track learners' concentration. In addition, the difficulties of the TVL track learners in finding a quiet study place are supported by the findings of (Oruikor, 2023) where the quietness factor is influenced by the classroom environment—which can be controlled by the physical design of the study area and by its occupants.

Table 10

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment When Grouped According to School of Origin

Items	Public Mean	Interpretation	Private Mean	Interpretation
As a learner, I am having difficulties in…				
1. listening to the class discussion because of the noise inside the classroom.	2.87	Moderate	3.00	Moderate
2. finding a quiet place to focus on my schoolwork.	3.35	Moderate	3.34	Moderate
3. using the school eLMS (eLearning Management System) due to the complexity of accessing the handouts.	2.73	Moderate	2.73	Moderate
4. accessing the technology (laptops, calculators) and resources (books, eBooks) I need to learn effectively.	2.97	Moderate	2.83	Moderate
5. solving word problems and reading the presentation due to inadequate lighting.	2.91	Moderate	2.76	Moderate
6. concentrating effectively due to sudden changes in temperature inside the classroom (sometimes too hot, sometimes too cold).	3.41	Moderate	3.48	Moderate
7. asking questions in class due to peer pressure or fear of judgment.	3.42	Moderate	3.36	Moderate
8. looking at the writing on the board because of the classroom layout.	2.95	Moderate	2.94	Moderate
9. balancing between physical space and class size.	2.79	Moderate	2.64	Moderate
10. adjusting to uninviting or discouraging classmates' behavior.	2.90	Moderate	3.03	Moderate
Mean	3.03	**Moderate**	3.01	**Moderate**

Table 10 shows the level of senior high school learners' difficulties in Statistics and Probability in the area of the learning environment when grouped according to school of origin. The overall mean score for learners originating from public schools is 3.03 and the learners originating from private schools, the overall mean score is 3.01, also interpreted as "moderate level." The data implies that learners from both public and private schools encounter moderate levels of difficulty in various aspects of their learning environment. Public school learners reported the most difficulty in asking questions in class due to peer pressure, while private school learners identified concentrating due to fluctuating classroom temperatures as the most difficult. Both groups reported moderate difficulty in using the school's eLMS. Overall, both groups of learners experienced moderate levels of difficulty in Statistics and Probability in the area of the learning environment. Bautista (2023), the remarks of Parent-Teacher Association (PTA) Federation president Willy Rodriguez include a comparison of the availability of air-conditioning in public schools versus private schools. This suggests that learners who come from private schools are susceptible in their perception of comfort with regards to temperature changes, as mentioned by Rodriguez that private schools do not complain as much during the summer as their classrooms are air-conditioned. For learners who came from public schools, the issue of peer pressure influencing the learners' decision to ask questions in class is supported by the study (Moneva, 2019), which showed a correlation between the perceived level of peer pressure in terms of social belongingness, curiosity, and cultural-parenting orientation of parents, and education.

Table 11

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment When Grouped According to Average Family Monthly Income

Items	Lower Mean	Interpretation	Higher Mean	Interpretation
As a learner, I am having difficulties in…				
1. listening to the class discussion because of the noise inside the classroom.	3.05	Moderate	2.88	Moderate

2.	finding a quiet place to focus on my schoolwork.	3.43	Moderate	3.27	Moderate
3.	using the school eLMS (eLearning Management System) due to the complexity of accessing the hand-outs.	2.81	Moderate	2.66	Moderate
4.	accessing the technology (laptops, calculators) and resources (books, eBooks) I need to learn effectively.	2.97	Moderate	2.78	Moderate
5.	solving word problems and reading the presentation due to inadequate lighting.	2.81	Moderate	2.81	Moderate
6.	concentrating effectively due to sudden changes in temperature inside the classroom (sometimes too hot, sometimes too cold).	3.38	Moderate	3.53	High
7.	asking questions in class due to peer pressure or fear of judgment.	3.55	High	3.21	Moderate
8.	looking at the writing on the board because of the classroom layout.	2.94	Moderate	2.95	Moderate
9.	balancing between physical space and class size.	2.79	Moderate	2.59	Moderate
10.	adjusting to uninviting or discouraging classmates' behavior.	3.11	Moderate	2.90	Moderate
Overall Mean		3.08	**Moderate**	2.96	**Moderate**

Table 11 revealed the level of senior high school learners' difficulties in statistics and probability according to learning environment when grouped according to Average Family Monthly Income. The overall mean for the lower group is 3.08 with the interpretation of "moderate level" while the higher group has an overall computed mean of 2.96 with the interpretation of "moderate level." The results imply that in terms of the learning environment, the learners in the lower group have encountered difficulties in asking questions because they are afraid to be judged by their peers. The learner in the higher group is experiencing difficulty in terms of the learning environment when there is a sudden change in the temperature inside the classroom. According to Khatimah (2021), the learning environment in the classroom influences improving student learning outcomes. A good classroom learning environment makes students feel comfortable and motivated when conducting learning activities.

Table 12

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teachers' Competence When Grouped According to Sex

Items	**Male Mean**	**Interpretation**	**Female Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. applying the concepts learned because my teacher does not provide clear real-world examples.	2.62	Moderate	2.63	Moderate
2. following the flow of the lessons because my teacher's explanations are confusing or unclear.	2.72	Moderate	2.82	Moderate
3. staying engaged in class because my teacher's teaching style is monotonous or uninspiring.	2.48	Low	2.67	Moderate
4. taking effective notes because the pace of the lecture is too fast and lacks clear organization.	3.13	Moderate	2.97	Moderate
5. asking questions in class because my teacher seems unapproachable or dismissive.	2.22	Low	2.49	Low
6. understanding the lesson because the teachers' grammar is wrong.	1.92	Low	2.04	Low
7. looking for additional learning resources because my teacher has fewer resources for reference.	2.41	Low	2.55	Moderate

8.	feeling motivated or interested in the subject matter because the teacher does not encourage active participation.	2.40	Low	2.65	Moderate
9.	developing critical thinking skills because the class activities are not designed to foster deeper understanding.	2.53	Moderate	2.62	Moderate
10.	keeping up with the class material because the lessons are not adapted to different learning styles.	2.53	Moderate	2.85	Moderate
Overall Mean		2.49	**Low**	2.63	**Moderate**

Table 12 shows the level of senior high school learners' difficulties in Statistics and Probability in the area of teachers' competence when grouped according to sex. The overall mean score is 2.49 for male learners, interpreted as "low level," and 2.63 for female learners, interpreted as "moderate level." The result above indicates that both the learners encounter the same difficulty. In the item no. 3, 7, and 8 learners from the male group encounter less difficulty in learning even the teaching style of the teacher is monotonous, even the teacher does not encourage the learners to participate, and the available resources is limited. Female learners find it difficult to study Statistics and Probability in the area of teachers' competence. This result above implies that both male and female learners encounter moderate levels of difficulty in taking effective notes due to the rapid lecture pace and lack of clear organization. This is consistent with the results of a study by (Siegel, 2022), where the rate of speech was the most frequently chosen factor affecting notetaking ability. Both groups also reported low levels of difficulty in understanding lessons due to teachers' grammatical errors. This indicates that effective communication in the classroom influences student learning outcomes (Mahdi, 2023). Overall, male learners reported a slightly lower level of difficulty compared to female learners in the area of teachers' competence.

Table 13

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teachers' Competence When Grouped According to Track

Items	**Academics**		**TVL**	
	Mean	**Interpretation**	**Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. applying the concepts learned because my teacher does not provide clear real-world examples.	2.60	Moderate	2.69	Moderate
2. following the flow of the lessons because my teacher's explanations are confusing or unclear.	2.72	Moderate	2.89	Moderate
3. staying engaged in class because my teacher's teaching style is monotonous or uninspiring.	2.56	Moderate	2.6	Moderate
4. taking effective notes because the pace of the lecture is too fast and lacks clear organization.	3.00	Moderate	3.21	Moderate
5. asking questions in class because my teacher seems unapproachable or dismissive.	2.37	Low	2.29	Low
6. understanding the lesson because the teachers' grammar is wrong.	2.01	Low	1.89	Low
7. looking for additional learning resources because my teacher has fewer resources for reference.	2.47	Low	2.50	Moderate
8. feeling motivated or interested in the subject matter because the teacher does not encourage active participation.	2.52	Moderate	2.50	Moderate
9. developing critical thinking skills because the class activities are not designed to foster deeper understanding.	2.55	Moderate	2.64	Moderate

10. keeping up with the class material because the lessons are not adapted to different learning styles.	2.66	Moderate	2.76	Moderate
Overall Mean	2.55	**Moderate**	2.60	**Moderate**

Table 13 shows the level of senior high school learners' difficulties in statistics and probability according to teacher's competence when grouped according to track. The overall mean scores are 2.55 for the academic track, interpreted as "moderate level" and 2.60 for the TVL group, interpreted as "moderate level." The result shows that the learners TVL strand find it difficult to have access to the additional resources compared to the learners from the TVL track. Learners from academic tracks were able to find additional resources that can aid in the learning of the lesson. The results imply that in terms of the teacher's competence, the learners are having difficulty taking effective notes due to the fast pace and unorganized way of teaching. On the other hand, the learners have encountered less difficulty in learning even though the teacher's grammar is wrong. According to Simmons (2020), planning for good pacing in the lesson needs good timing to keep the learners engaged. When pacing is too slow, students often become bored and disengaged. When it is too fast, some may not grasp what is being taught and get lost or discouraged.

Table 14

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teachers' Competence When Grouped According to School of Origin

Items	**Public Mean**	**Interpretation**	**Private Mean**	**Interpretation**
As a learner, I am having difficulties in…				
1. applying the concepts learned because my teacher does not provide clear real-world examples.	2.61	Moderate	2.63	Moderate
2. following the flow of the lessons because my teacher's explanations are confusing or unclear.	2.93	Moderate	2.70	Moderate
3. staying engaged in class because my teacher's teaching style is monotonous or uninspiring.	2.60	Moderate	2.56	Moderate
4. taking effective notes because the pace of the lecture is too fast and lacks clear organization.	3.05	Moderate	3.05	Moderate
5. asking questions in class because my teacher seems unapproachable or dismissive.	2.43	Low	2.32	Low
6. understanding the lesson because the teachers' grammar is wrong.	2.02	Low	1.96	Low
7. looking for additional learning resources because my teacher has fewer resources for reference.	2.50	Moderate	2.47	Low
8. feeling motivated or interested in the subject matter because the teacher does not encourage active participation.	2.57	Moderate	2.50	Moderate
9. developing critical thinking skills because the class activities are not designed to foster deeper understanding.	2.69	Moderate	2.53	Moderate
10. keeping up with the class material because the lessons are not adapted to different learning styles.	2.87	Moderate	2.61	Moderate
Mean	2.63	**Moderate**	2.53	**Moderate**

Table 14 shows the level of senior high school learners' difficulties in statistics and probability according to teachers' competence when grouped according to school of origin. The overall means scores of the learners that originated from the public and private schools are 2.63 and 2.53 with the interpretation of "moderate level." The results indicate that the learners who finish their Junior High School in public and private schools have encountered challenges because the pacing of the discussion is fast and lack of organization. Both learners are experiencing less difficulty even though the teachers are having trouble using correct grammar. Based on the study of Bonsu (2016), teachers

should improvise the teaching and learning resources that were not available in the schools to enhance the quality of education in both private and public basic schools in the country of Ghana.

Table 15

Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teachers' Competence When Grouped According to Average Family Monthly Income

Items	Lower Mean	Interpretation	Higher Mean	Interpretation
As a learner, I am having difficulties in…				
1. applying the concepts learned because my teacher does not provide clear real-world examples.	2.58	Moderate	2.66	Moderate
2. following the flow of the lessons because my teacher's explanations are confusing or unclear.	2.88	Moderate	2.66	Moderate
3. staying engaged in class because my teacher's teaching style is monotonous or uninspiring.	2.59	Moderate	2.56	Moderate
4. taking effective notes because the pace of the lecture is too fast and lacks clear organization.	3.04	Moderate	3.06	Moderate
5. asking questions in class because my teacher seems unapproachable or dismissive.	2.49	Low	2.23	Low
6. understanding the lesson because the teachers' grammar is wrong.	2.11	Low	1.87	Low
7. looking for additional learning resources because my teacher has fewer resources for reference.	2.54	Moderate	2.43	Low
8. feeling motivated or interested in the subject matter because the teacher does not encourage active participation.	2.48	Low	2.56	Moderate
9. developing critical thinking skills because the class activities are not designed to foster deeper understanding.	2.63	Moderate	2.53	Moderate
10. keeping up with the class material because the lessons are not adapted to different learning styles.	2.63	Moderate	2.74	Moderate
Mean	2.60	**Moderate**	2.53	**Moderate**

Table 15 shows the level of senior high school learners' difficulties in Statistics and Probability in the area of teachers' competence when grouped according to average family monthly income. The overall mean score for a lower average family monthly income is 2.60, whereas the overall mean score for a higher average family monthly income is 2.53. The results imply that both learners from lower and higher-income families encounter moderate levels of difficulty in taking effective notes due to the rapid lecture pace and lack of clear organization. This again echoes the discussions made in Table 14, where the rate of speech is the most frequently selected factor affecting notetaking ability (Siegel, 2022). Both groups also reported low levels of difficulty in understanding lessons due to teachers' grammatical errors. This again reiterates the discussions in Table 12, where effective communication in the classroom influences student learning outcomes (Mahdi, 2023). While both income groups experienced moderate overall difficulty, learners from lower-income families reported a slightly higher level of difficulty compared to those from higher-income families in the area of teacher competence.

Table 16

Difference in the Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Content Knowledge and Pedagogy When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U	*p*-value	*Sig. level*	Interpretation
Sex	Male	127	124.10	7633.000	0.756	0.05	Not Significant

	Female	123	126.94			
Track	Academics	185	123.96	5728.500	0.571	Not Significant
	TVL	65	129.87			
School of Origin	Public	73	131.22	6043.000	0.421	Not Significant
	Private	177	123.14			
Average Family Monthly Income	Lower (below Php 30,000)	118	130.05	7251.000	0.346	Not Significant
	Higher (Php 30,000 & above)	132	121.43			

As revealed in Table 16, the comparative analysis of the level of senior high school learners' difficulties in statistics and probability according to content knowledge and pedagogy when grouped and compared according to variables. The result shows that there are no significant differences in learner's difficulties in Statistics and Probability across various categories. When grouped by sex, academic track, school of origin, and average family monthly income, the p-value are higher than the significance level. Since all p-values exceed the 0.05 significance level, these differences are interpreted as statistically not significant, confirming that students experience similar challenges in the subject regardless of these factors. Thus, the hypothesis that states, "there is no significant difference between the level of senior high school learner's difficulties in statistics and probability according to content knowledge and pedagogy when grouped and compared according to variables," is hereby accepted. Implications from the findings of this study might suggest improving K-12 school facilities by the school public administrators and collaborative effort of teachers to enhance the students' self-efficacy, attitudes towards statistics, and teaching statistics reveal optimistic results. Also, school administrators may provide opportunities for Statistics teachers to hone their pedagogical skills in promoting and building students' self-confidence and interest in the subject." In contrast, according to Retutas and Rubio (2021), "the findings revealed that among the demographic factors, the only type of school has a significant difference to the self-efficacy beliefs, attitudes towards Statistics, and performance of senior high students in Statistics.

Table 17

Difference in the Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Learning Environment When Grouped and Compared According to the Aforementioned Variables

Variable	**Category**	**N**	**Mean Rank**	**Mann Whitney U**	***p*-value**	***Sig. level***	**Interpretation**
Sex	Male	127	132.53	6917.500	0.118		Not Significant
	Female	123	118.24				
Track	Academics	185	124.12	5756.500	0.609		Not Significant
	TVL	65	129.44				
School of Origin	Public	73	126.70	6373.000	0.866	0.05	Not Significant
	Private	177	125.01				
Average Family Monthly Income	Lower (below Php 30,000)	118	132.65	6944.000	0.139		Not Significant
	Higher (Php 30,000 & above)	132	119.11				

As shown in Table 17, the comparative analysis on the level of senior high school learner's difficulties in statistics and probability according to learning environment when grouped and compared according to variables. The result indicates no significant differences in learner's difficulties in Statistics and Probability across various categories. When grouped by sex, track, school of origin, and average family monthly income, all computed p-values exceed the 0.05 significance level, meaning the differences are not statistically significant. This supports the hypothesis that senior high school learners experience similar difficulties in the subject regardless of these factors.

This implies that learners who study in a positive learning environment have shown more motivation, are more engaged, and have a higher learning ability while students learning in a poor learning environment might feel uncomfortable and distracted because of the noise around them causing them to have difficulty in concentrating and

absorbing the lesson. This study was supported (2024), who states that the learning environment plays a crucial role in the learning process and students' success. Several factors affect learning ability, including seating, light, noise, and even the color of the classroom.

Table 18

Difference in the Level of Senior High School Learner's Difficulties in Statistics and Probability in the Area of Teachers Competence When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U	*p*-value	*Sig. level*	Interpretation
Sex	Male	127	118.88	6969.500	0.141	0.05	Not Significant
	Female	123	132.34				
Track	Academics	185	124.53	5833.500	0.721		Not Significant
	TVL	65	128.25				
School of Origin	Public	73	130.40	6103.000	0.491		Not Significant
	Private	177	123.48				
Average Family Monthly Income	Lower (below Php 30,000)	118	128.43	7442.500	0.545		Not Significant
	Higher (Php 30,000 & above)	132	122.88				

As indicated in Table 20, the comparative analysis of the level of senior high school learners' difficulties in statistics and probability according to teacher's competence when grouped and compared according to variables. The results indicate no statistically significant differences across various groups. When categorized by sex the computed p-value of 0.141 exceeds the 0.05 significance, suggesting no meaningful difference. Similarly, when grouped according to track the p-value of 0.721 confirms that the variation is not statistically significant. Regarding school origin, the computed p-value of 0.491, the difference remains statistically insignificant. Finally, assessing the average family monthly income, the computed p-value of 0.545 supports the conclusion that there is no significant difference. Therefore, the hypothesis that states, "there is no significant difference between the level of senior high school learners' difficulties in statistics and probability according to teacher's competence when grouped and compared according to variables," was accepted. The study result found that students face similar difficulties in Statistics and Probability regardless of sex, academic track, school of origin, or family income. This suggests the need for equitable and unbiased teaching strategies that accommodate all learners. Since external factors like school type and financial background do not significantly impact students' difficulties in the subject, educators should focus on standardized and adaptable teaching methods to support all students effectively. According to the study by Anggara et al. (2018), teachers should identify the learners' difficulties for they to be able to plan and prepare the appropriate learning process. Contrary to the study of Puspitasari, et al. (2019) that shows many students get poor grades in statistics and probabilities, due to difficulties in probabilistic reasoning, combinatoric reasoning, and proof of variability in random variables.

Conclusions

The findings of this study underscore the significant challenges faced by senior high school learners in Statistics and Probability, particularly in the areas of content knowledge, learning environment, and teacher competence. Despite these advantages, students struggle primarily with memorizing formulas and computing test statistics, indicating a need for targeted instructional support. The learning environment also plays a critical role, as fluctuating classroom temperatures and noise levels negatively impact students' concentration, particularly among female learners. To improve these conditions, schools should prioritize maintaining stable classroom conditions and providing quiet study areas. Furthermore, the difficulties in note-taking due to fast-paced and poorly organized lectures highlight the necessity for ongoing professional development for teachers to enhance their instructional effectiveness. Enhancing teacher competence through professional development is essential. Importantly, the lack of significant differences in difficulties among various demographic groups suggests that all learners, regardless of background, encounter similar obstacles in understanding and determining the application of Statistics and Probability. This may indicate a thorough review of the approaches used in teaching and finding ways to improve teaching strategies and learning conditions, ensuring that all students have the opportunity to succeed in this relevant subject.

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