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MATHEMATICS PERFORMANCE AND SELF-EFFICACY OF GRADE 8 LEARNERS IN A DIFFERENTIATED ASSESSMENT

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Abstract : The study assessed the Mathematics performance and self-efficacy of Grade 8 learners of Infanta Integrated School, Infanta District, Schools Division Office I Pangasinan in a Differentiated Assessment. It aimed to determine the mathematics performance of Grade 8 learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of pre-test, post-test, and retention test; ascertain the self-efficacy of the learners towards Mathematics exposed to differentiated assessment and those exposed to non-differentiated assessment; differentiate the mathematics performance of learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of post-test, and retention test; and compare the self-efficacy of the learners towards Mathematics exposed to differentiated assessment and those exposed to non- differentiated assessment. This study used the quasi-experimental research design. The mathematics performance of the learners in the pre-test, post-test and retention test when exposed to differentiated assessment and non-differentiated assessment varies from very low to high. The self-efficacy level of the learners varies from moderately low to moderately high. There was a highly significant difference in the post-test and retention scores of those learners exposed to differentiated assessment compared to those exposed to non-differentiated assessment. Moreover, the differentiated assessment group had a significantly higher self-efficacy level towards Mathematics compared to the non-differentiated assessment group.

Keywords: - differentiated assessment, self-efficacy, Mathematics performance

INTRODUCTION

In today's educational landscape, classrooms are filled with a diverse group of students, each with their own unique set of abilities, backgrounds, and cultural identities. This diversity presents a challenge for teachers, as they are tasked with catering to the individual needs of each learner in order to create an inclusive environment. Unfortunately, many teachers have not received adequate training to effectively address the needs of such a varied student population.
In addition to the challenge of catering to diverse learners, teachers often face the issue of poor academic performance, particularly in subjects like Mathematics. The performance of Filipino students in the 2003 Trends in Mathematics and Science Study (TIMSS) revealed low achievement scores in these subjects, highlighting the need for targeted intervention and support in order to improve outcomes for students. These findings underscore the importance of equipping teachers with the necessary tools and resources to effectively support all learners, regardless of their background or ability level. Recognizing the numerous challenges faced by teachers and the impact it has on education, a group of researchers embarked on a study to explore the benefits of implementing differentiated assessment in the teaching of mathematics. The goal was to enhance student performance in mathematics and boost their confidence in the subject. This decision was made in light of the pressing need to improve the quality of education in the Philippines, as highlighted by the underperformance of the country's top universities on a global scale. The struggle to keep up with

the demands of globalization has become a major concern for educational institutions in the country. Despite efforts by the government to prioritize basic education, a recent World Bank report has indicated that additional investments in both capital and recurrent public spending are necessary to address the existing challenges. Numerous research studies have already been carried out on the academic performance of Filipino students in the subject of Mathematics. One significant study, known as the Trends in Mathematics and Science Study (TIMSS), was conducted in 2003. The findings from this study indicated that there were low achievement scores in both Science and Mathematics among a selected group of Grade 4 and Grade 8 students from various schools in the Philippines (Gonzales, 2004).

NEED OF THE STUDY.

This study sought to assess the Mathematics performance and self-efficacy of the Grade 8 learners in a differentiated assessment in Infanta District, Schools Division Office I Pangasinan during the School Year 2023-2024.

Specifically, it sought to answer the following sub-problems:

1. What is the Mathematics performance of Grade 8 learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of pre-test?
2. What is the Mathematics performance of Grade 8 learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of post-test?
3. What is the Mathematics performance of Grade 8 learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of retention test?
4. What is the self-efficacy level of Grade 8 learners towards Mathematics between differentiated assessment and non-differentiated assessment group before intervention?
5. What is the self-efficacy level of students towards Mathematics between differentiated assessment and non-differentiated assessment group after intervention?
6. Is there a significant difference between on the post-test results between differentiated assessment and non-differentiated assessment group?
7. Is there a significant difference of retention test results between Gradual Release of Responsibility Instructional Model and non-Gradual Release of Responsibility Instructional Model group?
8. Is there a significant difference between the Comparison of Self-efficacy levels between groups?

3.1 Population and Sample

This study sought to assess the Mathematics performance and self-efficacy of the Grade 8 learners in a differentiated assessment in Infanta District, Schools Division Office I Pangasinan during the School Year 2023-2024.It looked into the Mathematics performance of Grade 8 learners exposed to Differentiated Assessment and those exposed to non- Differentiated Assessment in terms of pre-test and post-test and self-efficacy level of students towards Mathematics between Differentiated Assessment and non-Differentiated Assessment group before and after intervention.

3.2 Data and Sources of Data

The study was conducted in Infanta Integrated School, Infanta District, Schools Division Office I Pangasinan. The participants of this study were the Grade 8 learners who were enrolled in Mathematics 8 for SY 2023-2024. One section served as the experimental group while the other served as the control group.

3.3 Theoretical framework

The study is supported by the following underlying learning principles and theories: Experiential and Situated Learning, Reflective Learning, Constructivism, Cooperative Learning and Discovery and Inquiry-based Learning.

Experiential Learning, as proposed by David Kolb, emphasizes the importance of learning through direct experiences in everyday life. According to Kolb's Experiential Learning Theory, knowledge is created through the process of reflecting on and transforming experiences. This theory highlights the significance of both grasping the experience and then actively transforming it into knowledge.

On the other hand, Situated Learning, developed by Lave and Wenger, focuses on learning within the specific context where concepts and theories are put into practice. This approach underscores the relationship between learning and the social environment in which it takes place. Situated Learning recognizes the influence of the surrounding social situation on the learning process and emphasizes the importance of context in shaping understanding. By immersing learners in real-world situations, Situated Learning aims to enhance the application of knowledge and skills in authentic settings.

Reflective Learning is a type of learning that is enhanced by reflective thinking, which goes beyond simply encountering real-life situations. It involves learners being able to reflect on their experiences, process them, and derive meaning from them. This type of learning emphasizes that knowledge is gained through experiences and can be continuously updated by recording and reflecting on those experiences. Reflective learning has gained attention in the field of education as it encourages students to think critically about what they have read, done, or learned, and to connect the lesson to their own lives. It is about making sense of the material rather than just memorizing facts, formulas, or dates. This approach allows learners to deepen their understanding and apply their knowledge in a more meaningful way.

Constructivism is a theory that posits that knowledge is not passively received, but actively built by the learner through connecting new information to their existing experiences and ideas. According to Bruner, learning is a dynamic process where individuals create new concepts by building upon their past knowledge. The learner plays an active role in selecting, transforming, and organizing information, forming hypotheses, and making decisions based on their cognitive framework. Bruner emphasizes

that effective instruction should consider the learner's predisposition towards learning, the organization of knowledge to enhance understanding, the optimal sequence for presenting material, and the appropriate use of rewards and punishments. By structuring knowledge effectively, it can lead to simplification, the generation of new ideas, and improved information processing.

The formalization of the theory of constructivism is commonly credited to Jean Piaget, a renowned psychologist. Piaget proposed that learners internalize knowledge through a series of processes known as accommodation and assimilation. Accommodation involves adjusting one's existing mental structures to incorporate new information, while assimilation entails fitting new experiences into pre-existing cognitive frameworks without altering them. This theory emphasizes the active role of the individual in constructing their understanding of the world, highlighting the importance of firsthand experiences in the learning process. Jean Piaget's work has had a significant impact on educational practices and continues to influence our understanding of cognitive development.

Cooperative Learning emphasizes the importance of active learning through collaboration with peers to accomplish a common goal. In the realm of mathematics education, students are encouraged to ask pertinent questions and explore novel concepts. Both Discovery Learning and Inquiry-based Learning emphasize that students are more likely to grasp new knowledge when they can relate it to their own experiences. This type of learning typically occurs in problem-solving scenarios where learners rely on their past encounters and existing knowledge to uncover new information and connections. Students are actively involved in their learning process by interacting with the world around them, whether through hands-on exploration, engaging in debates, or conducting experiments. Advocates of Discovery Learning argue that it fosters active participation, boosts motivation, nurtures independence and responsibility, fosters creativity, enhances problem-solving abilities, and customizes learning experiences to suit individual needs.

According to Ausubel, individual learning is heavily influenced by the individual's existing knowledge, which he refers to as cognitive structure or a mental map of knowledge. Meaningful learning is the core concept in Ausubel's theory, suggesting that new information can be better retained and understood when it is connected to existing knowledge. Ausubel advocates for pretesting to assess a student's current knowledge before introducing new information, ensuring that the new knowledge can be effectively integrated into the learner's cognitive structure. He also emphasizes the use of various techniques such as elaborate multiple choice questions, visuals, pictures, sequencing, grouping, and sorting activities to help organize and strengthen the learner's cognitive structure. By focusing on meaningful learning and building upon existing knowledge, Ausubel's approach aims to enhance the overall learning experience and knowledge retention for students.

RESEARCH METHODOLOGY

The researchers used the pre-test-post-test quasi-experimental design in conducting this study. Descriptive method was also used in collecting the data followed by quantification, statistical analysis, interpretation of results and discussion.

3.1Population and Sample

This study made use of a 42-item Teacher-Made Test to assess learners' mathematics performance (pre-test, post-test and retention test) before and after instruction when exposed to differentiated assessment and non-differentiated assessment. The test obtained a KR21 reliability coefficient of 0.903 using the item analysis software developed by Bermundo, Bermundo and Ballester (2004). The 24-item Sources of Mathematics Self-Efficacy Scale based on the work of Usher and Pajares (2009) was used to determine the self-efficacy of students.

3.2 Data and Sources of Data

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are Descriptive Statistics (frequency counts, percentage, mean and standard deviation) and Analysis of Covariance (ANCOVA) were used to describe the Mathematics performance and the self-efficacy level of the students.

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3.4 Statistical tools and econometric models

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3.4.1 Descriptive Statistics

Descriptive Statics has been used to find the maximum, minimum, standard deviation, mean and normally distribution of the data of all the variables of the study. Normal distribution of data shows the sensitivity of the variables towards the periodic changes and speculation. When the data is not normally distributed it means that the data is sensitive towards periodic changes and speculations which create the chances of arbitrage and the investors have the chance to earn above the normal profit. But the assumption of the APT is that there should not be arbitrage in the market and the investors can earn only normal profit. Jarque bera test is used to test the normality of data.

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IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Descriptive Statics

Range	DA			Non-DA		
	f	%	Interpretation	f	%	Interpretation
90% - 100%	0	0	Very High	0	0	Very High
86 % - 89%	1	2.17	High	0	0	High
80% - 85%	1	2.17	Moderate	1	2.22	Moderate
75% - 79%	8	17.39	Low	2	4.44	Low
65% - 74%	36	78.26	Very Low	42	93.33	Very Low
		= 16.09	(Very Low)		= 14.67	(Very Low)

This study shows that both groups had a very low level of performance in the pre-test. It supports the study of Segumpan and Tan (2018) when they found out that the students' performance in Mathematics before exposure to a Flipped classroom is very low. Moreover, this study supports the study of Saligumba and Tan (2018) when they found out that the mathematics performance of students exposed to Gradual Release of Responsibility Instructional Model (GRRIM) and non-GRRIM is also very low.

The mathematics performance of students exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of post-test. The overall mean score of the differentiated assessment group in the post test is 31 which indicates a high performance while the overall mean score of the non-differentiated assessment group is 24.44 which indicates a low performance.

Table 4.2: Mathematics Performance of Students Exposed to Differentiated Assessment and those Exposed to Non-Differentiated Assessment in terms of Post-test

Range	DA			Non-DA		
	f	%	Interpretation	f	%	Interpretation
90% - 100%	20	43.48	Very High	5	11.11	Very High
86 % - 89%	10	21.74	High	7	15.56	High
80% - 85%	11	23.91	Moderate	11	24.44	Moderate
75% - 79%	4	8.70	Low	7	15.56	Low
65% - 74%	1	2.17	Very Low	15	33.33	Very Low
		= 31 (High)			= 24.44 (Low)	

This result supports Ciubal-Fulgencio and Tan (2018) when they found out that learners exposed to Mathematics Communication Strategies environment (MCS) have a higher performance compared to the students exposed to non-Mathematics Communication Strategies environment (non-MCS. However, it opposes to the study of Pagtulon-an and Tan (2018) when they found out that the mathematics performance of students exposed to rich assessment tasks environment (RATE) is of the same level when compared to those exposed to non-RATE.

Table 4.3 presents the mathematics performance of learners exposed to differentiated assessment and those exposed to non-differentiated assessment in terms of retention test. The overall mean score of the differentiated assessment group in the retention test is 25.30 which indicates a moderate performance while the overall mean score of the non-differentiated assessment group is 19.80 which indicates a low performance.

Table 4.3. Mathematics Performance of Grade 8 Learners Exposed to Differentiated Assessment and those Exposed to Non- Differentiated Assessment in terms of Retention Test

Range	DA			Non-DA		
	f	%	Interpretation	f	%	Interpretation
90% - 100%	8	17.39	Very High	2	4.44	Very High
86 % - 89%	8	17.39	High	2	4.44	High
80% - 85%	6	13.04	Moderate	7	15.56	Moderate
75% - 79%	11	23.91	Low	10	22.22	Low
65% - 74%	13	28.26	Very Low	24	53.33	Very Low
		= 25.30 (Moderate)			= 19.80 (Very Low)	

This finding conforms to the study of Ciubal-Fulgencio and Tan (2018) when they found out that learners exposed to MCS have a higher retention than the learners exposed to traditional learning. It also conforms to the study of Salingay and Tan (2018) when they found out that the level of performance of learners in Mathematics exposed to Concrete-Pictorial-Abstract (CPA) approach in terms of retention test scores is higher than those who are exposed to non-CPA approach.

Self-Efficacy of the Grade 8 Learners Toward Mathematics Before and After the Intervention

Table 4.4 illustrates the self-efficacy levels of Grade 8 learners in relation to their perception of mathematics, comparing those who underwent differentiated assessment with those who did not, prior to any form of intervention. The findings indicate that prior to any intervention, learners in the differentiated assessment group displayed a moderately high level of self-efficacy, as evidenced by an average score of 2.97. On the other hand, learners in the non-differentiated assessment group exhibited a moderately low level of self-efficacy, as reflected by an average score of 2.23. These results suggest that the implementation of differentiated assessment strategies may have a positive impact on learners' self-efficacy beliefs in mathematics.

Table 4.4: Self-efficacy Level of Grade 8 Learners Toward Mathematics between Differentiated Assessment and Non-Differentiated Assessment Group Before Intervention

Self-efficacy Towards Mathematics	DA		Non-DA	
	Mean	Interpretation	Mean	Interpre-tation
I make excellent grades on math tests.	2.91	MH	2.11	ML
I have always been successful with math.	2.65	MH	1.93	ML
Even when I study very hard, I do poorly in math.	3.63	H	2.76	MH
I got good grades in math on my last report card.	3.72	H	2.73	MH
I do well on math assignments.	3.54	H	2.80	MH
I do well on even the most difficult math assignments.	2.30	ML	1.60	ML
Seeing adults do well in math pushes me to do better.	3.74	H	3.07	MH
When I see how my math teacher solves a problem, I can picture myself solving the problem in the same way.	2.83	MH	2.44	ML
Seeing kids do better than me in math pushes me to do better.	3.83	H	3.02	MH
When I see how another student solves a math problem, I can see myself solving the problem in the same way.	3.02	MH	2.11	ML
I imagine myself working through challenging math problems successfully.	2.76	MH	2.38	ML
I compete with myself in math.	3.60	H	2.70	MH
My math teachers have told that I am good at learning math.	2.17	MH	1.29	L
People have told me that I have a talent for math.	2.20	ML	1.24	L

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