
Analyzing Teachers' Know-How in Applying Innovative Mathematics Teaching Strategies

Heizl M. Alolor

Teacher II, Julio Ledesma National High School
Email: heizl.alolor@deped.gov.ph

Mary June V. Delima

Teacher II, Lina De La Viña Valmayor Integrated School
Email: mary.delima@deped.gov.ph

Pamela L. Kirong

Teacher II, Lipata National High School
Email: pamela.kirong@deped.gov.ph

Chyrame B. Medida

Teacher II, Lipata National High School
Email: chyrame.medida@deped.gov.ph

Daisy Lynn J. Robin

Teacher III, Mahaplag National High School
Email: daisylynn.robin@deped.gov.ph

Abstract — This study aimed to determine the extent of utilization of innovative mathematics teaching strategies and the personal performance rating in Instructional Performance in Teaching Mathematics of Public School Teachers during the school year 2025-2026. This study employed a quantitative descriptive-correlational research design with 105 Secondary Mathematics Public School Teachers as the respondents. An adapted survey questionnaire was utilized. Employing weighted means to get the extent of utilization of different innovative mathematics teaching strategies and the personal performance rating of the teacher's instructional performance. A chi-square test of independence was performed to examine the relation between the extent of utilization of innovative mathematics teaching strategies and the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs). The study's empirical findings revealed that most of the teachers' profiles correlated directly with the utilization of innovative

mathematics strategies. However, it does not correlate with age and civil status. Also, some profiles of the teachers correlate with the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs); only civil status and highest educational attainment were determined as not statistically significant. Lastly, it was proven that there is a significant relationship between the extent of utilization of innovative mathematics teaching strategies and the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs). Based on the findings of the study, the researchers concluded that the profile of the mathematics teachers may influence the utilization of innovative mathematics teaching strategies. The same way in their instructional practices, based on the identified key results areas (KRAs). Hence, the utilization of the proposed mathematics teaching professional development plan to further enhance the utilization of innovative mathematics teaching strategies of the teachers is recommended.

Keywords — Mathematics Education, Instructional Practices, Mathematics Teaching Strategies, descriptive-correlational, Minglanilla, Cebu, Philippines

I. INTRODUCTION

Education is one of the most crucial factors in a nation's development. It is a crucial tool for creating a workforce that is knowledgeable and capable of contributing to the country's advancement. One of the skills that one country is emphasizing is math education. Mathematics is essential in education, as it serves as the foundation for many other disciplines, including physics, engineering, and economics. Critical thinking and problem-solving abilities are developed through mathematics education. It instructs students in information analysis, pattern recognition, relationship analysis, and logical inference. These abilities are highly regarded in the job and essential for achievement in many fields. However, despite the importance of mathematics education, many students struggle with the subject and perform poorly academically (Guinocor et al., 2020).

Literature Review

This study is significant as it examines the extent to which teachers utilize innovative teaching strategies in mathematics. The primary goal is to provide practical recommendations for an effective implementation plan. To comprehend this phenomenon, it is crucial to analyze the key theoretical constructs: innovative teaching strategies, their application by teachers, and their significance in mathematics education.

Innovative mathematics teaching strategies transcend conventional didactic methods, incorporating approaches that foster in-depth conceptual understanding, critical thinking, problem-solving skills, and engagement. These could include constructivist methodologies, inquiry-based pedagogy, technological integration, differentiated instruction, collaborative learning, and the practical application of mathematical concepts (Bature, 2020). The fundamental concept is to shift from rote instruction to active, student-centered learning experiences that accommodate various learning styles and enhance mathematical reasoning. Recent studies have highlighted the importance of innovative pedagogical approaches in mathematics education. Although teachers typically demonstrate a considerable understanding of these strategies, their practical application in classrooms is limited, as conventional methods, particularly the lecture format, continue to dominate across educational levels (Christian-Ike et al., 2024).

The implementation of these strategies by teachers is a complex process affected by numerous factors. Theoretical frameworks frequently highlight elements such as teachers' pedagogical content knowledge (PCK), self-efficacy in implementing innovative strategies, accessibility of resources and training, organizational culture, administrative backing, and personal views regarding the teaching and learning of mathematics. Factors contributing to the gap between awareness and implementation include insufficient training and a lack of knowledge regarding effective implementation (Achuonye, 2015). Multimedia-based initiatives are among the least utilized new strategies (Campilla & Castañaga, 2020). The gap between awareness of an innovative method and its regular implementation in the classroom is a crucial aspect for comprehension, frequently necessitating a supportive setting and ongoing professional growth.

These supportive frameworks are not just a luxury, but a necessity for reassuring educators and instilling confidence in their ability to implement change.

II. METHODOLOGY

Research Design

This study employed a quantitative descriptive-correlational research design in determining the relationship between the teacher's extent of utilization of innovative mathematics teaching strategies and the personal performance rating of teachers' instructional performance.

A descriptive-correlational design is employed in research investigations that attempt to present a static picture of situations while also establishing a relationship between different variables (McBurney & White, 2009).

Sample of the Study

The respondents of this study were the 105 Public School Teachers in SDO Cebu Province, Minglanilla District 2. The selected teachers were expected as the research respondents because they are the focus of the study, in which the researchers will determine the relationship between the teacher's extent of utilization of innovative mathematics teaching strategies and the personal performance rating of teachers' instructional performance. To ensure the reliability of the samples, a complete enumeration sampling was utilized.

Table 1 presents the distribution of the respondent groups.

TABLE 1
DISTRIBUTION OF THE RESPONDENT GROUPS

Sampled Respondents	N	n	%
Secondary Public School Mathematics Teachers	105	105	100.00
Total	105	105	100.00

This study involved 105 public school teachers from Minglanilla District 2 in the Schools Division Office of Cebu Province. All teachers who were part of the district's secondary mathematics teaching force were included as respondents. They were chosen because the study aims to understand how often teachers use innovative strategies in teaching mathematics and how this relates to their instructional performance ratings.

Measures

The study utilized an adapted survey questionnaire of Cabrera (2024) and the Department of Education (DepEd) standard review form to gather data on the extent of innovative teaching strategies and the level of instructional practices of teachers in teaching Mathematics. The survey questionnaire consists of 3 parts, of which the first part is the teacher's professional profile in terms of: age; sex; civil status; highest educational attainment; number of years teaching handling Mathematics; and number of hours of relevant Seminars/training related to Mathematics attended. The second part is the teachers' utilization of innovative mathematics teaching strategies in teaching Mathematics in terms of: Small Group Learning Strategy; Problem Solving strategy; Using Models/Manipulative; and Games. Lastly, the third part is the teachers' personal performance rating of teachers instructional performance based on the Key Results Area (KRA) in terms of: content knowledge and pedagogy; learning environment and diversity of learners; curriculum and planning and assessment and reporting; community linkages and professional engagement; and personal growth and professional development.

To measure the responses of the respondents in Part I, a simple percentage was utilized. In part II the Likert-Type Scale of the level of frequency Response by Vagias (2006) was adopted to determine the Teachers' Extent of Utilization of Different Innovative Teaching Strategies in Mathematics. The instrument assessed the extent of teachers' utilization of innovative teaching strategies in teaching Mathematics and was scaled to five levels. A scale of (5) implies always with the score ranging in 4.21 – 5.00; (4) denotes often with the score ranging in 3.41 – 4.20 ; (3) indicates Sometimes with the score ranging in 2.61 – 3.40 ; (2) implies rarely with the score ranging in 1.81 – 2.61; and (1) suggests never with the score ranging in 1.00 – 1.80. While the in

Part III, the personal performance rating of the teachers instructional performance based on the identified

Content validation was conducted by a panel of experts at Northwest Samar State University, with the instrument undergoing revisions based on their feedback.

Procedures

Collecting data included giving the participants a survey, and they then provided their responses. Rest assured, the answers were collected carefully to maintain accuracy and privacy.

Each institution's school administrator received a letter seeking authorization to conduct the study. Upon approval from the school administrator, the study then commenced.

Then, teachers received the questionnaire and were asked to provide honest responses regarding their extent of utilization of different mathematics innovative teaching strategies, and the personal performance rating of the teachers' instructional performance based on the identified Key Result Areas

Lastly, tabulation of the data was done after the retrieval of the questionnaires. All the gathered data was subjected to statistical computation with the help of the statistician. The last steps were the interpretation, analysis, and presentation of the data.

Data Processing

The gathered data from the survey questionnaires were tabulated and organized. Additionally, the data were treated and analyzed using the subsequent statistical tools:

Frequency Count. This was used for tallying the number of respondents' responses on their professional profiles.

Percentage. This was used to determine the proportion of the total respondents' professional profiles.

Weighted Mean. This was used to determine the teacher's extent of utilization of different innovative mathematics teaching strategies and the personal performance rating of the teacher's instructional performance based on the identified Key Result Areas.

Chi-square test of independence. This was used to determine the relationship between the teacher's extent of utilization of different innovative mathematics teaching strategies and the personal performance rating of the teacher's instructional performance.

Ethical Considerations

Before the survey was conducted, the researcher asked the respondents' permission and got full approval for them to take part in the study. During the survey procedure, respondents were told in full about their rights. The right to privacy of individuals was respected during interviews and data collection. Respondents' names and answers remained secret while the researcher looked into them. Lastly, the researcher declared that all study documents were disposed of, following the completion of the study.

III. RESULTS AND DISCUSSION

This section provided, evaluated, and interpreted the information gleaned from the study participants' questionnaires. Together with related statistical analysis and interpretation, the data are given in tabular and graphical formats. The conversation focuses on the extent of utilization of innovative mathematics teaching strategies and the personal performance rating in Instructional Performance in Teaching Mathematics.

Profile of respondents. This subsection provided the demographic profile of the respondents, which was used in obtaining data on the extent of utilization of innovative

mathematics teaching strategies and the personal performance rating in Instructional Performance in Teaching Mathematics of Public School Teachers.

Age. Table 2 presents the total number of Mathematics teacher-respondents in terms of their age. Out of 105 respondents, there were 32 from 31 - 40 years old, which comprised 30.48% of the total population. There were 30 respondents from 41-50 years old, which comprised 28.57% and another 24 from 21-30 years old, which also comprised 22.86% of the total population. Lastly, 19 respondents from more than 50 comprised 18.10% of the total population.

TABLE 2.
PROFILE IN TERMS OF AGE

AGE	<i>f</i>	%
21 - 30 yrs old	24	22.86
31 - 40 yrs old	32	30.48
41 - 50 yrs old	30	28.57
More than 50	19	18.10
TOTAL	105	100.00
Mean Age: 39.69		
StDev. 10.36		

Older teachers may be more competent because they have a 'knowledge base' that has been created over years of teaching experience compared to younger teachers, but they, too, must constantly study to keep up with the latest pedagogical techniques in their everyday teaching for optimal teaching and learning results (Esmail and Abd Wahid, 2018). Thus, the age of the mathematics teachers serves a significant role in the total understanding of teachers' instructional performance.

Sex. Table 3 presents the profile of the mathematics teacher-respondents in terms of sex. There were 92 out of 105 respondents who were female, who comprised 87.62 % of the total respondents. Followed by 13 male respondents who composed 12.38 % percent of the total respondents.

TABLE 3.
PROFILE IN TERMS OF SEX

SEX	<i>f</i>	%
Male	13	12.38
Female	92	87.62
TOTAL	105	100.00

In the study of Löwe et al. (2022), they found that the gender of the teacher is significant in this context, with evidence suggesting that females exhibit a stronger response to same-sex role models than boys do. This implies that a female mathematics teacher is more likely to influence the learning of the students and highly implement the innovative mathematics teaching strategies.

Civil Status. Table 4 below presents the profile of the teacher-respondents in terms of civil status. With a total of 105 respondents, 68 teachers, comprising 64.76% are identified as married, while 37 of the respondents, comprising 35.24% whom are single in terms of their civil status.

TABLE 4.
PROFILE IN TERMS OF CIVIL STATUS

CIVIL STATUS	<i>f</i>	%
Single	37	35.24
Married	68	64.76
Separated	0	0
Widow/Widower	0	0
TOTAL	105	100.00

Dela Rosa and Vargas (2021) found no significant difference in teaching efficiency among various civil status categories. Thus, civil status seems to exert some influence; nonetheless, the evidence indicates it is not an important consideration in teaching mathematics efficacy and the implementation of the innovative teaching strategies.

Highest Educational Attainment. Table 5 provides a breakdown of the respondents' highest educational attainment. With a total of 105 teacher-respondents, 45 of them were master's level, which comprised 42.86% of the total number of respondents, followed by 41 who comprise

39.05% who are only College graduates. A significant number also identified were 18 of the total number of respondents that comprise the 17.14% graduated with their master's degree, and 1 teacher that comprises the 0.95% is at the Doctoral Level.

Students who were taught by several highly trained teachers were more likely to obtain higher levels of education (Lee & Lee, 2020). Teachers' attainment of higher degrees, notably master's degrees, has attracted significant attention, with several states providing wage increases to teachers who pursue extra education. Teacher qualifications will continue to play a vital role in the overall development of each student, particularly in the implementation of the innovative teaching strategies in Mathematics.

Length of Years of Teaching Experience. The length of years in teaching experiences of the teacher-respondents. As the study revealed, there were 43 that comprised 40.95% of the 105 respondents who had experience in teaching with 4 to 10 years, followed by 40 comprising the 38.10% who had significantly more than 10 years of teaching experience, and 22 with 1-3 years of teaching experience comprising the 20.95% of the total respondents.

Podolsky et al. (2019) discovered that teaching experience is positively related to student accomplishment improvements throughout a teacher's career; as teachers gain experience, students are more likely to perform better on success indicators other than test scores. Thus, teachers' efficacy improves when they teach in a welcoming, collegial setting or gain experience in the same grade, subject, or district.

Number of Hours of Relevant Seminars/Training Attended. The number of hours of seminars/trainings the teacher-respondents attended. Out of 105 respondents, there were 45 who had 9 to 40 hours of training, comprising 42.86% of the total respondents, followed by 39 with more than 40 hours of training, comprising 37.14%, and 21 respondents with below 9 hours of training, comprising 20%.

Ingsih et al. (2020) emphasize that training alone does not ensure performance improvement, indicating the necessity for focused, high-quality professional development

programs. This implies that the evidence indicates that training is beneficial but must be methodically structured to optimize instructional success of the teachers.

Summary of Findings

This contained a concise summary of the results taken from the survey questionnaires in connection with the extent of utilization of innovative mathematics teaching strategies and the personal performance rating in Instructional Performance in Teaching Mathematics. This summarized the brief upshots and insights obtained and used them with notable trends and patterns perceived.

Professional Profile of the Respondents. The data gathered revealed significant information in this study in terms of the profile of the respondents.

In the age of the respondents. Out of 105 respondents, 32 were between 31 and 40 years old, comprising 30.48% of the total population. There were 30 respondents from 41-50 years old, which comprised 28.57% and another 24 from 21-30 years old, which also comprised 22.86% of the total population. Lastly, 19 respondents from more than 50 comprised 18.10% of the total population.

Additionally, the sex of the respondents. There were 92 out of 105 respondents who were female, who comprised 87.62 % of the total respondents. Followed by 13 male respondents who composed 12.38 % percent of the total respondents. While the civil status of the respondents was revealed, with a total of 105 respondents, 68 teachers, comprising 64.76% are identified as married, while 37 of the respondents, comprising 35.24% whom are single in terms of their civil status.

Subsequently, in the educational attainment of the respondents. With a total of 105 teacher-respondents, 45 of them were master's level, which comprised 42.86% of the total number of respondents, followed by 41 who comprise 39.05% who are only College graduates. A significant number also identified were 18 of the total number of respondents that comprise the 17.14%

graduated with their master's degree, and 1 teacher that comprises the 0.95% is at the Doctoral Level.

Moreover, the experience in teaching of the respondents revealed, there were 43 that comprised 40.95% of the 105 respondents who had experience in teaching with 4 to 10 years, followed by 40 comprising 38.10% who had significantly more than 10 years of teaching experience, and 22 with 1-3 years of teaching experience comprising 20.95% of the total respondents.

Lastly, the number of hours of relevant seminars/ training attended by teacher-respondents. Out of 105 respondents, there were 45 who had 9 to 40 hours of training, comprising 42.86% of the total respondents, followed by 39 with more than 40 hours of training, comprising 37.14%, and 21 respondents with below 9 hours of training, comprising 20%.

The Extent of Utilization of The Following Innovative Mathematics Teaching Strategies. The gathered data are as follows:

In terms of small group learning strategies. The aggregated mean of 3.41, categorized as “often,” was determined. The findings indicate that while small group learning shows promise as an innovative mathematics teaching strategy, its adoption varies across educational contexts. In terms of problem-solving strategies. The aggregated mean of 3.43, categorized as “often,” was determined. The result implies that there is a need for further improvement in terms of the implementation of the Problem-Solving Strategy.

The Self-Assessed Instructional Performance Rating of Teachers Based on The Identified Key Results Areas (Kras). The data revealed the following:

In terms of content knowledge and pedagogy, the determined aggregated mean is 3.44, which falls into the category of “very satisfactory”. The data implies that the teachers need further professional development programs to develop their instructional performance in content knowledge and pedagogy. While in terms of learning environment and diversity of learners, the aggregated mean of 3.49 falls into the category of “very satisfactory” and was determined. The

findings emphasize the importance of providing continuous professional development opportunities, creating supportive work environments, and implementing systematic approaches to enhance teachers' capacity in managing both learning environments and learner diversity effectively.

Moreover, in terms of curriculum and planning and assessment, and reporting. The data revealed that the teachers' self-assessment of their instructional performance in “adapt and implement learning programs that ensure relevance and responsiveness to the needs of all learners” was categorized as “very satisfactory” with a mean of 3.41. This implies that the mathematics teachers already have good instructional performance in this indicator and could be enhanced through a professional development program.

Additionally, in terms of Community Linkages and Professional Engagement. The aggregated mean of 3.39, which falls into the category of “satisfactory,” was determined. The findings imply that there is a need for teachers to undergo a professional development program implementation that addresses these indicators. Lastly, in terms of Personal Growth and Professional Development. The data revealed that the teachers' self-assessment of their instructional performance in “adopt practices that uphold the dignity of teaching as a profession by exhibiting qualities such as caring attitude, respect, and integrity” was only categorized as “satisfactory” with a mean of 3.37. This implies that the mathematics teachers need to enhance their personal growth and professional development for a better outcome in their instructional performance.

Test of Significant Relationship. The data revealed that there was a strong, positive correlation between the utilization of innovative mathematics strategies and the following profile of teachers, which was statistically significant: sex, highest educational attainment, no. of years of teaching experience, and no. of hours of relevant training/seminars attended. However, the same correlation test revealed that there was no positive correlation between the utilization of innovative mathematics teaching strategies and the following profile of teachers, which was not statistically significant: age, and civil status.

Lastly, in the extent of utilization of innovative mathematics teaching strategies and the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs). The contingency table shows that there is a significant relationship between the extent of utilization of innovative mathematics teaching strategies and the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs). It further revealed the relation between these variables was SIGNIFICANT, $\chi^2(1, N=105) = 5, p = .025$.

IV. CONCLUSIONS

Based on the findings of this study, it can be concluded that the profile of the mathematics teachers may influence the utilization of innovative mathematics teaching strategies. The same way in their instructional practices, based on the identified key results areas (KRAs). Subsequently, there is a significant correlation between the extent of utilization of innovative mathematics teaching strategies and the self-assessed instructional performance rating of teachers based on the identified key results areas (KRAs). Thus, a proposed professional development plan is developed to further enhance the instructional practices and utilization of innovative mathematics teaching strategies of the teachers.

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