Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 7 (2026)

Mathematics Proficiency Level of Grade 11 Students and Innovative Teaching Approaches in the First Congressional District I, Batangas Province

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Publication Date: July 24, 2026 DOI: **10.5281/zenodo.21529336**

Abstract

This study assessed the mathematics proficiency level of Grade 11 students in the First Congressional District of Batangas, focusing on four key domains: conceptual understanding, procedural fluency, problem-solving skills, and mathematical reasoning. Furthermore, it investigated the extent to which innovative teaching approaches were utilized in terms of lesson delivery methods, learning activities, and instructional resources. By examining these variables, the research aimed to determine if a significant relationship exists between the implementation of innovative pedagogical strategies and the resulting proficiency levels of the students.

The researcher employed a descriptive research design, utilizing a combination of survey questionnaires and qualitative interviews to collect data. The study was conducted to one hundred (100) senior high school Mathematics teachers, with the interviews providing deeper insights into the practical challenges encountered when integrating modern teaching techniques. This mixed-methods approach allowed for a comprehensive analysis of both the frequency of instructional use and the qualitative barriers to effective implementation.

The findings revealed that senior high school students have above-average proficiency in Mathematics, while teachers reported moderate use of innovative teaching approaches. Despite these positive indicators, several persistent challenges were identified: the administrative pressure to cover all curriculum competencies, a lack of prerequisite mastery among students, and the significant time required to plan and execute innovative lessons. Statistical analysis confirmed a significant relationship between the extent of utilization of these innovative approaches and the students' Mathematics proficiency. Based on these results, the study proposes the development of an instructional guide centered on innovative strategies to serve as a practical tool for teachers in fostering a more engaging and effective teaching-learning process.

Keywords: *Mathematics proficiency level, innovative teaching approaches, Senior High School, instructional guide, Mathematics*

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 7 (2026)

INTRODUCTION

Innovative teaching refers to the deliberate and proactive integration of new strategies and methodologies into the teaching and learning process. The use of innovative approaches reflects an acknowledgment that existing teaching practices can always be improved and that continuous growth is essential, just as teachers encourage their students to learn and evolve. Exploring and implementing various teaching strategies enables teachers to promote learning more effectively and to create meaningful educational experiences for their students.

This study sought to examine the relationship between the extent of teachers' utilization of innovative instructional methods and students' achievement in Mathematics, specifically in the areas of reasoning, problem-solving, modeling, and application. Through this investigation, the researcher aimed to determine the overall impact of these innovative practices on the learning outcomes of senior high school students.

Having served as a Senior High School teacher for nearly four years, the researcher consistently observed that many learners continued to struggle with fundamental mathematical problems, such as operations involving integers. These challenges were attributed to potential factors, including dyscalculia, student inadvertence, and a lack of engaging, creative instructional approaches. These observations served as the primary inspiration for this research. Consequently, the study was conducted with the objective of developing an instructional guide designed to assist Mathematics teachers in enhancing lesson delivery and improving the academic performance of Grade 11 students.

Candelaria (2023) explored various teaching styles used in Mathematics instruction through descriptive and quantitative methods. The research revealed that high school teachers frequently employed demonstrative, facilitator, and hybrid teaching styles. To improve the quality of learning activities, the author recommended that educational institutions prioritize the reskilling and upskilling of teachers to enhance their versatility in utilizing diverse pedagogical approaches.

According to Ling and Mahmud (2023), teachers faced three primary challenges: low student mastery, limited instructional time, and insufficient ICT infrastructure. In response,

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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educators demonstrated innovation by diversifying their instructional approaches to stimulate interest and improve skills among students, particularly in word-based problem-solving. This dedication contributed significantly to the broader goal of providing quality education despite environmental constraints.

This study aimed to determine the relationship between the extent of utilization of innovative teaching approaches and the Mathematics proficiency level of Grade 11 students in the First Congressional District of Batangas during the school year 2025-2026.

Specifically, it sought to answer the following questions:

1. What is the Mathematics proficiency level of the students as assessed by the teachers in terms of:

1.1 conceptual understanding;

1.2 procedural fluency;

1.3 problem-solving skills; and

1.4 reasoning?

2. How may the extent of utilization of the innovative teaching approaches be assessed by the respondents, relative to:

2.1 lesson delivery methods;

2.2 learning activities; and

2.3 instructional resources?

3. Is there a significant relationship between assessments on the Mathematics proficiency level of the students and on the extent of utilization of the innovative teaching approaches?

4. What are the challenges encountered by teachers in utilizing innovative teaching approaches?

5. Based on the analysis of the study, what instructional guide may be proposed?

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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Hypothesis

Null Hypothesis. There is no significant relationship relationship between assessments on the Mathematics proficiency level of Grade 11 and on the extent of the utilization of innovative teaching approaches.

METHODOLOGIES

Research Design

The primary objective of this study was to develop an instructional guide for Senior High School Mathematics teachers in Congressional District I, Batangas Province. To achieve this goal, the descriptive research method was employed, utilizing questionnaires and interviews as the main tools for collecting the necessary data. Descriptive research involves systematically observing a population in its natural setting to identify and describe phenomena. Its purpose was to determine what exists rather than why it exists.

Through this approach, the researcher gathered accurate information via questionnaires and interviews without manipulating any variables. This enabled the study to present a clear picture of the current situation and assess how innovative learning activities could enhance students' school experiences. It also ensured that the findings were grounded in real classroom situations, providing a solid basis for designing practical and effective instructional materials.

Subjects of the Study

The subjects of this study were drawn from the entire population of Mathematics teachers in Congressional District I, SDO Batangas Province and SDO Calaca City. These individuals were considered essential participants, as their insights, teaching experience, and current instructional practices are vital in identifying challenges and opportunities when implementing new learning activities. Focusing on this specific demographic ensures that the gathered data accurately reflects the authentic classroom dynamics and localized educational needs of these particular divisions. The professional perspectives provided by these teachers consequently serve as a foundational element for developing practical strategies aimed at enhancing the overall quality of Mathematics instruction throughout the region.

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To ensure data accuracy and representative sampling from this diverse population, the study employed a stratified random sampling technique. The sub-sample sizes for each location were determined using the Raosoft Sample Size Calculator at a 5% margin of error. These figures were derived by dividing the population of each municipality or city by the total population and then multiplying the quotient by the computed sample size of 100.

Data Gathering Instruments

The primary instruments employed for data collection in this study consisted of a researcher-developed questionnaire and semi-structured interviews conducted via Google Meet. The questionnaire was utilized to assess the mathematics proficiency levels of students, as perceived by their teachers, and to determine the extent to which innovative teaching approaches were utilized. Complementary data regarding the challenges encountered by teachers during the implementation of these approaches were gathered through the Google Meet sessions.

The research instrument was structured into three distinct sections. The first part evaluated student Mathematics proficiency across four domains: conceptual understanding, procedural fluency, problem-solving skills, and reasoning. Each of these variables comprised ten indicators, which respondents rated using a provided Likert scale. The second part measured the utilization of innovative teaching approaches regarding lesson delivery methods, learning activities, and instructional resources, with each category also containing ten indicators. The third part consisted of questions intended for answering the challenges encountered by teachers in implementing innovative teaching strategies. Following a systematic development process, the researcher-made questionnaire underwent rigorous construction, validation, administration, and scoring.

Data Gathering Procedure

To gather the necessary data, the researcher sent formal request letters to the Schools Division Superintendents of SDO Batangas Province and SDO Calaca City. Upon receiving the signed approval, the researcher forwarded the letters to the school principals, attaching the SDS endorsement. With the school heads' permission, the questionnaires were reproduced and distributed to the mathematics teachers across Congressional District I in Batangas Province.

In compliance with established research ethics, consent was also secured from the school administration and other research collaborators. Furthermore, since the study collected personal information, the researchers strictly adhered to the provisions of the Data Privacy Act of 2012 to protect participant identity. Finally, to ensure the integrity and validity of the results, systematic procedures for administration, verification, and scoring were meticulously carried out.

Data Analysis Plan

Statistical procedures were used to interpret the results that were gathered from the respondents of the study. This study used the statistical treatment of data such as ranking, weighted mean, and Person's r. Ranking. This was used to determine the positional importance of the response to items answered. Weighted Mean. This was the arithmetic average of the overall response of the respondents. Pearson's r Coefficient of Correlation. This was used to determine the significant relationship between assessments on the Mathematics proficiency level of Grade 11 and the extent of utilization of innovative teaching strategies by teachers.

Ethical Considerations

In accordance with Republic Act No. 10173, also known as the Data Privacy Act of 2012, this study upheld the quality and integrity of all gathered information while ensuring that participants were fully informed of their rights and obligations. The researcher maintained diligence and sensitivity regarding the disclosure of data provided in the instruments, assuming full responsibility for its protection. Furthermore, no respondent was coerced into joining the study; all participants were fully aware of the relevant aspects of the research undertaking. In instances where a respondent could not participate due to unavoidable circumstances or chose to withdraw, appropriate replacements were secured. Finally, the researcher ensured that all references and sources utilized in the study were properly cited, giving due credit to the proponents and authors from whom the primary and secondary data were derived.

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RESULTS

This paper presents the results and discussion of the data collected from the responses to the questionnaire distributed to the respondents. The said data were:

1. **Mathematics Proficiency Level of Senior High School Students as Assessed by the Teachers.**
   1.1 Conceptual Understanding

Table 2
Teachers' Assessment of the Mathematics Proficiency Level of Students in Terms of Conceptual Understanding

Indicators	WM	VI	Rank
Students are able to...			
1. distinguish between a population parameter and a sample statistic.	3.69	H	2
2. describe the sampling distribution of the sample mean when the population variance is either known or unknown.	3.53	H	6
3. understand what the rejection region means in hypothesis testing.	3.43	AA	7
4. know the probability distribution for a discrete random variable and its properties.	3.61	H	4
5. show the differences between discrete and continuous random variables.	3.94	H	1
6. describe the characteristics of a normal random variable.	3.64	H	3
7. understand the concept of a confidence interval and the confidence level.	3.32	AA	8
8. explain the sampling distribution of the sample mean by using the central limit theorem.	3.27	AA	9
9. understand the concept of empirical rule.	3.25	AA	10
10. know when and why to use the t-distribution instead of the standard normal distribution.	3.56	H	5
COMPOSITE MEAN	**3.52**	**H**	

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Table 2 presents the teachers' assessment of the students' Mathematics proficiency levels, focusing specifically on conceptual understanding across ten indicators. The analysis utilized weighted means, verbal interpretations, and rankings to categorize the results. The data revealed a composite mean of 3.52, which corresponded to a verbal interpretation of high. Notably, the findings indicated that students were most proficient at distinguishing between discrete and continuous random variables, an indicator that earned the highest weighted mean of 3.94 and a very high verbal interpretation.

In contrast, the lowest weighted means were recorded for the students' ability to understand confidence intervals and levels (3.32) and their capacity to explain the sampling distribution of the sample mean using the Central Limit Theorem (3.27), both of which were interpreted as above average. Additionally, understanding the Empirical Rule garnered a mean of 3.25, also interpreted as above average. These results suggested that students began to experience anxiety and difficulty when lessons involved complex formulas or multi-step solutions.

1.2 Procedural Fluency

Table 3
Teachers' Assessment of the Mathematics Proficiency Level of Students in Terms of Procedural Fluency

Indicators	WM	VI	Rank
Students are able to...			
1. find probabilities and percentiles using the standard normal table.	3.44	AA	6
2. convert a normal random variable to a standard normal variable and vice versa.	3.47	AA	4
3. find the mean and the variance of a discrete random variable.	3.49	AA	3
4. find the possible values of a random variable.	3.68	H	1
5. calculate the right sample size by using the length of the confidence interval.	3.20	AA	8.5

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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6. identify percentiles using the t-table.	3.35	AA	7
7. calculate the test statistic for a hypothesis test about the population mean.	3.45	AA	5
8. identify the possible values of a given random variable.	3.52	H	2
9. calculate the length of the confidence interval using the required values.	3.14	AA	10
10. calculate the test statistic value for a hypothesis test about the population proportion.	3.20	AA	8.5
COMPOSITE MEAN	**3.39**	**AA**	

Table 3 presents the teachers' assessment of the students' Mathematics proficiency level, specifically focusing on procedural fluency across ten indicators. The analysis utilized weighted means, verbal interpretations, and rankings to categorize the gathered data. The results showed a composite mean of 3.39, which corresponded to a verbal interpretation of above average. According to the findings, students were most proficient at finding the possible values of a random variable, which earned the highest weighted mean of 3.68 and a verbal interpretation of high.

On the other hand, the lowest weighted mean of 3.14 was recorded for the students' ability to calculate the length of a confidence interval, which still carried a verbal interpretation of above average. Two indicators shared a weighted mean of 3.20: the ability to calculate the appropriate sample size using the length of a confidence interval and the ability to compute the test statistic for a population proportion. Both were interpreted as above average. These results suggested that teachers should prioritize these competencies by providing supplemental intervention materials or targeted activities to help students refine their procedural accuracy and deepen their understanding.

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1.3 Problem-Solving Skills

Table 4

Teachers' Assessment on the Mathematics Proficiency Level of Students in Terms of Problem-Solving Skills

Indicators	WM	VI	Rank
Students are able to...			
1. calculate probabilities for a specific random variable in a word problem.	3.25	AA	4
2. solve real-life problems involving mean and variance of a discrete random variable.	3.30	AA	2
3. determine the mean and the variance of a discrete random variable within a problem context.	3.38	AA	1
4. identify the independent and dependent variables in a problem.	3.27	AA	3
5. solve problems that involve the mean and variance of probability distributions.	3.11	AA	6
6. solve problems that involve testing hypotheses about the population mean.	3.05	AA	7
7. apply confidence interval concepts to estimate a parameter in real life.	2.95	AA	9
8. solve problems that involve correlation analysis.	2.89	AA	10
9. solve problems that involve sampling distributions of the sample mean.	3.19	AA	5
10. solve problems that involve testing hypotheses about the population proportion.	3.04	AA	8
COMPOSITE MEAN	**3.14**	**AA**	

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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Table 4 presents the teachers' assessment of the mathematics proficiency level of students, focusing specifically on their problem-solving skills across ten indicators. The data utilized weighted means, verbal interpretations, and ranking. The students' Mathematics proficiency levels in terms of problem-solving skills, revealing an average composite mean of 3.14, which was interpreted as above average. The findings indicated that students were most proficient at determining the mean and variance of a discrete random variable within a problem context, earning the highest weighted mean of 3.38.

However, the lowest weighted mean of 2.89 was recorded for the students' ability to solve problems involving correlation analysis. Other lower-rated indicators included the ability to test hypotheses about population proportions (3.04) and the application of confidence interval concepts to real-life parameter estimation.

1.4 Reasoning

Table 5

Teachers' Assessment of the Mathematics Proficiency Level of Students in Terms of Reasoning

Indicators	WM	VI	Rank
Students are able to...			
1. recognize the mean and the variance of a discrete random variable to make logical conclusions.	3.41	AA	2
2. explain why the t-distribution is helpful for estimating or testing in small samples.	3.22	AA	5
3. explain how the normal curve's properties allow for the conversion to the standard normal variable.	3.37	AA	3
4. explain what a percentile means in the context of the t-table.	3.13	AA	7
5. explain why random sampling is important for applying results to the population.	3.36	AA	4

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6. explain what the calculated length of the confidence interval means for the accuracy of the estimate.	2.91	AA	10
7. explain the importance of the Central Limit Theorem in inferential statistics.	3.01	AA	9
8. justify their choice to reject or not reject the null hypothesis by comparing the p-value with the level of significance.	3.06	AA	8
9. understand the properties of discrete probability distribution.	3.51	H	1
10. make a conclusion about the population mean by looking at the test-statistic value and the rejection region.	3.20	AA	6
COMPOSITE MEAN	**3.22**	**AA**	

Table 5 presents the teachers' assessment of the students' Mathematics proficiency levels, focusing specifically on reasoning across ten indicators. The analysis utilized weighted means, verbal interpretations, and rankings to evaluate the gathered data. The results showed an average composite mean of 3.22, which corresponded to a verbal interpretation of above average. Based on the findings, students were most proficient at understanding the properties of discrete probability distributions, earning the highest weighted mean of 3.51 with a verbal interpretation of high.

Conversely, the lowest weighted mean of 2.91, interpreted as above average, was recorded for the students' ability to explain how the calculated length of a confidence interval affected the accuracy of an estimate. Two other indicators also received lower weighted means: justifying the choice to reject or not reject the null hypothesis by comparing the p-value with the level of significance (3.06) and explaining the importance of the Central Limit Theorem in inferential statistics (3.01).

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2. Extent of the Utilization of Innovative Teaching Approaches

2.1 Lesson Delivery Methods

Table 6

Extent of Utilization of the Innovative Teaching Approaches Relative to Lesson Delivery Methods

Indicators	WM	VI	Rank
As a Mathematics teacher, I ...			
1. plan lecture-free days to focus on hands-on statistical investigations and data gathering processes.	3.62	HU	3
2. start each lesson with an open-ended statistical question, and students try to answer.	3.51	HU	6
3. integrate Statistics lessons with concepts from other subjects.	3.58	HU	5
4. deliver lessons by linking statistical concepts to local issues, data, or news stories.	3.60	HU	4
5. use different methods to deliver content.	3.68	HU	2
6. use the Jigsaw method to break down complex topics like the Central Limit Theorem.	3.17	MU	10
7. use blended approach by alternating in-person teaching and online modules for self-paced learning of procedural fluency of tasks.	3.26	MU	8
8. use whiteboards or interactive displays to show step-by-step procedures for statistical calculations.	3.43	MU	7
9. start my lesson with a brainstorming game to motivate my students to learn more.	3.24	MU	9
10. adjust the pace and depth of my lessons based on ongoing assessments of each student's understanding.	3.69	HU	1
COMPOSITE MEAN	**3.48**	**MU**	

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Table 6 presents the extent to which innovative teaching approaches were utilized, specifically focusing on lesson delivery methods across ten indicators. The data analysis employed weighted means, verbal interpretations, and rankings to evaluate the results. The findings revealed an overall composite mean of 3.48, which corresponded to a verbal interpretation moderately utilized. The highest weighted mean of 3.69, interpreted as highly utilized, indicated that Mathematics teachers adjusted the pace and depth of their lessons based on ongoing assessments of student understanding.

In contrast, the strategy of using the jigsaw method to break down complex topics, such as the Central Limit Theorem, earned the lowest weighted mean of 3.17 and was moderately utilized. Similarly, three other indicators were moderately utilized: using interactive displays for step-by-step procedures (3.43), employing blended learning for self-paced modules (3.26), and utilizing brainstorming games as motivators (3.24). This suggested that teachers often prioritized content delivery over the creation of highly engaging or interactive instructional materials.

2.2 Learning Activities

Table 7

Extent of Utilization of Innovative Teaching Approaches Relative to Learning Activities

Indicators	WM	VI	Rank
As a Mathematics teacher, I ...			
1. give students statistical problems that have common errors and ask them to find and fix the mistakes.	3.41	MU	8
2. make sure that the given problems is checked and answered before I gave it to the students.	3.85	HU	1
3. incorporate games or decision-making scenarios that require students to calculate.	3.43	MU	6.5
4. set up peer tutoring sessions where students work together to practice and check each other's calculations.	3.62	HU	3
5. use frequent, low-stakes formative assessments to	3.58	HU	5

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check their conceptual understanding.			
6. use a structured "Think-Pair-Share" activity for students to discuss and improve their logical reasoning.	3.69	HU	2
7. use coins, dice, or drawing names from a box to conduct simple probability experiments.	3.60	HU	4
8. use a standard deck of playing cards to simulate probability of events.	3.43	MU	6.5
9. use colored tokens or marbles in a bag to simulate sampling with and without replacement, highlighting the difference in probability calculations.	3.15	MU	10
10. have students repeatedly roll a pair of dice to empirically determine the probability distribution of the sum of two independent events.	3.35	MU	9
COMPOSITE MEAN	**3.51**	**HU**	

Table 7 presents the extent of utilization of innovative teaching approaches, focusing specifically on learning activities across ten indicators. The data analysis utilized weighted means, verbal interpretations, and rankings to evaluate the results. The findings showed an overall composite mean of 3.51, which corresponded to a verbal interpretation of highly utilized. The indicator that received the highest weighted mean of 3.85, also highly utilized, stated that Mathematics teachers ensured all problems were thoroughly checked and solved before they were presented to the students.

The lowest weighted mean of 3.15, interpreted as moderately utilized, was recorded for the use of colored tokens or marbles to simulate sampling with and without replacement.

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2.3 Instructional Resources

Table 8

Extent of Utilization of the Innovative Teaching Approaches Relative to Instructional Resources

Indicators	WM	VI	Rank
As a Mathematics teacher, I...			
1. use physical resources like dice, cards, spinners, or colored tokens extensively to teach probability and concepts.	3.50	HU	5
2. regularly use multimedia resources (videos, infographics) to explain complex statistical theories and their applications.	3.61	HU	4
3. use interactive digital tools for quick checks and immediate feedback.	3.24	MU	6.5
4. use clear plastic containers labeled with probabilities to conduct simple demonstrations of sampling without replacement.	2.98	MU	10
5. provide students with accessible formulas as a standard resource.	3.71	HU	1
6. use tokens or chips for students who will participate in my class.	3.17	MU	8.5
7. use index cards or flashcards containing statistical terms, definitions, and formulas for quick self-study and peer quizzing	3.24	MU	6.5
8. utilize pre-made, basic templates in presentation software like powerpoint for students to easily understand the lesson.	3.70	HU	2
9. give students simple, real-world applications and group themselves to visualize the distribution.	3.63	HU	3
10. use physical measuring tools to collect continuous data for in-class data analysis.	3.17	MU	8.5
COMPOSITE MEAN	**3.40**	**MU**	

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Table 8 presents the extent of utilization of innovative teaching approaches, focusing specifically on instructional resources across ten indicators. The data analysis employed weighted means, verbal interpretations, and rankings to evaluate the results. The findings showed an overall composite mean of 3.40, which corresponded to a verbal interpretation of moderately utilized. The results revealed that Mathematics teachers provided students with accessible formulas as a standard resource, an indicator that earned the highest weighted mean of 3.71 and a verbal interpretation of highly utilized. The lowest weighted mean of 2.98, interpreted as moderately utilized, was recorded for the use of clear plastic containers to demonstrate sampling without replacement.

3. Relationship Between Assessments on the Mathematics Proficiency Level of Grade 11 Students and on the Extent of the Utilization of the Innovative Teaching Approaches

Table 9
Relationship Between Assessments on the Mathematics Proficiency Level of Grade 11 Students (Conceptual Understanding) and on the Extent of the Utilization of the Innovative Teaching Approaches

Variable	Computed R-values	Interpretation	p-values	Decision	Conclusion
Lesson Delivery Methods	.553	Strong Positive Relationship	.000	Reject	Significant
Learning Activities	.582	Strong Positive Relationship	.000	Reject	Significant
Instructional Resources	.718	Strong Positive Relationship	.000	Reject	Significant

The results of the study showed that all three variables yielded a p-value of .000, which led to the rejection of the null hypothesis and indicated that the results were statistically significant. The data suggested that students better understood the lessons when teachers focused on active, student-centered methods. Utilizing problem-solving tasks and physical manipulatives served to bridge the gap between abstract mathematical concepts and deep conceptual understanding.

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Table 10

Relationship Between Assessments on the Mathematics Proficiency Level of Grade 11 Students (Procedural Fluency) and on the Extent of the Utilization of the Innovative Teaching Approaches

Variable	Computed R-values	Interpretation	p-values	Decision	Conclusion
Lesson Delivery Methods	.444	Moderate Positive Relationship	.000	Reject	Significant
Learning Activities	.442	Moderate Positive Relationship	.000	Reject	Significant
Instructional Resources	.593	Strong Positive Relationship	.000	Reject	Significant

The result of the study revealed that all three variables yielded a p-value of .000, which led to the rejection of the null hypothesis and indicated that the results were statistically significant. Consequently, when students struggled with complex tasks in solving problems or equations, the consistent use of innovative approaches to master procedural fluency helped reduce the anxiety associated with mathematical computation.

Table 11

Relationship Between Assessments on the Mathematics Proficiency Level of Grade 11 Students (Problem-Solving Skills) and on the Extent of the Utilization of the Innovative Teaching Approaches

Variable	Computed R-values	Interpretation	p-values	Decision	Conclusion
Lesson Delivery Methods	.682	Strong Positive Relationship	.000	Reject	Significant

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Learning Activities	.531	Strong Positive Relationship	.000	Reject	Significant
Instructional Resources	.578	Strong Positive Relationship	.000	Reject	Significant

The result of the study shows that the highest computed R-values among the three variables is the lesson delivery methods (r=.682 ;p=.000) that implies a strong positive relationship between Mathematics proficiency level of Grade 11 students and the utilization of innovative teaching approaches. It means that it is effective to use innovative teaching approaches in lesson delivery methods to have an effective learning. Findings revealed that it is effective to have a strong foundation of information for teachers in implementing an effective and meaningful innovation approach for learners to have an engaging and motivating learning environment.

Table12

Relationship Between Assessments on the Mathematics Proficiency Level of Grade 11 Students (Reasoning) and on the Extent of the Utilization of the Innovative Teaching Approaches

Variable	Computed R-values	Interpretation	p-values	Decision	Conclusion
Lesson Delivery Methods	.534	Strong Positive Relationship	.000	Reject	Significant
Learning Activities	.546	Strong Positive Relationship	.000	Reject	Significant
Instructional Resources	.639	Strong Positive Relationship	.000	Reject	Significant

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The study revealed a statistically significant relationship between the assessment of Mathematics reasoning proficiency and the utilization of innovative teaching approaches. Across the three variables analyzed, a consistent, strong positive correlation was observed. The highest computed value was r = .639 with a p-value of .000, specifically reflecting the impact of the variable instructional resources. the results suggest that student reasoning skills were enhanced through the integration of innovative teaching approaches within instructional resources. These methods fostered greater student engagement, encouraged attentive learning, and empowered students to explore complex reasoning problems more effectively.

4. Challenges Encountered by the Teachers in Utilizing Innovative Teaching Approaches

Teaching Mathematics at the senior high school level remained a significant challenge for educators, primarily due to the consistently low proficiency levels exhibited by the students. The thematic analysis of the participants' responses revealed three primary challenges that impeded the adoption of these modern strategies. First, educators felt intense pressure to cover the extensive list of competencies required for Statistics and Probability, which restricted their ability to implement flexible or student-paced learning models. Second, a widespread lack of mastery regarding prerequisite Mathematics skills among students prevented meaningful engagement in complex, innovative activities. Finally, the process of planning and developing specialized materials for these innovative lessons was found to be excessively time-consuming, further straining the limited resources available to the teaching staff.

5. Description of the Developed Instructional Guide

Instructional Guide: Statistics and Probability

This guide was designed to facilitate a meaningful learning experience in Statistics and Probability by incorporating innovative pedagogical approaches, such as gamified activities and engaging Microsoft PowerPoint presentations. The content of this instructional guide targeted the three lowest-performing learning competencies identified in the study by Pilac (2025), titled “Mathematics Proficiency Level of Grade 11 Students and Innovative Teaching Approaches in Congressional District I, Batangas Province.”

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DISCUSSION

The findings indicated that the reasoning skills of students were enhanced through the use of innovative instructional resources. These resources helped students engage more deeply in discussions, learn more attentively, and explore reasoning problems more effectively.

This strong performance in foundational identification and classification tasks aligned with the observations of Rahman et al. (2022), who emphasized that mathematical proficiency encompassed both robust conceptual understanding and the ability to apply arithmetic competence. Similarly, the results mirrored the findings of Mendoza (2025), which showed that learners exhibited high performance levels in grasping, visualizing, and modeling mathematical concepts.

These results suggested that students possessed a strong foundational understanding of discrete variables, aligning with the findings of Bernal Jr. et al. (2024), who noted that learners often demonstrate proficiency in simple, structured tasks. This indicated that students exhibited a clear understanding of variable identification, reflecting the effectiveness of the teachers' instructional strategies for this specific competency. Another study suggested that students benefited from the procedural fluency identified by Bernal Jr. et al. (2024), which enabled them to execute steps accurately within systematic problem structures.

This result aligned with the observations of Mendoza (2025), who noted that learners often exhibited high levels of mathematical performance in areas involving the visualization and modeling of concepts. This finding reflected the study of Tafara and Masataka (2023), who noted that facilitating collaborative group activities and managing time efficiently remained major hurdles in implementing student-centered tasks.

Additionally, the moderate use of such collaborative strategies might have been a byproduct of technostress or workload management issues, as described by Tizon-Viray (2025) and Bejasa and Yango (2023). Their research indicated that the pressure to adapt to new tools often compelled educators to prioritize routine tasks over complex instructional designs. Overall, while teachers successfully used assessment to guide their pacing, there remained a clear opportunity to increase the use of structured collaborative methods to further enhance higher-

order thinking. Prioritizing the integration of these cooperative models allows institutions to move toward a more balanced pedagogical framework where the rigor of content delivery is matched by the depth of student interaction. Providing teachers with the necessary technical support and time-management resources could mitigate the effects of technostress, ultimately fostering a more sustainable environment for high-level instructional innovation.

These findings were supported by the study of Molina and Bustamante (2023), who emphasized that interactive and collaborative peer-based activities effectively shifted the educational focus toward student-centered engagement.

This was aligned with the findings of Sangco (2023), who noted that mathematical performance improved when students utilized problem-posing strategies, as such methods encouraged deep thinking, creativity, and engagement. Additionally,Tizon-Viray (2025) and Bejasa and Yango (2023) highlighted that technostress and heavy workloads often hindered teachers from fully adopting specialized tools. These findings suggested that teachers tended to avoid bulky materials when they felt students could already understand the lesson through other engaging means.

According to Briñosa and Collina (2025), the quality of the teaching experience and learner outcomes were directly impacted by the degree to which teachers applied innovative strategies. Furthermore, Malak (2024) found that game-based quizzes and activities significantly enhanced student motivation, participation, and accuracy in solving mathematical tasks. His study also demonstrated that gamification could effectively complement traditional instruction, encouraging students to take a more active and engaged role in the learning process.

These findings aligned with the study of Lopez (2023), who found that teachers who employed effective instructional strategies and materials produced students with a deeper grasp of mathematical procedures. Additionally, Bernal Jr. et al. (2024) emphasized that procedural fluency, which is essential for mastering higher-level mathematics, required systematic problem-solving steps and immediate reinforcement.

The findings of Francisco (2024) reveals that many teachers expressed the need of focused and continuous professional development rather than one-time workshops to effectively

design and implement innovative teaching strategies. He also emphasized that the absence of a systematic teacher development framework often comples teachers to rely on traditional methods, as they lack sufficient guidance or expposure to alternative instructional models.

In addition, Cagais and Rodriguez (2024) also highlight in their study that leadership development must accompany teacher professional development to ensure that innovations become institutionalized rather than dependent on the enthusiasm of individual educators. They added that achieving sustainable innovation requires a strong collab and alignment between school and division leaders.

These findings align with the study of Besa (2025), which asserted that the quality of learner outcomes is directly impacted by the degree to which teachers apply innovative strategies. Furthermore, the significance found in reasoning proficiency corroborated the findings of De Jesus and Guzon (2023), who emphasized that reasoning serves as a key indicator of overall mathematical proficiency and is strongly linked to accuracy in problem-solving.

The Instructional Guide: Statistics and Probability was specifically created to address the challenges educators face, such as the significant time required to plan and develop innovative materials. Ultimately, the primary goal was to provide ready-made resources - including PowerPoint presentations, offline gamified quizzes, and instructional files for group activities - to support effective classroom instruction.

In summary, the results suggest that student reasoning skills were enhanced through the integration of innovative teaching approaches within instructional resources. These methods fostered greater student engagement, encouraged attentive learning, and empowered students to explore complex reasoning problems more effectively.

CONCLUSION

From the findings, the following conclusions were drawn:

1. As assessed by the teachers, it was found that generally, students showed an above-average Mathematics proficiency level.

2. Teachers' self-assessment revealed that the utilization of the innovative teaching

approaches was highly utilized in learning activities and moderately utilized in lesson delivery methods and instructional resources.

2. There is a significant relationship between assessments on the Mathematics proficiency level of Grade 11 students and on the extent of the utilization of the innovative teaching approaches.
3. Teachers' challenges in utilizing innovative teaching approaches were the pressure to cover all competencies in Statistics and Probability, students' low mastery of prerequisite Mathematics skills needed to engage in innovative problem-solving activities, and planning and creating innovative lessons consume a lot of time.
5. An instructional guide that involves innovative approaches can be used as a

From the results and conclusions of the research, the following recommendations are proposed:

1. The instructional guide may be submitted to the school LR's for evaluation and may be utilized for approval.
2. LAC Sessions and training programs about the instructional guide may be conducted to help the teachers find better ways to teach Mathematics among the students.
3. The Mathematics coordinators within the district may provide pre-validated digital or printed instructional resources that are aligned with the Most Learning Competencies (MELCs) so that every Mathematics teacher can access them anytime.
4. Future researchers may work on similar or parallel studies to add more pertinentinformation toward a wider generalization.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 7 (2026)

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