

# **International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# Scaling Up Skills in Numeracy in If-Then Statement of Grade 8-Juniper Using Differentiated Instructions

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# ABSTRACT

This action research focused on scaling up the skills in numeracy of Grade 8 Juniper at Cataingan National High School, Masbate Province, by utilizing differentiated instruction method. With the Grade 8 Juniper Mean Percentage Score revealed obtaining 58.67% falls on the average achievement. It was found out that most of the learners struggled comprehension and poor retention on the given statement especially when numbers are involved. Revealed that traditional teaching did not cater the diverse needs of every student. Using differentiated instructions it would be tailored to learners progress of participation and engagement. With differentiated instruction the learners can have fun through learning. The session lasted for a week with 21 students involved with the 30 minutes fun learning with differentiated instruction intervention. A pretest-posttest design was employed, to evaluate the effectiveness of the intervention. The analysis showed that the mean difference scored -1.95 points, clearly indicates that the learners scored higher on the posttest compared to the pretest, implying improvements of the performance. The findings revealed a statistically significant yielded at p-value <0.001, indicating that the intervention significantly enhanced the performance of the Grade 8 Juniper learners. The results highlighted the importance of instruction and strategies of teaching and learnings matters for learners engagements and productivity.

Keyword: Mean Percentage Score, comprehension, poor retention, differentiated instruction

# 1. Introduction

Mathematics is a subject that secondary grade can make or break. According to RA 10533, also known as the Enhanced Basic Education act of 2013, which strengthens the K to 12 curriculum, to ensure the students develop essential competencies for lifelong learning, the law emphasizes how important is mathematics that plays a crucial role for enhancing critical-thinking, problem-solving and analytical skills. But student engagement and motivation are the factors to students success, to assist with motivating students, instruction must be differentiated, for learners to benefit and the way they learn by updating teaching methods to fit learning styles, learners motivation increase and the performance improved (Malacapay,2019). Grade 8 Juniper learners of Cataingan National High School struggled significantly their skills in numeracy in terms of finding the value of the number and identifying of which in the statements falls into hypothesis and a conclusion. Gregory and Chapman (2013) stated, it is very crucial to the educators to be mindful on how learners learn best in order for them to satisfy the needs of their learners.

To address this challenge, the researchers developed innovative strategies which could tailored the needs of the learners and there learning preferences by utilizing differentiated instruction. By differentiating instruction all learners are accommodated and provided various ways that allow them to learn and succeed. Prince and Howard (2002) remarked, developing lessons according to learners readiness levels, interest, learning profiles, educators will able to integrate learners prior knowledge and experiences which will empower learners to view things differently and share their opinions because they already have knowledge and interest in the topics. To accommodate the interest and needs of the learners, the materials used in this study tailored to the diverse needs of the learners. Konstantinuo-Katzi et al.(2013) proved that differentiated instruction was effective in improving learners performance and in enhancing their motivation and engagement

This study examined the effectiveness of the differentiated instruction in improving the numeracy skills of Grade 8 Juniper learners in the If-then Statement. The study aimed to provide a practical solution that could help the learners and educators to transformed the whole class into more interactive and livelier one and no one would feel handicapped by any means of lack of knowledge. This research helped learners improve numeracy skills in a fun yet engaging.

### 1.1 Statement of the Problem

This action research aimed to improve the skills in numeracy of Grade 8 Juniper learners at Cataingan National High School, Masbate, Province, helping them to improve through differentiated instruction. This study fosters the collaboration of the learners and educators and coupled with different instruction that meets the needs of every learner. Further, it examined how the use of differentiated instruction improved the skills in the numeracy of the Grade 8 Juniper learners and identify the numeracy skills of the learners before and after the intervention and also to determine whether there was an improvements after the intervention.

#### 2.1 Research Design

A pre-experimental one-group pretest-posttest design was utilized to examine whether the use of differentiated instruction improve the numeracy skills of Grade 8 Juniper learners at Cataingan National High School. The design involved measuring the learners numeracy skills before and after the intervention. In order to assessed the learners prior knowledge, pre-test was then utilized. For enlightenment of the learners, the intervention was then implemented which cover with 20 minutes discussion and activities tailored with differentiated instruction and learners engagement was the documented. Right after posttest was conducted using same assessment implemented with the pretest. Hence, this method evidently showed that the intervention had a positive effect on the learners performance and has impact on student achievement (Koeze, 2007).

### 2.2 Data Sources

The primary source or the participants for this study were the 21 Grade 8 Juniper students of Cataingan National High School ,Masbate, Province. The participants were composed of 6 males and 15 females and both utilized the pre-test and post-test to measures their improvements before and after the intervention of differentiated instruction. The secondary sources of data include the Mean Percentage Scores (MPS),which serves as a baseline of their performance. This participants are choosen due to its accessibility and also to determine whether the intervention of differentiated instruction can improved there numeracy skills.

#### 2.3 Research Procedure

The study involved 21 Grade 8 Juniper learners of Cataingan National High School. The researchers secured an approval form from the school principal to secure support and permission to the school setting, before the implementation of the intervention. The differentiated instruction assessments were crafted by the research team, focusing on the improvements of the numeracy skills of the learners. All the crafted materials was then validated for it be suited to the learning needs of the learners before it was implemented. As cited by Rothman and Thomas,1994 cited that validation and evaluation of the materials are important to ensure content accuracy and instructional appropriateness. Before the differentiation started, the researchers seek for ethical considerations as it plays greater emphasis on the welfare and rights of participants before we proceed to the collection of data (Miles and Huberman,1994).

A pre-experimental, one-group pretest-posttest framework was then implemented to determine the effectiveness of differentiated instruction in improving the numeracy skills of Grade 8 Juniper learners. A Shapiro-Wilk test was then used to assess the normality of the data. Subsequently, the result did not follow a normal distribution, thus require the use of Wilcoxon Signed Rank Test. This test is very efficient and is good substitute to the t-test when the latter is not appropriate (Cooper & Schindler,2011). In consequence after analyzing the data, it can be possibly concluded that with utilizing differentiated instruction had impact to improvements of the learner numeracy skills.

## 3. Results and Discussion

#### 3.1 Normality Testing of Gathered Data

Verifying the distribution of the collected data was essential to ensure the accurate interpretation of learning gains. To assess whether the pre-test and post-test scores followed a normal distribution, the Shapiro-Wilk test for normality was conducted. This test was selected due to its appropriateness for small to moderate sample sizes and its widespread use in educational and psychological research, as highlighted by Razali and Wah (2011). The Shapiro-Wilk test is particularly sensitive to deviations from normality, making it a reliable tool for preliminary data screening in empirical studies.

As shown in Table 1, the results of the Shapiro-Wilk test revealed that both the pre-test and post-test scores had p-values less than 0.05. This indicated a significant deviation from normality and led to the rejection of the null hypothesis, which posits that the data are normally distributed. The W-statistic for the pre-test and post-test scores was 0.809, with a corresponding p-value of < 0.001, thereby confirming the non-normal distribution of the data.

Given the violation of the normality assumption, the use of non-parametric statistical methods was deemed necessary. In response, the Wilcoxon Signed-Rank Test was selected to further evaluate the differences between the pre-test and post-test scores. This decision was supported by Field (2013), who emphasized that non-parametric tests are suitable for small sample sizes and non-normally distributed data. Moreover, Ghasemi and Zahediasl (2012) reinforced that non-parametric tests provide robust alternatives when the assumptions of parametric tests are not met, ensuring the integrity of statistical conclusions.

The use of the Shapiro-Wilk test guided the researcher in adopting more suitable statistical tools, thus enhancing the reliability, accuracy, and validity of the results. Ultimately, the validation of data assumptions played a critical role in maintaining the rigor and consistency of the research process.

#### Table 1

Variables	Ν	W-stat	P-value	Interpretation	
Pre-test – Post-test	21	0.809	< 0.001	Not normally	

#### 3.2 Significant Increase in the Average scores of Grade-8 Juniper in the utilization of Differentiated Instruction

The implementation of Differentiated Instruction (DI) among Grade 8–Juniper learners significantly improved their performance in the topic of If-Then statements. Using a pre-experimental, one-group pre-test/post-test design, the study aimed to examine the effect of DI on learners' numeracy skills. Due to the non-normality of data distribution confirmed through the Shapiro-Wilk test, the Wilcoxon Signed-Rank Test was used to analyze the learners' performance before and after the intervention. The results in tabke 2, showed a statistically significant increase (p < 0.001), suggesting the positive impact of differentiated instruction on students' learning outcomes. This notable improvement in the learners' Mean Percentage Score (MPS)—from 58.67% ("Average") to 71% ("Moving Towards Mastery")—indicated that differentiated strategies directly contributed to the development of logical reasoning and mathematical thinking. These findings are consistent with recent literature affirming that DI is particularly effective in addressing varied learning needs within a diverse classroom. As emphasized by Tomlinson (2017), differentiated instruction allows educators to tailor content, processes, and assessments according to students' readiness levels, interests, and learning profiles, thereby fostering academic growth and equity.

The increased performance can also be attributed to the active and inclusive nature of the intervention. Malacapay (2019) pointed out that when teaching methods are aligned with students' learning preferences and needs, engagement and motivation are heightened, resulting in improved academic performance. In this study, students were given varied instructional materials, scaffolded activities, and flexible learning tasks, enabling them to grasp abstract mathematical concepts such as conditional logic with greater ease and confidence. The use of differentiated strategies also promoted a student-centered learning environment where learners were encouraged to take responsibility for their own progress. Konstantinou-Katzi et al. (2013) explained that when students perceive lessons as accessible and relevant, they are more likely to participate actively and persist in tasks despite challenges. This shift from passive to active learning observed in the post-intervention phase reflects the empowering effect of DI on learners' attitudes toward mathematics.

Moreover, the study underscored the importance of inclusive instruction in promoting learner confidence and reducing math anxiety. According to Lawrence-Brown (2004), differentiated instruction not only enhances academic achievement but also nurtures self-efficacy and positive learner identities, especially in subjects perceived as difficult. The transformation in the students' performance highlights the dual role of DI in improving both cognitive and affective learning outcomes. From a pedagogical perspective, this improvement implies that DI should be integrated as a standard instructional strategy in secondary mathematics classrooms. Teachers who differentiate are better positioned to manage classroom diversity, accommodate students with learning gaps, and challenge advanced learners simultaneously (Santangelo & Tomlinson, 2019). In the context of the present study, the use of tiered activities and flexible grouping allowed all learners to engage meaningfully with the content at their own pace.

In terms of educational leadership, these results reinforce the need for continuous teacher training in differentiated strategies. As noted by Nouri et al. (2020), professional development programs that equip teachers with skills in active learning and formative assessment are crucial to the effective implementation of DI. In schools where differentiation is embedded in classroom culture, students are more likely to experience sustained academic growth, regardless of their starting point.

Another key implication lies in the promotion of reflective teaching. The intervention encouraged the teacher to analyze students' responses, adjust instructional pacing, and design customized learning paths. This practice resonates with Black and Wiliam's (2009) advocacy for formative assessment, which emphasizes ongoing feedback and instructional responsiveness—core elements of DI. Such reflection is critical in ensuring that all learners are appropriately challenged and supported. Furthermore, the findings affirm that differentiated instruction can be a catalyst for improving not only individual learner outcomes but also overall classroom performance. The statistical evidence from the Wilcoxon Signed-Rank Test validates the strategy's effectiveness, especially in numeracy development. The success of this approach in a real-world classroom setting adds to the growing body of empirical evidence supporting the adoption of DI in both basic and secondary education (Deunk et al., 2018).

Lastly, this study serves as a call for curriculum developers and school administrators in the Masbate Province and beyond to institutionalize differentiated instruction as part of pedagogical frameworks. The growing diversity in student populations demands adaptive teaching methods that address academic disparities and promote inclusivity. When implemented effectively, DI not only bridges achievement gaps but also fosters a resilient learning culture rooted in equity, engagement, and excellence.

#### Table 2

Statistical Interpretation of Pretest and Posttest in Utilization of Differentiated Instruction Using Wilcoxon Signed-Rank Test

Variables	N	V-value	P-value	Interpretation
Pretest-posttest	21	0b	<0.001	Statistically significant

# 4. Conclusion

The results of this action research clearly demonstrate that differentiated instruction significantly improved the numeracy skills of Grade 8-Juniper learners at Cataingan National High School, Masbate Province. Grounded in a pre-experimental, one-group pretest-posttest design, the study revealed a notable increase in learners' performance, as evidenced by the improvement in their Mean Percentage Score (MPS) from 58.67% ("Average") to 71% ("Moving Towards Mastery"). The statistically significant p-value (<0.001), derived from the Wilcoxon Signed-Rank Test, further validated that the intervention was effective in enhancing students' understanding of conditional statements and logical reasoning. These outcomes affirm that when instruction is adapted to meet diverse learner needs-through varied content delivery, tasks, and assessments-students are more likely to engage meaningfully and succeed academically. Moreover, this study has shown that differentiated instruction fosters not only cognitive gains but also boosts learner motivation, confidence, and classroom participation. The implementation of DI created an inclusive and student-centered environment where learners felt supported and challenged according to their individual levels of readiness. This approach promoted positive attitudes toward mathematics, minimized learning anxiety, and increased self-efficacy. The intervention's success highlights the critical role of responsive teaching practices in addressing the wide range of abilities present in a typical classroom and ensuring equitable access to learning opportunities for all students. In conclusion, differentiated instruction should be adopted as a sustainable pedagogical strategy in mathematics education, particularly in diverse and mixed-ability classrooms. This research underscores the value of equipping educators with the necessary skills to design and implement differentiated tasks and assessments effectively. As schools aim to improve student performance and promote inclusive learning environments, differentiated instruction offers a practical and evidence-based solution. Therefore, it is recommended that both local and national education stakeholders, including curriculum planners, teacher trainers, and school leaders, integrate DI into teacher development programs and classroom practice to ensure continued academic growth and success among learners.

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