MATHEMATICS TEACHERS' ASSESSMENT OF SPIRAL PROGRESSION APPROACH

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ABSTRACT

The main purpose of this study isto determine how Mathematics teachers on selected public high schools in Laguna perceive spiral progressionapproach. A total of seventy(70) respondents were selected from public high schools in Liliw, Magdalena, Nagcarlan, Rizal, and Santa Cruz, Laguna.

The main instrument used in this research was the self-made questionnaire – printed and in Google forms. The data gathered using this instrument were statistically treated through Frequency, Mean, Standard Deviation, T-test for Two Independent Samples, and Linear Regression Analysis.

Based on the data analyzed, the mathematics teachers are mostly female, aged within the intervals of 35 to 39 years old. The overall mean level of mathematics teachers' perception towards spiral progression approach with respect to its advantages is "High". Likewise, the overall mean level of perception of mathematics teachers on the spiral progression approach with respect to assessment, content, and implementation are all "High". The most commonly used teaching strategies by the mathematics teachers were guided discovery, cooperative learning, and collaborative learning, while the preferred teaching strategies are student-centered approaches. The level of academic performance of the students in mathematics under the spiral progression curriculum yielded a "Very Satisfactory" result. The inferential statistics have shownthat: (1) there is a significant difference between the level of perceptions of Mathematics teachers on the advantages and characteristics of the spiral progression approach with respect to their demographic profile; (2) the level of perception of Mathematics teachers on the advantages and characteristics of the spiral progressionapproach do not significantlyaffect the academic performance of the students; and (3) the common and preferred teaching strategies of Mathematics teachers under the spiral progression approach do not significantly affect the academic performance of the students.

The following recommendations were suggestedby the researcher: 1.) The teachers may consider using guided discovery, cooperative learning, and collaborative learning in teaching mathematics as these are the top three (3) most frequently utilized strategies in teaching mathematics under the spiral curriculum. 2.) DepEd officials and school heads must frequently conduct seminars and training to improve the skills of the teachers in handling math topics especially algebra and statistics; 3.) Students may refer on this study to determine which teaching strategy might be connected to their learning style so that they will be able to effectivelysynergize with their classmates and teachers during class discussion; and 4.) Future researchers may use this study as it may serve as data bank for further enrichment of their readings of similar nature and thus may strengthen further the findings of the present research undertaking.

Keywords:

Teacher's assessment, spiral progression approach, teaching mathematics

INTRODUCTION

A new approach in teaching Mathematics and other subjects was utilized along the implementation of K-12 curriculum, starting from the school year 2012 – 2013. This new approach is called the spiral progression approach or SPA. Inspired by the spiral curriculum of Jerome Bruner, this approach allows the students to continuallyreturn to basic topics while newlessonsand concepts were being added throughout the course outline (Tan, 2012).

Despite the goal of K-12 curriculum for a better quality of education, teachers began to experience difficulty in inculcating to students the topics that need to serve as foundation for their mastery of the lesson (Orale & Uy, 2018). Specifically in Mathematics of the secondary level, the teachers will now focus on teaching the basic concepts of Algebra, Geometry, Trigonometry, Statistics and Probability on the lower grade while gradually teaching more complex topics on the said branches of Mathematics as the students are being promoted to higher grade levels.

The implementation of SPA changed drastically how the teachers view the process of teaching Mathematics. As such, this study aims to analyze the perceptions of Mathematics teachers in spiral progression approach with respect to their gender, on selected public high schools in Laguna. This also sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of:
    1.1 Age; and
    1.2 Sex?
2. What is the level of perception of Mathematics teachers' spiral progression approach with respect to its advantages?
3. What is the level of perception of Mathematics teachers on the spiral progression approach with respect to the following characteristics:
    3.1 Assessment;
    3.2 Content; and
    3.3 Implementation?
4. What are the common and preferred teaching strategies of Mathematics teachers under the spiral progression curriculum?
5. What is the level of academic performance of the students under the spiral progression curriculum with regards to their general weighted average (GWA)?
6. Is there a significant difference between the level of perceptions of Mathematics teachers on the advantages and disadvantages, and characteristics of the spiral progressionapproach with respect to their demographic profile?
7. Does the level of perception of Mathematics teachers on the advantages and disadvantages, and characteristics of the spiral progression approach significantly affect the academic performance of the students?
8. Do the common and preferred teaching strategies of Mathematics teachers under the spiral progression approach significantly affect the academic performance of the students?

REVIEW OF RELATED LITERATURE

The following readings provide support for the findings of the researcher in this study:

The foundation for the future growth of educational institutions is considered to be the young teachers. The level of career passion of young teachers typically comes from their positive attitude and commitment to what they do. It is normal to see their enthusiasm and love for teaching in such instances (Rogayan, 2018).

A questionnaire used by Resurreccion & Adanza (2015) for their study indicates the following advantages of spiral progression approach: (1) avoids disjunction between stages of schooling; (2) allows learners to learn topics and skills appropriate to their development stage; (3) allow learners to learn topics and skills as they are revisited and consolidated; (4) it strengthens retention and mastery of topics and skills as they revisited and consolidated; and (5) it allows learnersto gain valid experience. They found out that the benefits presented by spiral progression approach are only noticeable in case -to-case scenarios. Strengthening a teacher's ability to implement the K–12 Mathematics curriculum in the Philippines is accordance with the spiral progression approach (Tapanan, et al., 2021). The traditionalmethod of teaching, such as the lecture method/discussion, which is a common strategy used by Mathematics teachers, can help students' performance in Algebra (Rico & Baluyos, 2021).

The K–10 Mathematics curriculum needs to be revised to include the most important learning competencies (vertically organized) per content area that are based on international benchmarks (Dio, 2020). Teachers must also receive training in order to effectively teach Statistics and Probability (Candelario-Aplaon, 2017).

Guberman and Leikin (2013) found out on their study that mathematical problem solving is at the core of teaching and learning mathematics, while mathematical challenge is at the heart of all learning. The curriculum takes into account the complexity of teachers' knowledge. Since the students of today, especially in high school, have access to digital technology (i.e. cell phone, laptop), it is important to take advantage of it by integrating them to the lesson (Moore & Vitale, 2018). Students become more eager to learn if they have access to various tools that will help in facilitating their learning (Barnes, 2013; Mareco, 2017).

Discovery, collaborative and experiential learning are also the most preferred teaching strategies under the spiral progression approach since they are aligned with the student-centered approach (Molina, 2018; Resurrecion & Adanza, 2015). Engaging the students on the mathematics content is an important task that the teachers should do in order to improve their academic performance (Smith, 2018).

METHODOLOGY

The study employed a mixed-method research design wherein both quantitative and qualitative data are being collected and analyzed using research instrumentssuch as interviews and surveys, side-by-side. A total of seventy (70) mathematics teachersfrom public high schools in Liliw, Magdalena, Nagcarlan, Rizal, and Santa Cruz, Laguna were selected as the respondents of this study using quota sampling technique. The main instrument used in this research was the self-made questionnaire – printed and in Google forms. The data gathered using this instrument were statistically treated through frequency, mean, standard deviation, t-test for two independent samples, and linear regression analysis.

RESULT AND DISCUSSION

Figure 1. Demographic Profile of the Respondents in terms of Age and Sex

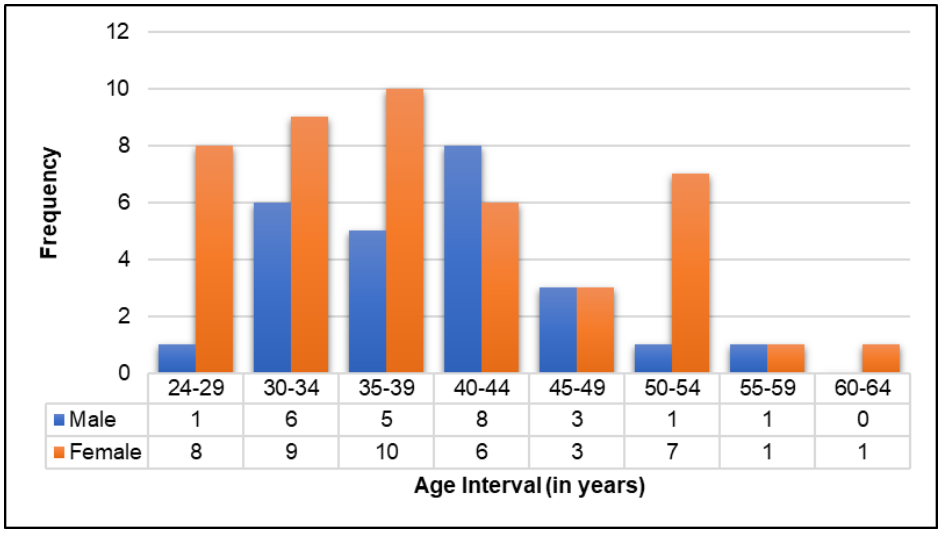


Figure 4 reveals that the age range of the respondents were divided into eight (8) age intervals, as the oldest recorded age of the respondents is 60 years old, with 24 years old being the youngest age. The figure illustrates that most of the male respondents are aged within the intervals of 40 to 44 years old, as shown with a frequency of 8. On the other hand, no recorded male respondents lie on the age interval of 60 to 64 years old.

Additionally, most of the female respondents are aged within the intervals of 35 to 39, with a frequency of 9. Evidently, there are only 1 recorded female respondent within the age interval of 55 to 59 years old, and another sole female respondent within the age interval of 60 to 64 years old.

The data shown in Figure 4 provide insights that most of the respondents, which are Mathematics teachers in the public junior high schools, are female. Specifically, there are a total of 45 female respondents while there are only 25 male respondentsselected by the researcher in the study. Aside from these results, there are evidently more young teachers as they are considered to be the foundation for the future development of schools and other educational institutions (Rogayan, 2018).

Table 1 presents the level of mathematics teachers' perception towards spiral progression approach with respect to its advantages. From the statements indicated in Table 1, "Allows the student to use their prior knowledge in new situations" yielded the highest mean among the male respondents ($\bar{X}$=4.24, SD=0.78) and was remarked as "Strongly Agree", while "Helps in students' realizations of the importance of integrating topics from other subjects" received the highest mean among the female respondents ($\bar{X}$=3.78, SD=1.00) and was remarked as "Agree". On the other hand, the statement "This approach is efficient in a field in which resources for staff development are limited" received the lowest mean score of responses for both the male ($\bar{X}$=3.33, SD=0.60) and female ($\bar{X}$=3.33, SD=0.98) respondents,and was remarked as "Agree".

In general, the statements "Allows the student to use their prior knowledge in new situations" and "Helps in students' realizations of the importance of integrating topics from other subje cts" obtained the highest overall mean ($\bar{X}$=3.91, SD=0.93), while the statement "This approach is efficient in a field in which resources for staff development are limited" received the lowest overall mean ($\bar{X}$=3.53, SD=0.90), yet both remarked as "Agree". It can be gleaned from Table 1 that the overall mean level of mathematics teachers' perception towards spiral progression approach with respect to its advantages is"High" for both male ($\bar{X}$=4.05, SD=0.81) and female ($\bar{X}$=3.54, SD=1.04) respondents. In totality, the overall mean level of mathematics teachers' perception towards spiral progression approach with respect to its advantages is 3.72, with a standard deviation of 0.99 and also verbally interpreted as "High".

Table 1. Level of Mathematics Teachers' Perception towards Spiral Progression Approach with respectto its Advantages

Statement	Male Respondents			Female Respondents			Overall		
	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks
Enables continuity of lessons from simple to complex.	4.04	0.84	Agree	3.67	1.02	Agree	3.80	0.97	Agree
Allows the student to use their prior knowledge in new situations.	4.24	0.78	Strongly Agree	3.73	1.01	Agree	3.91	0.96	Agree
Strengthens retention and mastery of topics and skills as they are revisited and consolidated.	3.92	0.95	Agree	3.33	1.19	Moderately Agree	3.54	1.14	Agree
Allows learners to learn topics and skills appropriate to their development stage.	4.04	0.79	Agree	3.60	1.01	Agree	3.76	0.95	Agree
Helps in *students'* realizations of the importance of integrating topics from other subjects.	4.16	0.75	Agree	3.78	1.00	Agree	3.91	0.93	Agree
It promotes teaching skills that are age-appropriate and relevant to the *students'* daily lives.	3.92	0.91	Agree	3.62	1.07	Agree	3.73	1.02	Agree
It encourages the use of adaptations that accommodate the disability of a student/teacher or simplify task demands.	3.96	0.93	Agree	3.42	1.01	Agree	3.61	1.01	Agree
Teachers were able to collaborate to ensure that holistic and coherent learning is provided over some time.	4.20	0.82	Agree	3.58	0.99	Agree	3.80	0.97	Agree
Students learn well what is being taught to them.	4.12	0.73	Agree	3.33	1.07	Moderately Agree	3.61	1.03	Agree
This approach is efficient in a field in which resources for staff development are limited.	3.88	0.60	Agree	3.33	0.98	Moderately Agree	3.53	0.90	Agree
Overall Mean		4.05			3.54			**3.72**	
Overall SD		0.81			1.04			**0.99**	
Verbal Interpretation		High			High			**High**	

Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.21 – 5.00	Strongly Agree	Very High
4	3.41 – 4.20	Agree	High
3	2.61 – 3.40	Moderately Agree	Neutral
2	1.81 – 2.60	Disagree	Low
1	1.00 – 1.80	Strongly Disagree	Very Low

The findings stated above is supported by Moore and Vitale (2018) stating the importance of integrating technology as the students of today will be able to learn better if they make use of available resources such as the Internet and their gadgets. This is also supported by Resurreccion & Adanza (2015) who mentioned that spiral progression approach will helpbuild validexperience, not onlyin the classroom but most importantly outside, for the students to apply the things they learned on their lesson to their daily lives.

Table 2. Level of Perception of Mathematics Teachers on the Spiral Progression Approach with respectto Assessment

Statement	Male Respondents			Female Respondents			Overall		
	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks
The learning activities arecongruent with the stated objectives.	4.08	0.76	Agree	3.71	0.84	Agree	3.84	0.83	Agree
The objectives are achievable within the *students'* developmental levels.	3.96	0.79	Agree	3.33	0.95	Moderately Agree	3.56	0.94	Agree
The materials and methods are appropriate for the set of objectives.	3.96	0.98	Agree	3.49	0.84	Agree	3.66	0.92	Agree
The teachers have the skill to implement the activities or use the strategy.	4.24	0.72	Strongly Agree	3.84	0.95	Agree	3.99	0.89	Agree
Teachers use various ways of teaching to complement the learning styles of the students.	4.28	0.68	Strongly Agree	3.96	0.88	Agree	4.07	0.82	Agree
There are alternative activities for the students to do to accomplish the same objectives.	4.20	0.76	Agree	3.84	0.80	Agree	3.97	0.80	Agree
The activities motivate the students to do more and harness their potential.	4.08	0.76	Agree	3.64	0.88	Agree	3.80	0.86	Agree
The activities provide maximum learning experiences.	4.04	0.73	Agree	3.58	0.92	Agree	3.74	0.88	Agree
The activities utilize multiple sensory abilities of the students.	4.00	0.65	Agree	3.60	0.86	Agree	3.74	0.81	Agree
The activities address multiple intelligences of the students.	3.96	0.68	Agree	3.58	0.89	Agree	3.71	0.84	Agree
Overall Mean	4.08			3.66			**3.81**		
Overall SD	0.75			0.89			**0.87**		
Verbal Interpretation	High			High			**High**		

Table 2 shows the level of perception of mathematics teacherson the spiral progressionapproach with respect to assessment. From the statements indicated in Table 2, "Teachers use various ways of teaching to complement the learning styles of the students" yielded the highest mean for both the male ($\bar{X}$=4.28, SD=0.68) and female respondents ($\bar{X}$=3.96, SD=0.88) which are remarked as "Strongly Agree" and "Agree," respectively.

On the other hand, the statements "The objectives are achievable within the students' developmental levels" ($\bar{X}$=3.96, SD=0.76), "The materials and methods are appropriate for the set of objectives" ($\bar{X}$=3.96, SD=0.98), and "The activities address multiple intelligencesof the students" ($\bar{X}$=3.96, SD=0.68) received the lowest mean scores of responses for the male respondents while only the statement "The objectives are achievable withinthe students' developmental levels" has the lowest mean among the female respondents ($\bar{X}$=3.33, SD=0.95), and were remarked as "Agree" and "Moderately Agree", respectively. In general, the statement "Teachers use various ways of teaching to complement the learning styles of the students" obtained the highest overall mean ($\bar{X}$=4.07, SD=1.01), while the statement "The objectives are achievable within the students' developmental levels" received the lowest overall mean ($\bar{X}$=3.56, SD=0.94), both remarked as "Agree".

Tapanan et al. (2021) have supported the findings of the studyas they found out that the teachers' quality in teaching and capacity to enable students to acquire sufficient knowledge and skills to become fully realized individuals makes the assessment for spiral progression approach. Rico and Baluyos (2021) added that students perform well in mathematics, specifically in Algebra, by the use of traditional methods of teaching such as lecture and board works.

Table 3. Level of Perception of Mathematics Teachers on the Spiral Progression Approach with respectto Content

Statement	Male Respondents			Female Respondents			Overall		
	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks
Spiral progression approach exposes students to a wide variety of concepts, skills, and attitudes deemed to be essential.	3.80	0.87	Agree	3.53	0.87	Agree	3.63	0.87	Agree
The subject matter is kept in constant rotation and continually reviewed.	3.88	0.73	Agree	3.44	0.94	Agree	3.60	0.89	Agree
Once learned, a topic or subject is reinforced if there is continuous exposure to it.	3.92	0.86	Agree	3.36	0.96	Moderately Agree	3.56	0.96	Agree
The utility of the basic concepts in Mathematics becomes obvious to the teacher and student as competencies gained in the early years are built on in the later years.	4.04	0.68	Agree	3.44	0.92	Agree	3.66	0.88	Agree
Students achieve a better understanding by exploring the same topics at deepening levels.	3.72	0.98	Agree	3.13	1.14	Moderately Agree	3.34	1.11	Moderately Agree
Brings some order to the increasingly complex nature of engineering and other related fields of Mathematics.	4.00	0.76	Agree	3.22	1.02	Moderately Agree	3.50	1.00	Agree
Students are encouraged to go beyond factual recallto an application of knowledge and skills.	3.72	0.98	Agree	3.31	1.12	Moderately Agree	3.46	1.09	Agree
The spiral curriculum is also a flexible one, i.e. students can be allowed to transfer directly to the second spiral of a course of study if they have mastered the first level in a Math-based course (for example).	3.80	0.91	Agree	3.24	1.09	Moderately Agree	3.44	1.06	Agree
What is learned about a topic in early loops of the spiral (Grades 7 and 8) is linked to what is learned in later loops (Grades 9 and 10).	3.80	1.00	Agree	3.38	1.03	Moderately Agree	3.53	1.03	Agree
The *learner's* competence increases with each visit, until the final overall objectives are achieved.	3.72	0.98	Agree	3.24	1.00	Moderately Agree	3.41	1.01	Agree
Overall Mean	3.84			3.33			**3.51**		
Overall SD	0.87			1.01			**0.99**		
Verbal Interpretation	High			Neutral			**High**		

Table 3 portrays the level of perception of mathematics teachers on the spiral progression approach with respect to content. From the statements indicated in Table 3, “The utility of the basic concepts in Mathematics becomes obvious to the teacher and student as competencies gained in the early years are built on in the later years” yielded the highest mean among the male respondents ($\bar{X}$=4.04, SD=0.68) while the statement “Spiral progression approach exposes students to a wide variety of concepts, skills, and attitudes deemed to be essential” has the highest mean among the female respondents ($\bar{X}$=3.53, SD=0.87) which are both remarked as “Agree”. On the other hand, the statements “Students achieve a better understanding by exploring the same topics at deepening levels” ($\bar{X}$=3.72, SD=0.98), “Students are encouraged to go beyond factual recall to an application of knowledge and skills” ($\bar{X}$=3.72, SD=0.98), and “The learner’s competence increases with each visit, until the final overall objectives are achieved” ($\bar{X}$=3.72, SD=0.98) received the lowest mean scores of responses for the male respondents while only the statement “Students achieve a better understanding by exploring the same topics at deepening levels” has the lowest mean among the female respondents ($\bar{X}$=3.31, SD=1.12), and were remarked as “Agree” and “Moderately Agree”, respectively.

In general, the statement “The utility of the basic concepts in Mathematics becomes obvious to the teacher and student as competencies gained inthe earlyyears are built on in the later years” obtained the highest overall mean ($\bar{X}$=3.66, SD=0.88), while the statement “Students achieve a better understanding by exploring the same topics at deepening levels” received the lowest overall mean ($\bar{X}$=3.34, SD=1.11), remarked as “Agree” and “Moderately Agree”, respectively. It can be inferred from Table 4 that the overall mean level of mathematics teachers’ perception towards spiral progression approach with respect to content is “High” for male respondents ($\bar{X}$=3.84, SD=0.87) and “Neutral” for female respondents ($\bar{X}$=3.33, SD=1.01). In totality, the overall mean level of mathematics teachers’ perception towards spiral progression approach with respect to content is 3.51, with a standard deviation of 0.99 and verbal interpretation of “High”.

Despite positive perceptions on the content of spiral progression approach from the teachers,Dio (2020) has suggested that the K–10 Mathematics curriculum to be revised as it lacks the most important learning competencies (vertically organized) per content area that are based on international benchmarks. Furthermore, to better teach students on the mathematics content, Candelario -Aplaon (2017) recommended that teachers in public high schools must undergo seminars and trainings related to the subjects of Statistics and Probability. This is evident on the global assessment as Philippines rank among the lowest in Mathematics (Reysio-Cruz, 2019).

Table 4 shows the level of perception of mathematics teacherson the spiral progressionapproach with respect to implementation. From the statements indicated in Table 4, “Students are the center of the curriculum” yielded the highest mean among the male respondents ($\bar{X}$=4.16, SD=0.80) while the statement “Creating an environment conducive to learning” has the highest mean among the female respondents ($\bar{X}$=3.80, SD=0.81) which are both remarked as “Agree”. On the other hand, the statement “There are sufficient school resources or materials to implement the curriculum” received the lowest mean scores of responses for both the male ($\bar{X}$=3.64, SD=0.86) and female ($\bar{X}$=3.33, SD=1.11) respondentsand were remarked as “Agree” and “Moderately Agree”, respectively.

Table 4. Level of Perception of Mathematics Teachers on the Spiral Progression Approach with respectto Implementation

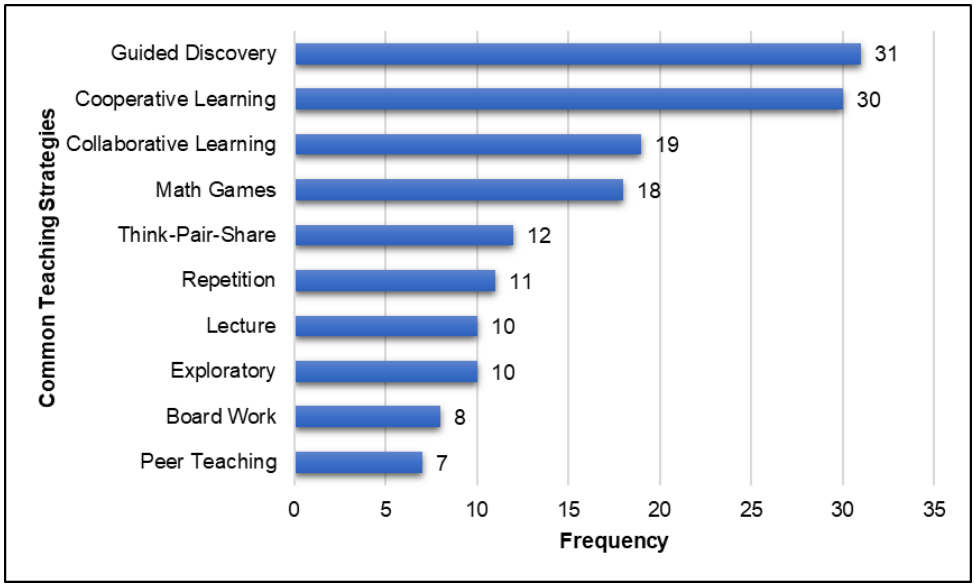
Statement	Male Respondents			Female Respondents			Overall		
	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks	Mean ($\bar{X}$)	SD	Remarks

Engaging the students with the subject matter content.	3.92	0.81	Agree	3.64	0.91	Agree	3.74	0.88	Agree
Creating an environment conducive to learning.	4.12	0.73	Agree	3.80	0.81	Agree	3.91	0.79	Agree
Ensuring access for all students.	4.12	0.83	Agree	3.62	0.91	Agree	3.80	0.91	Agree
Use of questioning to monitor and promote understanding.	4.04	0.79	Agree	3.73	0.89	Agree	3.84	0.86	Agree
Encouragingthestudentsto make sense of the subject matter content.	4.00	0.76	Agree	3.58	0.87	Agree	3.73	0.85	Agree
Students are the center of the curriculum.	4.16	0.80	Agree	3.64	1.05	Agree	3.83	0.99	Agree
Teachers are empowered to develop their own school curricula taking into consideration their own expertise, the context of the school, and the abilities of the students.	4.00	0.71	Agree	3.69	0.95	Agree	3.80	0.88	Agree
The *teachers'* role now shifts from planning to doing that implies guiding, facilitating, and directing activities that will be done by the students.	4.04	0.73	Agree	3.69	0.85	Agree	3.81	0.82	Agree
There are sufficient school resources or materials to implement the curriculum.	3.64	0.86	Agree	3.33	1.11	Moderately Agree	3.44	1.03	Agree
Encouragingtheteachersto pursue higher educational levels (graduate and post-graduate degrees).	3.92	0.81	Agree	3.78	0.97	Agree	3.83	0.92	Agree
Overall Mean		4.00			3.65			**3.77**	
Overall SD		0.78			0.93			**0.90**	
Verbal Interpretation		High			High			**High**	

In general, the statement "Creating an environment conducive to learning" obtained the highest overall mean ($\bar{X}$=3.91, SD=0.79), while the statement "There are sufficient school resources or materials to implement the curriculum" received the lowest overall mean ($\bar{X}$=3.44, SD=1.03), both remarked as "Agree". It can be inferred from Table 5 that the overall mean level of mathematics teachers' perception towards spiral progressionapproach with respect to implementation is "High" for both the male ($\bar{X}$=4.00, SD=0.78) and female ($\bar{X}$=3.65, SD=0.93) respondents. In totality, the overall mean level of mathematics teachers' perception towards spiral progression approach with respect to implementation is 3.77, with a standard deviation of 0.90 and verbal interpretation of "High".

As stated on the study of Guberman and Leikin(2013), teacher's must be takeninto consideration when planning the curriculum. They further supported the statement that lack of resources in the classroom will affect the learning process of the students as the classroom becomes less of a conducive learning environment. Barnes (2013) and Mareco (2017) added that students in a conducive environment for learning are more motivated to study, alongside the facilitation of their subject teachers.

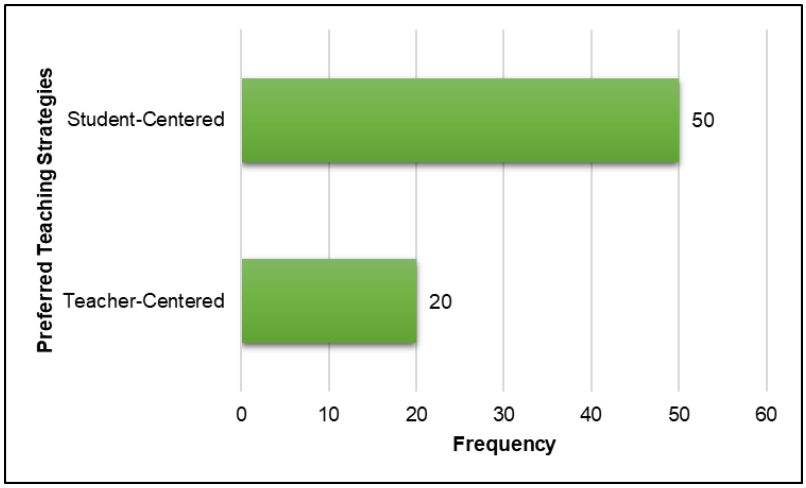
Figure 2. Common Teaching Strategies of Mathematics Teachers under the Spiral Progression Curriculum



As shown in Figure 2, only the top ten (10) most commonly utilized teaching strategies were presented to better understand how the respondents teach the subject of mathematics. As the respondents wrote three (3) teaching strategies, the sum of the frequencies will not be equivalent to the total number of respondents (which is 70).

Thirty-one (31) out of 70 mathematics teachers indicated that they use guided discovery as their commonly used teaching strategy. This is followed by cooperative learning with a total frequency of 30, and collaborative learning with a total frequency of 19. On the other hand, only 7 out of 70 utilize peer teaching approach in teaching mathematics.

Figure 3. Preferred Teaching Strategies of Mathematics Teachers under the Spiral Progression Curriculum



The findings on Figure 2 matches with the results in Figure 3, where the researcher determined the general type of teaching strategies used by the respondents in teaching mathematics. As shown in Figure 6, most of the mathematics teachers apply student-centeredapproach in teaching mathematics in junior high school students. As spiral progression approach caters with the students' needs first and

foremost, it is only evident that teachers focus on the utilization of student-centered teaching strategies, which, as can be seen in Figure 5, have been the most commonly used teaching strategies.

The findings on the teaching strategies are supported by Molina (2018), stating that discovery, collaborative, and experiential learning are three (3) of the most preferred teaching strategies under the spiral progression approach. The mentioned approaches in teaching mathematics are one of the most utilized student-centered approaches that fosters independence and critical thinking among the students (Resurreccion & Adanza, 2015).

Table 5. Level of Academic Performance of the Students under the Spiral Progression Curriculum

GWA	Frequency	Percentage
90 – 100	5	7.14%
85 – 89	41	58.57%
80 – 84	24	34.29%
75 – 79	0	0.00%
74 and below	0	0.00%
Mean	**85.17**	
SD	**2.44**	
Verbal Interpretation	**Very Satisfactory**	

Table 5 illustrates the level academic performance of the students under the spiral progression curriculum with regards to the general weighted average (GWA) of the students in Mathematics. The obtained grades were based on the recent quarter on public junior high schools (Second Quarter).

As seen on Table 5, most of the GWA for the sections handled by the teacher-respondents lie on the interval of 85 to 89 (F=41; 58.57%), followed by most of the grades lying on the interval of 80 to 84 (F=24; 34.29%). Evidently, none of the sections handled by the teachers obtained a GWA in mathematics of less than 80.

The level of academic performance of the students under the spiral progression curriculum yielded a computed mean of 85.17 with a standard deviation of 2.44, interpreted as "Very Satisfactory".

Engaging the students on the lessons as shown on the teaching strategies used by the teachers have indicated that it helps in improving the student's academic performance (Smith, 2018). Evidently, the students' overall grades are quite satisfying and can be further improved by utilizing the commonly used teaching strategies among other schools.

As shown in Table 6, the variable Advantages has a computed p-value of 0.0179 which is lower than the alpha value of 0.05; hence, the result is significant. The mean difference of 0.51 in Advantages as perceived by the male and female teacher-respondents is high, which supports the analysis of significant difference among the variable.

Additionally, the variables Assessment and Content have the computed p-values of 0.0242 and 0.0134, respectively, which are both lower than the alpha value of 0.05; hence, the results are significant. On the other hand, the variable Implementation has a computed p-value of 0.0719 which is greater than the alpha value of 0.05; thus, the result is not significant. The findings indicate that the male and female-respondents agree on the level of Implementation of spiral progression approach but have different perceptions on its Assessment and Content, as evident on the mean differences of 0.42 and 0.51, respectively.

Table 6. Significant Difference between the Level of Perceptions and the Characteristics of the Spiral Progression Approach with respect to their Demographic Profile

Spiral Progression Approach	Mean		Mean Difference	t-stat	p-value	Analysis
	Male	Female				
Perception						
• Advantages	4.05	3.54	0.51	2.4262	0.0179	Significant
Characteristics						
• Assessment	4.08	3.66	0.42	2.3062	0.0242	Significant
• Content	3.84	3.33	0.51	2.5392	0.0134	Significant
• Implementation	4.00	3.65	0.35	1.8285	0.0719	Not Significant

*significant at .05 level of significance

Stereotyped beliefs have stated that males are generally better in mathematics than females (Forgasz & Leder, 2020). Nonetheless, no scientific research has supported this claim but based on the findings of the study, all of the variables evidently shows that perceptions of male teachers are greater than the female teachers towards spiral progression approach for teaching Mathematics.

Table 7. Significant Effect of the Level of Perception of Mathematics Teachers and Characteristics of the Spiral Progression Approach on the Academic Performance of the Students

Spiral Progression Approach	Academic Performance	Beta Coefficient	t-stat	p-value	Analysis
Perception					
• Advantages	GWA	0.4273	1.2704	0.2803	Not Significant
Characteristics					
• Assessment		0.9595	2.5728	0.0123	Significant
• Content	GWA	0.5191	1.4893	0.1410	Not Significant
• Implementation		0.6719	1.7884	0.0782	Not Significant

The variable Advantages have the computed p-value of 0.2803 which is greater than the alpha value of 0.05; hence, the result is not significant. Similarly, the variables Content and Implementation have the computed p-values of 0.1410 and 0.0782, respectively, which are also both greater than the alpha value of 0.05; hence, the results are not significant. On the other hand, the variable Assessment has a computed p-value of 0.0123 which is lower than the alpha value of 0.05; thus, the result is significant. This is supported by a high beta value of 0.9595 which indicates that the positive perception of the teachers significantly affects the GWA of the students.

Teacher's perceptions towards the curriculum have shown to be not a significant factor to affect the students' academic performance in mathematics. As the teachers perceived highly of the spiral progression approach, anxiety in mathematics of the students seem to be non-existent. Nonetheless, Gafoor and Kurukkan (2015) have determined that efforts of students on the subject as monitored by the teachers is one of the relevant factors to improve their academic performance in mathematics, among others.

The variable Common and Preferred Strategy has the computedp-value of 0.1792 which is greater than the alpha value of 0.05; hence, the result is not significant. The beta value of 0.6410 is not high enough to provide evidence that Common and Preferred Strategy of the Mathematics teachers affect the performance of the students in terms of their grade.

Table 7. Significant Effect of the Level of Perception of Mathematics Teachers and Characteristics of the Spiral Progression Approach on the Academic Performance of the Students

Spiral Progression Approach	Academic Performance	Beta Coefficient	t-stat	p-value	Analysis
Common and Preferred Strategy	GWA	0.6410	1.3573	0.1792	Not Significant

In comparison to the findings of Iyamuremye et al. (2021), teaching strategies matters on the performance of the students. As basis for their claims, the findings of Carbonneau et al. (2013) have shown that the use of manipulatives was found to be an appropriate strategy to help students solve mathematical problemswhich improvestheir analysis and comprehension, thus improving their academic performance in mathematics.

CONCLUSION

The inferential statistics have shown that: (1) there is a significant difference betweenthe level of perceptions of Mathematics teachers on the advantages and characteristics of the spiral progression approach with respect to their demographic profile; (2) the level of perception of Mathematics teachers on the advantages and characteristics of the spiral progression approach do not significantly affect the academic performance of the students; and (3) the common and preferred teaching strategies of Mathematics teachers under the spiral progression approach do not significantly affect the academic performance of the students.

RECOMMENDATIONS

Based on the findings and conclusions drawn from this study, the researcher would like to recommend the following:

1. The teachers may consider using guided discovery, cooperative learning, and collaborative learning in teaching mathematics as these are the top three (3) most frequently utilized strategy in teaching mathematics under the current curriculum. The performance of the studentsmay not have been significantly affected by the teaching strategies, but the respondents have shown that the way they managed their classes resulted to the student's very satisfactory grades in mathematics.
2. DepEd officials and school heads must frequently conduct seminars and trainings to improve the skills of the teachersin handling math topics especially algebra and statistics. These are necessary steps to improve the numeracy skills of students particularly on the lower grades (Grades 7 and 8).
3. Students may refer on this study to determine which teaching strategy might be connected to their learning style so that they will be able to effectively synergize with their classmates and teachers during class discussion.
4. Future researchers may use this studyas it may serve as data bank for further enrichment of their readings of similar nature and thus may strengthen further the findings of the present research undertaking. Further, they may also utilize or modify the variables that were used to verify the findings of the study.

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