PEDAGOGICAL APPROACHES IN TEACHING SECONDARY MATHEMATICS IN THE DIVISION OF BATANGAS PROVINCE

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ABSTRACT

This study provides insights into the pedagogical approaches employed in teaching secondary Mathematics within the Division of Batangas Province. Additionally, it sought to examine the potential correlation between assessments of mathematical performance and the extent to which pedagogical approaches are utilized in teaching Mathematics. A descriptive research methodology was employed, utilizing a questionnaire as the primary data collection instrument. The study focused on SHS mathematics teachers in the Division of Batangas Province. Among the 149 respondents, the findings indicated that a majority assessed their utilization of pedagogical approaches to a great extent. Furthermore, the results revealed a significant relationship between learners' performance in General Mathematics and teachers' extent of utilization of pedagogical approaches. This relationship encompassed teacher-learner interaction, learning content, mastery of subject matter, and learning assessment. Moreover, the study identified various challenges faced by respondents in implementing pedagogical approaches, including a shortage of learning resources, handling large class sizes, heavy teacher workloads and ancillary activities, inadequately prepared curriculum materials, balancing diverse learning needs, student unwillingness to learn cooperatively, lack of support in training from administrators and stakeholders, insufficient time for activity preparation, and teacher resistance to exploring technology. Addressing these challenges is imperative to maximize teachers' potential in utilizing pedagogical approaches in teaching Mathematics. In response to these findings, the researcher recommends several strategies for overcoming challenges and enhancing the application of pedagogical approaches. Notably, the study introduces Project WERPA (Worksheets, E-games, Remediation, and Peer-Assistance) as a conceptualized initiative to effectively intensify the application of pedagogical approaches in teaching secondary Mathematics. These recommendations aim to benefit not only the teachers but also future researchers in this field.

Keywords: Collaborative, Constructivist, Integrative, Inquiry-based and Reflective Approach

INTRODUCTION

In harmony with the Department of Education's commitment to delivering quality, equitable, culture-based, and comprehensive basic education, our curriculum places a paramount focus on addressing individual learner needs. It accomplishes this by contextualizing content within real-life situations. The pedagogical methods employed reflect a constructivist approach, fostering active knowledge-building through exploration and critical thinking. Emphasizing inquiry-based learning,

reflective practices, and fostering collaboration among students are integral aspects of our educational framework.

In adherence to Republic Act 10533, which seeks to improve the basic education system, the Department of Education in the CALABARZON region underscores the importance of effective teaching methods, as outlined in Regional Memorandum 233 series from 2016. This memo introduces the 2C-2I-1R program, emphasizing Constructivist, Collaborative, Inquiry-Based, Reflective, and Integrative methods in education. The Quality Assurance Monitoring and Evaluation Division takes the lead in monitoring teachers' implementation of these approaches, as outlined in the Assessment Tool.

Recognizing the global adoption of various teaching strategies, especially in mathematics, the research delves into the use of Constructivism, the first "C" approach in the 2C-2I-1R hierarchy. Collaborative learning, the second "C" strategy, and Integrative and Inquiry-Based approaches ("I") are also examined. Reflective teaching and learning methods, the final "R" strategy, focus on self-observation and self-evaluation, emphasizing the processing of experiences for effective responses.

Considering the importance of these pedagogical methods in teaching mathematics, the study aims to enhance students' proficiency and understanding beyond the national average of 75%. The researcher, having witnessed low achievement in mathematics as a teacher, particularly in grade 11 students at San Pascual Senior High School 2, seeks to determine the assimilation of DepEd-designed teaching and learning pedagogies and their impact on student performance.

The primary objective of the researcher is to improve the effective utilization of pedagogical techniques in teaching mathematics, aligning with DepEd's mission and legislative basis. To achieve this, the research introduces engaging enrichment activities designed to provide students with practical applications of diverse mathematical techniques in real-life scenarios. These activities not only contextualize the subject matter but also foster positive peer relationships among teachers and students while enhancing numerical skills. The incorporation of these practical and interactive elements aims to ensure the successful implementation of educational objectives outlined by the Department of Education.

OBJECTIVES OF THE STUDY

The study aims to increase the use of pedagogical approaches in teaching General Mathematics in public senior high schools throughout the Batangas Province's Division.
In accordance, it specifically attempts to answer the following specific objectives:

1. Determine the learners' level of performance in Mathematics in terms of:
    1.1. understanding and illustrating concepts;
    1.2. applying concepts;
    1.3. evaluating concepts; and
    1.4. problem-solving
2. Identify the extent of utilization of pedagogical approaches in teaching Mathematics in terms of:
    2.1. teacher and learner interaction;
    2.2. learning content;
    2.3. mastery of the subject matter; and
    2.4. learning assessment.
3. Examine the assessments on the level of performance in Mathematics and the extent of utilization of pedagogical approaches in teaching.
4. Identify the challenges encountered by the teachers in teaching Mathematics.
5. Propose enrichment activities based on the results of the study.

METHODOLOGY

The descriptive research methodology was employed. According to Abad (2020), the descriptive approach entails the process of analysis, categorization, enumeration, and measurement of the provided data and relates to the existing facts as current state about the nature of a group of people, several items, as well as class of occurrences.

The major data collection instrument was a questionnaire, and the research was descriptive. The questionnaire was designed to collect information for the study's objective. Its goal is to

give information about how 2C-2I-1R and other pedagogical approaches are used in the Batangas Province's public secondary senior high schools.

RESULTS AND DISCUSSION

1. Learners' Level of Performance in General Mathematics as Assessed by their Teachers

This section presents the learner's level of performance in General Mathematics as assessed by their teachers along with understanding and illustrating concepts, applying concepts, evaluating concepts, and problem-solving. The Mathematics performance was assessed using the most essential learning competencies in the curriculum guide prescribed by the Department of Education.

1.1. Understanding & Illustrating Concepts

Table 2
Level of Performance in Understanding & Illustrating Concepts

The learners demonstrate an understanding of the key concepts of the following…	WM	VI
1. functions	3.88	P
2. rational functions	3.60	P
3. inverse functions	3.52	P
4. exponential functions	3.71	P
5. logarithmic functions	3.45	AP
6. simple and compound interests	3.55	P
7. simple and general annuities	2.68	AP
8. stocks and bonds	3.40	AP
9. business and consumer loans	3.46	AP
10. propositional logic, syllogism, and fallacies	3.48	AP
11. proof and disproof	3.39	AP
Composite Mean	**3.81**	**P**

Legend: WM = Weighted Mean, VI = Verbal Interpretation, P= Proficient, AP= Approaching Proficiency

Table 2 presents the learner's level of performance in understanding and illustrating concepts. Understanding and illustrating concepts in General Mathematics includes the key concepts of functions, rational functions, inverse functions, exponential functions, logarithmic functions, simple and compound interests, simple and general annuities, stocks and bonds, business and consumer loans, propositional logic, syllogism, fallacies, and proof and disproof.

As shown in the table, the teacher-respondents assessed that the learners' level of performance in understanding and illustrating concepts about functions, exponential functions, and rational functions was proficient. These indicators/items garnered the highest weighted mean of 3.88, 3.71, and 3.60 respectively. This suggests that the students completed their learning activities to the best of their abilities and possessed the necessary capabilities.

In accordance with this, the National Research Council (2013) recognized the five strands of mathematical proficiency as indicators that someone knows and can practice Mathematics. According to this study, the components of mathematical competency are interconnected and interdependent, meaning that improving one component helps improve the others.

Contrarily, comprehending mathematics does not include memorization of procedures, rules, explanations, or theorems. There must be a place to begin when deriving notions from simpler concepts. That observation raises complex and obscure mathematical and philosophical issues, and for some people, thinking about these issues takes up their entire lives. It is sufficient to use primary school math as the beginning point for this objective. It is both intuitive and suitably rich.

On the other hand, the indicators that got the lowest weighted mean of 2.68 was understanding and illustrating concepts about simple and general annuities, followed by understanding and illustrating concepts about proof and disproof with a weighted mean of 3.39, then understanding and illustrating concepts about stocks and bonds having a weighted mean of 3.40. All the weighted means of these indicators have a verbal interpretation of approaching proficiency.

According to the Council of Chief State School Officers (2013), instructors must first give clear instructions on the ground rules for classroom discussions to foster an environment that promotes mathematical knowledge. Second, teachers might need to set an example for the kind of interaction and questioning they want from their pupils. In such a case, direct guidance would be appropriate. To foster mathematical proficiency, it is essential to

emphasize and utilize students' ideas when teaching for understanding.

Building relational knowledge also requires keeping the thoughts of learners at the center of the learning environment by highlighting procedural norms, numerical proficiencies, and the requirements for Mathematical Performance. To accomplish this, the teacher must foster a collaborative learning environment in the classroom. The following characteristics of a mathematics classroom that fosters comprehension should be taken into account (Chapin, O'Conner, & Anderson, 2015).

Summing up, results from Table 2 reveal that the learners had a proficient level of performance in understanding and illustrating concepts in General Mathematics. It was reflected based on the computed composite mean of 3.81. A related conclusion is that students should comprehend and illustrate mathematical concepts and ideas, which is one of the most accepted principles in mathematical instruction.

The study by Godino (2013), which noted that recent curriculum modifications in several countries demonstrated an interest in teaching and studying mathematics with comprehension, validated the outcome. This interest was also evident in the proceedings of conferences as well as academic journals related to psychology and artificial intelligence. He concurred that it is a good idea to teach for understanding. It goes beyond knowledge and is larger than a collection of facts, figures, or information. It goes beyond simply being able to comply with instructions.

1.2. Applying Concepts

Table 3 shows the student's level of performance in applying concepts as assessed by their teachers. Applying concepts in General Mathematics includes the key concepts of functions, rational functions, inverse functions, exponential functions, logarithmic functions, simple and compound interests, simple and general annuities, stocks and bonds, business and consumer loans, propositional logic, syllogism, fallacies, and proof and disproof.

As shown in the table, the teacher-respondents assessed that the learners' level of performance in applying concepts about simple and compound interest, functions, business, and consumer loans was proficient. These indicators/items got the highest weighted mean of 3.83, 3.57, and 3.54 respectively.

Table 3
Level of Performance in Applying Concepts

The learners represent real-life situations using the following…	WM	VI
1. functions, including piece-wise functions	3.57	P
2. rational functions	3.39	AP
3. one to one function	3.36	AP
4. exponential function	3.33	AP
5. logarithmic function	3.39	AP
6. simple and compound interest	3.83	P
7. simple and general annuities	3.48	AP
8. stocks and bonds	3.53	P
9. business and consumer loans	3.54	P
10. propositional logic, syllogism, and fallacies	3.19	AP
11. proof and disproof	3.31	AP
Composite Mean	**3.79**	**P**

According to Benson-O'Connor et al. (2019), math diaries allow students to convey their knowledge of math concepts and/or their frustration with gaps in those understandings. Utilizing these diaries encourages metacognitive thinking to improve comprehension and application. This study looked at how fourth-grade children used math diaries to foster reflection, critical thinking, and application of arithmetic in the real world.

Additionally, there is proof that mastering mathematics through applications can produce outstanding results. Complex interactions exist between educators, learners, curriculum components, and pedagogical methods. The research does, however, support the idea that real-world situations and everyday issues can improve students' knowledge of mathematics.

On the other hand, the indicators that got the lowest weighted of 3.19 were applying concepts about propositional logic, syllogism, and fallacies, followed by applying concepts about proof and disproof with a weighted mean of 3.31, then applying concepts about exponential functions having a weighted mean of 3.40. All the weighted means of these indicators have a verbal interpretation of approaching proficiency.

As a result, Roseno (2015) argues that proficiency in mathematics is crucial for performing daily tasks because doing so is the only way to successfully apply mathematical concepts. The ability to apply new concepts depends on both memorization skills (for instance, remembering characteristics of the concept of volume) and the capacity to consider these concepts in light of practical circumstances.

In conclusion, the students demonstrated proficient level performance when applying general mathematics ideas. It was indicated based on the computed composite mean of 3.79. According to Mosvold (2015), one of the primary goals of math teaching is for learners to recognize the relevance of arithmetic principles in everyday life. Concentration, recall, and advanced thinking skills all play a role in a learner's progression from a foundational understanding of a subject to a certain degree of proficiency in applying that notion in practical circumstances.

In addition, one of the mathematical skills that learners need to have is the capacity to learn mathematical connections. Strong links between mathematical notions imply that those connections can be used to improve other mathematical aspects or vice versa. Learning and considering relationships between topics in mathematics require an overall perspective on mathematics.

1.3. Evaluating Concepts

Table 4 indicates the students' level of performance in evaluating concepts as assessed by their teachers.

As illustrated in the previous table, the teacher-respondents assessed that the learners' level of performance in evaluating a function, finding the domain and range of a rational function and one-to-one function was proficient. These indicators/items got the highest weighted mean of 3.96, 3.67, and 3.60 respectively.

Gronlund, N.E. & Linn, R.L. (2014), claimed that assessment and evaluation of learning are integral parts of the teaching-learning process. Valid conclusions about mathematics learning should be drawn because of assessment and evaluation. Based on sufficient and pertinent facts, a valid conclusion can be drawn. Depending on the inference's outcomes, different types and amounts of evidence are required.

Table 4
Level of Performance in Evaluating Concepts

The learners…	WM	VI
1. evaluate a function	3.96	P
2. find the domain and range of a rational function	3.67 3.60	P P
3. find the domain and range of a one-to-one function	3.48 3.49	AP AP
4. find the domain and range of an exponential function.	3.50	P
5. find the domain and range of a logarithmic function	3.54	P
6. compute interest, maturity value, future value, and present value in simple interest and compound interest environment	3.48 3.47 3.37	AP AP AP
7. find the future value of a present value of both simple annuities and general annuities		
8. calculates the fair market value of a cash flow stream that includes an annuity		
9. calculates the present value and period of deferral annuity		
10. perform the different types of operations on propositions		
Composite Mean	**3.56**	**P**

On the other hand, the indicators that got the lowest weighted of 3.47 were calculating the present value and period of deferral annuity, followed by finding the domain and range of an exponential function and calculating the fair market value of a cash flow stream that includes an annuity both with a weighted mean of 3.48. All the weighted means of these indicators have a verbal interpretation of approaching proficiency.

Hulet (2015) claims that despite their teacher's efforts to serve as the guide on the side and delegate evaluation to the students, students don't always evaluate explanations based on mathematics. He added that, given the intricacy of the elements that go into an explanation, evaluating mathematical concepts can be a very difficult task.

In general, it can be noticed that the learners had a proficient level of performance in evaluating

concepts in General Mathematics. It was reflected based on the computed composite mean of 3.56.

In fact, according to Gronlund (2013), evaluating concepts will aid teachers in gauging the scope and depth of students' grasp of—and progress toward—their mathematical goals. This implies that a wide range of goals, rather than just learning the material, are evaluated.

Additionally, Ko and Knuth (2013) suggested that the reason why students were unable to accurately evaluate proofs and counterexamples was that "students seemed to have an inadequate understanding of the mathematical content presented in the argument".

1.4. Problem Solving

Table 5
Level of Performance in Problem Solving

The learners solve problems involving the following…	WM	VI
1. F functions.	3.68	P
2. rational functions, equations and inequalities.	2.95	AP
	3.42	AP
3. inverse functions.	3.42	AP
4. exponential functions, equations, and inequality.	3.23	AP
	3.48	AP
5. logarithmic functions, equations, and inequality.	3.50	P
	3.44	AP
6. simple and compound interest.		
7. simple and general annuities.		
8. business and consumer loans.		
Composite Mean	**3.39**	**AP**

Table 5 presents the learner's level of performance in problem-solving in General Mathematics. It includes the key concepts of functions, rational functions, inverse functions, exponential functions, logarithmic functions, simple and compound interests, simple and general annuities, stocks and bonds, and business and consumer loans.

As revealed in the table, the teacher respondents assessed that the learners' level of performance in problem-solving about functions, simple and general annuities was proficient. These indicators/items got the highest weighted mean of 3.68 and 3.50 respectively.

In light of this, educating students to investigate, think critically, ask questions, and answer questions is one of the key principles of educating mathematics, according to Balim (2013). Understanding natural events is the cornerstone of mathematics education because the very nature of mathematics necessitates questioning and problem-solving.

Wright (2016) claimed that to build students' problem-solving skills, these problems should be taught in real-life situations that allow learners to become real-life issue solvers. This is the concept of contextual instruction, also referred to as contextualized learning, which emphasizes learning in real-world contexts through relevant exercises to ensure information retention and comprehension.

On the other hand, the indicators that got the lowest weighted of 3.23 was problem solving about rational functions equations and inequalities, followed by problem-solving about logarithmic functions, equations, and inequality with a weighted mean of 3.23, then problem solving about exponential functions, equations, and inequality & logarithmic functions, equations, and inequality having a weighted mean of 3.42. All the weighted means of these indicators have a verbal interpretation of approaching proficiency.

In a study issued by the National Council of Teachers of Mathematics, USA (NCTM, 2000), the importance of concentrating on math problems was emphasized, and it was considered as an essential center for mathematics instruction as well as a teaching standard for the various classes. Because of this, learners' inability to solve mathematical problems is a widespread problem. According to the research findings, the greatest difficulties that learners encountered in solving mathematical issues were brought on by a lack of comprehension the issue in terms of their ability to examine it, determine the given essentials, comprehend the significance of the vocabularies, and their inability to use any of the techniques or actions that would have clarified the solution.

In general, in terms of learners' level of performance in problem solving, results show that the learners had an approaching proficiency level of performance in problem solving in General Mathematics. This was attested by a composite mean of 3.39.

According to Delisle (2015), teaching problem solving provides K–12 Math teachers with an organized way to assist their students in

developing their thinking and problem-solving skills as they grasp critical subject knowledge. Students now have more freedom because of problem-solving while also giving professors a method to direct and mentor them.

The study by Kalpana (2014) supports the conclusion that while problem-solving may follow the same steps as inquiry-based learning, students are presented with a real challenge that has significance to them. Their investigation begins with this issue, and they work together to find solutions. It helps pupils develop the ability to weigh several points of view when analyzing a situation or event.

Additionally, Corpuz and Salandanan (2013) highlighted that in learning by solving problems, the job of the teacher is to get students to relate knowledge to new situations rather than simply delivering facts and assessing students on their recollection of these facts. Students are asked to research and provide useful answers to contextualized, poorly organized situations.

2. Extent of Utilization of Pedagogical Approaches in Teaching Mathematics

Pedagogical methods give guidance to individuals, especially leaders, directors, principals, and teachers of educational institutions, regarding the actions they must take to further the improvement of the entire educational system. Along with teacher-learner interaction, learning content, subject matter mastery, and learning assessment, this section also provides an evaluation of the instructors' use of pedagogical approaches in teaching mathematics.

2.1. Teacher and Learner Interaction

This part of the study presents the assessment of the teachers on the extent of their utilization of pedagogical approaches in teaching Mathematics in terms of teacher and learner interaction.

As to the extent of the use of pedagogical approaches in teaching Mathematics as assessed by the teacher respondents, the indicators/ items effectively and carefully adjust to the format and content of learning activity sheets and modules to provide rich exercises that keep students interested, demonstrating excitement for getting students to pay attention to the information being presented until the end of the lesson, aids troubled students with the right materials, embracing technology that creates connections with and opportunities for interaction with students on a variety of levels to create a vibrant learning environment, and creating learner-centered assignments for the module to encourage participation from the students garnered the highest ranks in terms of teacher and learner interaction. The obtained weighted average of 3.50 is perceived as to a significant extent attested to this.

Gonzales (2016), emphasized that the student-teacher interaction has a considerable impact on an individual's intellectual success and interaction with others. The student and teacher developed a good working relationship. They emotionally develop and their social intelligence is improved when they maintain strong connections.

Additionally, Westbrook (2013) explained that children are more socially responsive and attentive when teachers have a good attitude toward them. They do a better job of adapting their teachings to the individual needs of their pupils and are more successful at using their prior knowledge to contextualize and personalize their lessons.

The teacher respondents determined that the following indicators had the lowest weighted means of 3.21, 3.29, and 3.42: directs student monitoring through home visits for feedback on every learner's growth and performance; creates a conducive classroom environment that encourages positive interaction among learners; and builds a supportive long-term relationship with the students to increase their class involvement. It would imply that the reason the student won't perform well is that they aren't completely engaged in the assignments their teachers have given them. If the teachers frequently visit the students' homes to monitor their development, they will only rely on their parents' competency.

On the other hand, Fraser's (2013) study found that the way a teacher conducts their teaching techniques in a classroom setting might

have an impact on a student's career either directly or indirectly. The model of classroom interaction developed also takes into account a wide range of interconnected elements, including the influence of a foreign language on learning, external environments surrounding the classroom, instructional resources, and learning goals.

Meyer and Turner (2013) have emphasized the importance of learners' and teachers' feelings during classroom interactions. "By examining students and educators' relationships, understanding of what comprises the drive to acquire knowledge has progressively included emotions as being crucial for studying and teaching," they observed. The findings aid additional research on how much interpersonal relationships impact students' learning environments and whether they should be included in the instructional setting. A student's level of learning in the classroom will depend on how well they get along with their teacher.

Overall, the level of use of pedagogical approaches in terms of teacher and learner interaction acquired a composite average of 3.42 with a verbal analysis of moderate extent. This indicates that the instructors are doing all possible to involve their students in the teaching and learning process. This indicates that the instructors are doing all possible to involve their learners in the teaching and learning process.

2.2. Learning Content

The part of the study that states the evaluation of the teachers on the extent of their utilization of pedagogical approaches in teaching Mathematics in terms of learning content.

The indicators/items that received the highest weighted means of 3.96, 3.92, and 3.67 in terms of learning content were carrying out the lesson's objectives, clearly presenting the lesson's learning objectives, and encouraging the students to use their current/prior knowledge. These indicators/items represented the extent of the utilization of pedagogical approaches in demonstrating mathematics as assessed by the teacher respondents. According to the research, the most important aspects that contribute to the success of math instruction are the teacher's skills and the effectiveness of the learning objectives. All of the weighted means of these indicators and items. All the weighted means of these indicators/items have a verbal interpretation of a great extent.

The relevance of the teaching setting, student prior knowledge, and active engagement between the learner and the material to be learnt, on the other hand, was underlined by Hausfather (2013).

Furthermore, according to Lai (2013), planning group activities takes a lot of time because there are many factors to take into account, such as the purposes, resources, guidelines, or measures of the activity, and class organization when doing well.

According to the teacher respondents, the indicators with the lowest weighted means of 3.50 and 3.59 included using an apparent connection/relationship between and among the objectives of the lesson, content, and materials, emphasizing critical thinking development by requiring learners to comprehend complicated ideas, assess, compare/contrast, examine claims taking into account various points of view, and generate inferences, and addressing difficult topics in an array of ways.

Kazempour's (2014) study supported the notion that teachers' attention in the classroom should change from teaching to analyzing. Because it "can help in identifying the prior knowledge of learners, measuring how well they comprehend throughout their experience of learning and guiding instruction and assessing their comprehension and expertise at their conclusion of the developing experience," inquiry-driven teachers move into assessment roles.

Overall, the teachers have a great extent in the utilization of pedagogical approaches in terms of learning content. It was shown in the computed composite mean of 3.68. This suggests that providing students with outstanding instruction that is personalized to their specific ability levels is an essential component of maintaining an enjoyable atmosphere for learning in the classroom. This provides students a chance to achieve while still keeping their attention.

2.3. Mastery of the Subject Matter

This part of the study showed the evaluation of the teachers on the extent of their utilization of pedagogical approaches in teaching Mathematics in terms of the mastery of the subject matter.

According to the teacher respondents' assessments of the usage of pedagogical approaches in teaching mathematics, the items with the highest weighted means of 3.85 and 3.83 were those that offered pertinent and helpful examples related to the subject matter, demonstrated evidence of subject-matter expertise, and provided inputs appropriate to the lesson being taught. All the weighted means of these indicators/items have a verbal interpretation of a great extent. This indicates that subject matter expertise is a crucial talent for a teacher to possess in the teaching and learning process because it directly affects these processes in educational institutions.

In this regard, the foundation of a teacher's education is their mastery of the subject matter. The ability to master the subject matter and recognize the connections between other subjects are two more skills that the teacher must possess. These are crucial for a teacher's professional development and rest firmly on a foundation of general education that fosters a teacher's personal development. The teacher focuses on the subjects they will be instructing, which typically provides the teacher with scholarly knowledge of those areas. This integration of professional education also results in the teacher gaining new insights and abilities for performing professionally (Shantz and Latham, 2012).

Furthermore, according to Hammond (2016), a teacher's performance is mostly determined by their subject-matter expertise, teaching knowledge, and credentials obtained during teacher training. The efficacy of instruction and subsequent understanding is significantly affected by a teacher's knowledge of the subject. A teacher who is well-versed in the subject matter can effectively design and deliver the lesson by drawing the learner's attention to its key points and dispelling any misconceptions about them. This is thought to affect learning and improve the caliber of instruction and learning.

Meanwhile, the indicators with the lowest weighted means of 3.52, 3.59, and 3.63 as assessed by the teacher respondents were abreast with current trends, research, and publications in his/her field, providing contextualized learning activities based on his/her learners' cultural background, and using appropriate teaching methods concerning the topic he/ she discussed.

In accordance with this, teachers need to be aware of subjects that cause problems for students, according to Riechert et al. (2013). Teachers must find ways to look at their subject matter through the hearts, thoughts, and eyes of their students. It is their responsibility to adapt the material so that students can access it while yet keeping its integrity. Teachers must learn to adjust to changes since knowledge evolves over time and in different contexts.

Following the aforementioned claim, students create a deeper understanding of the topic when professors require them to investigate concepts before providing explanations. The amount of new knowledge construction among the students and the amount of time spent on concept investigation are positively correlated.

In terms of learning material, teachers generally utilize pedagogical approaches to a large extent. The calculated composite mean of 3.69 demonstrated it. It would imply that they must be knowledgeable about the material they are instructing because a teacher's ability to grasp the essential ideas and impart them to students, as well as to correct any knowledge misunderstandings, depends on their understanding of the subject matter.

According to the study by Kamamia, Ngugi, and Thinguri (2014), teachers who are proficient in their subject matter may distill it down to its essential elements so that students can understand it. It was advised that teachers spend time planning and meticulously preparing their lessons before entering the classroom to handle any difficulties the students may present.

Furthermore, Lucenario (2016) emphasized that it is obvious that a teacher's mastery of the subject and effective application of it during the teaching and learning process will always be a good indicator of the breadth of that teacher's subject matter knowledge.

2.4. Learning Assessment

This part of the study discuss the assessment of the teachers on the extent of their utilization of pedagogical approaches in teaching Mathematics in terms of learning assessment.

As to the extent of the use of pedagogical approaches in teaching Mathematics as assessed by the teacher respondents, the indicators/ items obtained the highest weighted mean of 3.83, 3.65, and 3.63 were about defining the learning outcomes clearly, using a variety of assessment strategies and presenting rubrics as needed, can adjust or improve activities based on the outcome of the learning results assessed, explaining to students that he/she is concentrating on assisting them in understanding the assessment of their learning and encouraging learners to ask questions as feedback on their assessment. All the weighted means of these indicators/items have a verbal interpretation of great extent.

According to a review by Havnes and Proitz (2016), the learning outcome model has received support from higher education policy initiatives all across the world. The learning outcome paradigm, they said, enables us to reorient our attention from the instructor to the outcomes of the students' learning processes. Bran (2013) claims that the need for the evaluation of learning outcomes is currently heightened by the desire of society to employ skilled graduates in a variety of occupations.

In the meantime, the numbers exhibiting the lowest weighted averages are 3.48 and 3.59, respectively as assessed by the teacher-respondents were using formal and informal learner feedback, providing assignments as reinforcement activities to measure the learner's understanding of the lesson and can select appropriate assessment measures and assess the learning outcomes.

Generally, the teacher respondents have a great extent in the utilization of pedagogical approaches in terms of learning assessment. It was shown in the computed composite mean of 3.62. This goes to show that the assessment for learning of the teachers were very evident as it is designed to aid learning when learning and instruction are in progress. It is used to bridge the gap between learners' current status and their desired learning outcomes.

3. Relationship between the assessments on the learners' level of performance in Mathematics and extent of utilization of pedagogical approaches in teaching

This study determined the relationship between the assessments on the learners' level of performance in Mathematics and extent of utilization of pedagogical approaches in teaching.

The table shows that the calculated correlation values were less than the level of significance of 0.05. As a result, the null hypothesis was rejected, and there was a significant relationship between the learners' level of performance in General Mathematics and the extent to which pedagogical approaches were used in terms of teacher and learner interaction, learning content, subject matter mastery, and learning assessment.

Balbacal (2017) noted that the sudden change in curriculum and methodology had an impact on students' performance prior to the findings. The 2010 Secondary Education Curriculum (SEC) was still being modified when the curriculum changed to the spiral-based K–12 program. Before implementing a novel educational strategy, it was crucial to take into account the availability of learning resources, the readiness of the students, the expertise of the teachers, and the accessibility of the necessary facilities.

However, Hattie's (2017) most recent list of variables affecting students' progress was made public through Visible Learning Plus in 2017. The things that teachers, school administrators, students, or parents can control or affect are among these components, along with each factor's corresponding impact value. Despite the assessment of each factor's effect size, no research that would combine or synthesis the interaction of these hierarchical elements in math achievement in the Philippines, particularly in Mindanao, have been documented.

Additionally, according to the research of Evangelio and Espinar (2014), school-related, student-related, and teacher-related elements can

all contribute to students' success in mathematics. These variables overlapped in their order of importance for math achievement. In order to address all of the elements that affect students' success in school, educators should consider all of them rather than just focusing on one.

Furthermore, Shayer's research (M. and R. Gamble. (2013) There are a number of student-related elements that instructors need to be mindful of when developing or implementing pedagogical approaches. Some of the factors include the students' academic aims and goals, age groups, grade levels, subjects, and concepts, as well as learning styles, social skills, personality traits, educational standards, institutional policies, and other needs and demands of the students.

4. Challenges Encountered by the Teachers in Teaching Mathematics

The findings showed that the teachers agreed that their major problems in the application of pedagogical approaches in teaching Mathematics are the lack of educational resources (textbooks, pedagogical materials, and other learning tools), handling large class sizes, and Instructors' excessive workloads and ancillary activities. This goes to show that there is a need to resolve these challenges to maximize teachers' potential in utilizing the pedagogical approaches in teaching Mathematics.

However, according to the study by Gajon (2018), the difficulties that teachers faced when implementing pedagogical approaches in Science teaching as observed by the instructors themselves included the following: only the quick learner can complete the activity; a lack of science technology; a wide variety of teaching techniques; students' varying skill levels control the productivity of the teachers; a large or larger class size; and students don't know how to connect lessons to observations of the real world.

According to Adu's (2016) study, it was discovered that teachers of mathematics at the JHS level faced a number of difficulties, including the difficulty of the students' attitudes toward the subject, the difficulty of the exams, and the students' readiness for new mathematics lessons. These difficulties have an impact on teachers' decisions regarding the best teaching strategies for high-quality mathematics instruction.

The overall composite mean of 2.92, with a verbal interpretation of agree, indicates there are really constraints in terms of utilizing the pedagogical approach in teaching Mathematics.

5. Enrichment Materials and Activities to Effectively Intensify the Utilization of Pedagogical Approaches in Teaching Mathematics

The suggested improvement tools and exercises are intended to effectively increase the use of pedagogical approaches in math instruction. These supplemental tools and exercises were created to assist teachers in enhancing their students' mathematical abilities, particularly in problem-solving, which needs significant development in light of the study's findings.

The researcher conceptualized and will implement Project *WERPA* (Worksheets, E-games, Remediation & Peer Assistance). Project *WERPA* is a math-friendly innovation for teachers to help and provide students the opportunity to learn and study collaboratively. It was done under the stipulations in the SCOUTERS' ROCK of the TEA Governance concentrating on E (Enable every school-aged child and youth to benefit from high-quality basic education services) and O (Optimize the utilization of ICT in enhancing access to and quality of basic education services). It will increase student involvement, enthusiasm, and engagement in the topic matter while also allowing teachers to convey material innovatively and creatively. Additionally, it will force students to put the knowledge into practice, enabling them to exercise and assess their critical thinking abilities.

The objectives of the interactive intervention materials and coaching are (1) to improve students' mathematical mastery along with understanding skills through enhanced worksheets; (2) to stimulate, motivate, and sustain learners' interests in the mathematics subjects through inclusive e-games; and (3) to assists academically challenged learners through remediation and peer assistance. The project utilizes a learner-centered and interactive method that requires active participation

among the learners while teachers will only act as facilitators. The activities chosen for mathematics teaching and learning must foster student activity and the acquisition of learning abilities, while a conducive atmosphere is developed to allow the learner to connect effectively with fellow students.

Here are the activities and lesson ideas using the **Project *WERPA*** in Mathematics:

Worksheets- **SKL** (**S**heets of **K**nowledgeable **L**earning)
E-games- **SML** (**S**ource and **M**anagement for **L**earning)
Remediation- **PETMALU** (**PE**rformance **T**ask in **Ma**thematics **L**earning and **U**nderstanding)
Peer **A**ssistance- **LODI** (**L**eaders **O**f **D**irect **I**nstruction)

CONCLUSIONS

Based on the data obtained, the following findings were drawn and the research questions were answered:

1. The learners' level of performance in General Mathematics in terms of understanding and illustrating concepts, applying concepts, and evaluating concepts as assessed by their teachers was at the proficiency level. However, in terms of problem-solving, teachers assessed it as a developing proficiency level.
2. The Mathematics teachers assessed their extent of utilization of pedagogical approaches in terms of learning content, mastery of the subject matter, and learning assessment to a great extent. However, in terms of teacher and learner interaction, teachers assessed it to a moderate extent.
3. There is a significant relationship between the learners' level of performance in General Mathematics and the extent of utilization of pedagogical approaches in teaching Mathematics.
4. The majority of the teachers who responded in the SDO- Batangas Province concurred that the lack of learning resources (such as pedagogical textbooks and gadgets), managing large class sizes, teachers' heavy workloads, and the lack of curriculum materials (textbooks/modules) prepared in a way that can facilitate pedagogical approaches were their biggest challenges.
5. From the data gathered, enhancement materials and activities were needed to intensify the utilization of pedagogical approaches in teaching Mathematics.

RECOMMENDATIONS

The following recommendations are made based on the study's results and conclusions.

1. Mathematics teachers may use and implement Project WERPA in their classes to continuously intensify the utilization of pedagogical approaches in teaching Mathematics.
2. For teachers to develop a comprehensive understanding of the meaning and applications of the various pedagogical approaches and teaching methods in their school setting, educational specialists may offer well-organized training sessions in each station.
3. To update their understanding of pedagogical strategies, teachers might read numerous related reviews of literature in the field.
4. Future researchers ought to perform a similar study across various divisions to extend the scope of the study and obtain a more accurate result.

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