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Specific Differentiated Instructional Strategies on Learners' Value-Based Aspect and Cognitive Domain of Learning in Mathematics

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Abstract**—***This study determined the effect of specific differentiated instructional strategies on learners' value-based aspect and cognitive domain of learning in mathematics. Specifically, it sought to determine the level of specific differentiated instructional strategies; determine the level of learners' value-based aspect of learning in mathematics; determine the level of learners' cognitive domain of learning in mathematics; find out whether there is a significant relationship between specific differentiated instructional strategies and learners' value-based aspect of learning; and find out whether there is a significant effect of differentiated instructional strategies on learners' cognitive domain of learning. A quantitative predictive-correlational research design was employed. Eighty-four Grade 11 STEM Senior High School students during School Year 2025–2026 were selected through census sampling. Research instruments included researcher-made structured questionnaires and a standardized test in probability. Data were analyzed using mean and standard deviation, Pearson Product-Moment Correlation, and Multiple Regression Analysis. Findings revealed that the level of differentiated instructional strategies was Very High, with compacting and tiered assignments receiving the highest ratings. The level of learners' value-based aspect of learning was Very High across attitude, motivation, and interest. The level of learners' cognitive domain of learning was Very Good across knowledge, analysis, and problem-solving, with no student scoring in the unsatisfactory range. All four strategies showed significant positive relationships with attitude, but no significant relationships with motivation. Only compacting showed a significant positive relationship with interest. Differentiated instructional strategies did not demonstrate a significant effect on students' knowledge, analysis, or problem-solving skills. The null hypothesis stating no significant relationship was rejected for attitude but failed to be rejected for motivation and interest. The null hypothesis stating no significant effect on the cognitive domain failed to be rejected. Teachers shall enhance differentiated instruction for advanced learners by designing tiered assignments that require higher-order thinking and strengthening compacting with enrichment activities aligned to students' interests. Students shall take an active role in their learning by developing self-regulation and metacognitive skills. Future researchers shall investigate additional variables influencing cognitive outcomes.*

Keywords**—** *Differentiated instruction, mathematics education, value-based aspect of learning, cognitive domain, learning mathematics.*

I. Introduction

Education in the 21st century is increasingly shaped by learner-centered approach that recognize every student's uniqueness. Traditional one-size-fits-all instruction is failed to meet the diverse needs of learners, creating gaps in both academic success and holistic development. In line with this, various differentiated instructional strategies such as flexible grouping, tiered assignments, graphic organizers, and compacting have emerged and become helpful to address this challenge.

According to the study of De Guzman (2020), the Department of Education (DepEd) promotes learner-centered pedagogy in the K–12 Curriculum. However, public schools often face challenges such as large class sizes, mixed-ability learners, and limited resources. Differentiated instructional strategies improves classroom participation and motivation.

Differentiated instructional strategies refer to teaching methods designed to accommodate the varied learning needs, preferences, and readiness levels of students within a single classroom. By adjusting material, procedures, products, or learning environments in accordance with student diversity, these initiatives seek to offer fair learning experiences. The affective domain, or internal belief systems, attitudes, and emotional structures that influence how a learner engages with concepts, is referred to as the value-based aspect of learning. The value-based component concentrates on the reasons why the student should be concerned about a certain variable in the first place, whereas the cognitive domain concentrates on how the brain interprets that variable.

Teachers in the field of education, especially those with specializations in Mathematics frequently encounter two formidable barriers to learning: the Cognitive Gap, where students lack the mental scaffolding to process abstract logic, and the Value Gap, where a lack of perceived relevance leads to chronic disengagement. By integrating the cognitive domain and the value-based aspect of learning into specific differentiated instructional strategies, teachers can transform these common obstacles into a cohesive pathway for student success.

For these, the researcher investigated the actual experiences of students especially regarding utilization of specific differentiated instructional strategies, value-based aspect of learning and cognitive learning in mathematics to the selected integrated high school students of Laguna.

1.1 Statement of the Problem

Problem/s which were addressed by the research

This study aims to determine the effect of Specific Differentiated Instructional Strategies on learners' value-based aspect and cognitive domain of learning in mathematics Specifically, it sought to answer the following:

1. What is the level of Specific Differentiated Instructional Strategies in terms of:
   1.1. Flexible Grouping;
   1.2. Tiered Assignments;
   1.3. Learning Situation; and
   1.4. Compacting?
2. What is the level of Learners' Value-Based Aspect of Learning in Mathematics in terms of:
   2.1. Learners' attitude;
   2.2. Motivation; and
   2.3. Interest?
3. What is the level of Learners' Cognitive Domain of Learning in Mathematics in terms of:
   3.1. Knowledge;
   3.2. Analysis; and
   3.3. Problem-solving?
4. Is there a significant relationship between Specific Differentiated Instructional Strategies and the Learners' Value-based Aspect of Learning in Mathematics?
5. Is there a significant effect of Differentiated Instructional Strategies on the Learners' Cognitive Domain of Learning in mathematics?

II. METHODOLOGY

A quantitative predictive-correlational research design was employed. Eighty-four Grade 11 STEM Senior High School students during School Year 2025–2026 were selected through census sampling. Research instruments included researcher-made structured questionnaires and a standardized test in probability. Data were analyzed using mean and standard deviation, Pearson Product-Moment Correlation, and Multiple Regression Analysis.

III. RESULTS AND DISCUSSION

This part presents, analyzes, and interprets the data gathered that showed a significant relationship between specific differentiated instructional strategies and the value-based aspect of learning in mathematics, and significant effect of differentiated instructional strategies on the cognitive domain of learning in mathematics.

Level of Specific Differentiated Instructional

In this study, the level of Specific Differentiated Instructional Strategies refers to the teaching approaches tailored to students' varied readiness, interests, and learning profiles in terms of Flexible Grouping, Tiered Assignments, Learning Situation, and Compacting.

The level of utilization of specific differentiated instructional strategies was treated statistically using mean and standard deviation.

The results revealed the descriptive interpretation of the level of utilization, including the corresponding mean ranges and qualitative descriptions, providing a basis for analyzing the extent to which teachers employ differentiated instruction across the four identified components. Higher mean scores reflect more frequent or consistent use of a strategy, whereas lower scores suggest limited implementation. Similarly, a smaller standard deviation indicates general agreement among teachers, while a larger standard deviation points to diverse practices across different classrooms.

Table 1 presents that the students expressed strong agreement with their teachers' use of flexible grouping strategies in mathematics instruction. The highest-rated indicators include providing opportunities for students to work with different classmates (M=4.85) and encouraging teamwork and peer learning (M=4.85). This depicts that collaborative and interactive learning environments are highly emphasized in mathematics classrooms.

Table 1. Level of Specific Differentiated Instructional Strategies in terms of Flexible Grouping

Statements Through diverse grouping strategies in math class, my mathematics teacher…	Mean	SD	Remarks
…organizes students into different groups based on our learning needs and abilities.	4.79	0.41	Strongly Agree
…modifies our groupings based on the topic or learning activity.	4.76	0.43	Strongly Agree
…provides opportunities for us to work on different classmates during math activities.	4.85	0.36	Strongly Agree
…assigns tasks that are appropriate to the skill level of each group.	4.80	0.40	Strongly Agree
…encourages teamwork and peer learning in every activity.	4.85	0.36	Strongly Agree
Weighted Mean	4.41		
SD	0.39		
Verbal Interpretation	Very High		

The results revealed the large majority of students indicated there was a high level of agreement with their teachers using flexible grouping strategies when providing mathematics instruction. The outcome of this evaluation reveals that many students expressed strong agreement that their teachers use flexible grouping strategies by allowing students to work with a variety of classmates, as well as support the development of student collaboration/teamwork and student peer learning, which means that collaborative/interactive learning environments are emphasized.

Overall, the composite mean was 4.41 with a standard deviation of 0.39, verbally interpreted as "Very High," indicating a high and consistent level of utilization of flexible grouping strategies in mathematics classrooms. This indicates that teachers regularly implement flexible grouping strategies to address the various learning styles of their students, and to facilitate active engagement of all students.

In summary, this implies that using flexible grouping as an instructional strategy is effective in supporting collaboration and being sensitive to the individual differences among students so they will be more successful in participating and succeeding in learning mathematics.

Table 2 presents the level of specific differentiated instructional strategies in terms of tiered assignments, as perceived by the students. The result shows that students strongly agreed that their teachers implement tiered assignments consistently in mathematics instruction. The highest rated indicator was encouraging all students to achieve the same learning objectives through different tasks (M=4.86, SD=0.35) and it is indicating that teachers effectively maintain same learning goals while different task complexity. The indicator on adjusting explanation and support according to each students learning level also received a high mean (M=4.83, SD=0.37) demonstrating teachers' responsiveness to the needs of individual learner.

Table 2. Level of Specific Differentiated Instructional Strategies in terms of Tiered Assignments

Statements By providing tasks tailored to different ability levels, my mathematics teacher…	Mean	SD	Remarks
…gives math tasks with different levels of difficulty based on our students.	4.82	0.39	Strongly Agree
…provides simpler or guided tasks for students who need additional support.	4.81	0.40	Strongly Agree
…offers more challenging activities for students who demonstrated advanced skills.	4.77	0.42	Strongly Agree
…adjusts explanations and support according to each student's learning level.	4.83	0.37	Strongly Agree
…encourages all students to achieve the same learning objectives through different tasks.	4.86	0.35	Strongly Agree
Weighted Mean	4.82		
SD	0.39		
Verbal Interpretation	Very High		

Overall, the composite mean was 4.82 with a standard deviation of 0.39 verbally interpreted as "Very High" it means a very high and consistent level of utilization of tiered assignments in mathematics classrooms. This recommend that the teachers will regularly apply the level tasks to ensure that all of the students regardless of their readiness level are appropriately challenge and supported in their learning.

Table 3. Level of Specific Differentiated Instructional Strategies in terms of Learners Situation

Statements Considering my interests and readiness, my mathematics teacher…	Mean	SD	Remarks
…considers students' interests and preferred learning styles during instruction.	4.76	0.43	Strongly Agree
…relates mathematics lessons to real-life experiences and situations.	4.76	0.43	Strongly Agree
…recognizes students' strengths and areas for improvement in learning mathematics.	4.83	0.37	Strongly Agree
…adapts teaching strategies based on students' readiness and prior knowledge.	4.87	0.34	Strongly Agree
…encourages students to express their ideas or learning preferences.	4.80	0.40	Strongly Agree
Weighted Mean	4.80		
SD	0.40		
Verbal Interpretation	Very High		

Table 3 presents the level of specific differentiated instructional strategies in terms of learners' situation as perceived by the students. The results showed that students strongly agreed that their teachers consider their individual contexts when delivering mathematics instruction. The highest-rated indicator was adapting teaching strategies based on students' readiness and prior knowledge (M=4.87, SD=0.34) and indicating that the teachers are aware to where students are in their learning journey. Also, it recognizing students' strengths and the areas for improvement (M=4.83, SD=0.37) reflects teachers' attentiveness to individual learning profiles.

The composite mean was 4.80 with a standard deviation of 0.40, verbally interpreted as "Very High" and indicating a high and consistent level of attention to learners' situations in mathematics classrooms. This suggest that teachers effectively consider student interests, readiness levels, and real-life connections to make mathematics instruction more relevant and meaningful.

Table 4 presents the level of specific differentiated instructional strategies in terms of compacting as perceived by the students. The results showed that students strongly agreed that their teachers efficiently manage instructional pacing and content by streamlining what is taught based on students' prior mastery. The highest-rated indicator was maximizing class time by focusing instruction only on new or challenging concepts (M=4.89, SD=0.31), indicating that teachers are intentional about avoiding redundant instruction and making the most of limited class time. This was closely followed by using previous assessment results to determine lessons that need to be reviewed or skipped (M=4.88, SD=0.33) and encouraging independent or extended projects for students who complete tasks early (M=4.88, SD=0.33), both reflecting a systematic approach to compacting.

Table 4. Level of Specific Differentiated Instructional Strategies in terms of Compacting

Statements By adapting lesson pacing and content, my mathematics teacher…	Mean	SD	Remarks
…uses previous assessment results to determine lessons that need to be reviewed or skipped.	4.88	0.33	Strongly Agree
…allow students to skip lessons or activities they have already mastered.	4.83	0.37	Strongly Agree
…provides enrichment or advanced activities for fast learners.	4.82	0.39	Strongly Agree
…maximizes class time by focusing only instruction on new or challenging concepts..	4.89	0.31	Strongly Agree
…encourages independent or extended projects for students who complete tasks early.	4.88	0.33	Strongly Agree
Weighted Mean	4.86		
SD	0.34		
Verbal Interpretation	Very High		

Allowing students to skip lessons or activities they have already mastered (M=4.83, SD=0.37) and providing enrichment or advanced activities for fast learners (M=4.82, SD=0.39) also received very high agreement, demonstrating that teachers not only condense instruction but also provide meaningful alternatives for advanced learners. The composite mean was 4.86 with a standard deviation of 0.34, verbally interpreted as "Very High," indicating that compacting is consistently and strongly practiced in mathematics classrooms. This suggests that teachers effectively use pre-assessment data, flexible pacing, and enrichment opportunities to respect students' prior knowledge and challenge those who are ready to move ahead.

Learners' Value-Based Aspect of Learning in Mathematics

In this study, it is the affective domain of education, focusing on the internal values, attitudes, and belief systems a student holds toward a subject. It is how a student moves from passive awareness to a state where they internalize and prioritize a concept as part of their identity.

The level of learners' value-based aspect of learning in mathematics in terms of learner's attitude, motivation and interest was treated statistically using mean and standard deviation.

Table 5 presents the level of learners' value-based aspect of learning in mathematics in terms of learner's attitude. The results revealed that students demonstrated a strongly positive attitude toward mathematics across all indicators. The highest-rated indicator was enjoying participation in math discussions and classroom activities (M=4.80, SD=0.40), indicating that students find mathematics classes engaging and inclusive. Additionally, students strongly agreed that learning mathematics helps them develop logical and critical thinking skills (M=4.76, SD=0.43), reflecting their recognition of the cognitive benefits of studying mathematics.

Table 5. Level of Learners' Value-Based Aspect of Learning in Mathematics in terms of Learner's Attitude

Statements My positive attitude toward mathematics helps me to…	Mean	SD	Remarks
…recognize the importance of mathematics for my future goals	4.69	0.47	Strongly Agree
…feel confident when solving mathematical problems.	4.74	0.44	Strongly Agree
…try my best even when mathematics problems are challenging.	4.74	0.44	Strongly Agree
…enjoy participating in math discussions and classroom activities.	4.80	0.40	Strongly Agree
…believe that learning mathematics helps me develop logical and critical thinking skills.	4.76	0.43	Strongly Agree
Weighted Mean	4.75		
SD	0.44		
Verbal Interpretation	Very High		

Overall, the composite mean was 4.75 with a standard deviation of 0.44, verbally interpreted as "Very High," indicating that students consistently exhibit positive attitudes toward mathematics. This suggests that students value mathematics not only for its practical utility but also for its role in developing critical thinking and problem-solving capabilities.

Table 6 presents the level of learners' value-based aspect of learning in mathematics in terms of motivation. The results revealed that students demonstrated exceptionally high levels of motivation across all indicators. The highest-rated indicators were putting more effort into learning when activities are engaging and meaningful (M=4.89, SD=0.31) and feeling inspired when applying mathematical concepts to real-life situations (M=4.89, SD=0.31), both reflecting the powerful influence of meaningful learning experiences on student motivation. Additionally, students strongly agreed that they study math even when there is no graded requirement (M=4.87, SD=0.34), indicating intrinsic motivation beyond external rewards.

Table 6. Level of Learners' Value-Based Aspect of Learning in Mathematics in terms of Motivation

Statements When I am motivated, I tend to…	Mean	SD	Remarks
…perform to the best of my ability in mathematics classes.	4.85	0.36	Strongly Agree
…study math even when there is no graded requirements.	4.87	0.34	Strongly Agree
…feel encouraged when my teacher acknowledges effort.	4.85	0.36	Strongly Agree
…put more effort into learning when activities are engaging and meaningful.	4.89	0.31	Strongly Agree
…feel inspired when I can apply mathematical concepts to real-life situations.	4.89	0.31	Strongly Agree
Weighted Mean	4.87		
SD	0.34		
Verbal Interpretation	Very High		

Overall, the composite mean was 4.87 with a standard deviation of 0.34, verbally interpreted as "Very High," indicating that students are consistently motivated to engage with mathematics. This suggests that students find mathematics inherently meaningful and are driven by both intrinsic enjoyment and the perceived relevance of the subject to their lives.

Table 7. Level of Learners' Value-Based Aspect of Learning in Mathematics in terms of Interest

Statements My interest in mathematics often lead me to…	Mean	SD	Remarks
…look forward to attending mathematics classes.	4.83	0.37	Strongly Agree
…enjoy exploring different strategies for solving mathematical problems.	4.86	0.35	Strongly Agree
…find math activities engaging and enjoyable.	4.82	0.39	Strongly Agree
…enjoy collaborating with classmates during group mathematics activities	4.87	0.34	Strongly Agree
…show curiosity about how mathematical concepts are used in everyday life.	4.87	0.34	Strongly Agree
Weighted Mean	4.85		
SD	0.36		
Verbal Interpretation	Very High		

Table 7 presents the level of learners' value-based aspect of learning in mathematics in terms of interest. The results revealed that students demonstrated consistently high levels of interest in mathematics across all indicators. The highest-rated indicators were enjoying collaborating with classmates during group mathematics activities (M=4.87, SD=0.34) and showing curiosity about how mathematical concepts are used in everyday life (M=4.87, SD=0.34), reflecting students' engagement with both the social and practical dimensions of mathematics. Additionally, students strongly agreed that they enjoy exploring different strategies for solving mathematical problems (M=4.86, SD=0.35), indicating intellectual curiosity and flexibility in their approach to mathematics. Overall, the composite mean was 4.85 with a standard deviation of 0.36, verbally interpreted as "Very High," indicating that students consistently demonstrate high levels of interest in mathematics. This suggests that students find mathematics engaging not only as an academic subject but also as a tool for exploration, collaboration, and real-world application.

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Learners' Cognitive Learning in Mathematics

In this study, it is the intellectual skills related to the acquisition and application of knowledge. It ranges from basic recall to complex synthesis. It is the hardware of learning where logical processing occurs.

The level of learners' cognitive learning in mathematics in terms of knowledge, analysis and problem solving was treated statistically using mean and standard deviation.

Table 8 presents the level of learners' cognitive learning in mathematics in terms of knowledge, including the distribution of scores with their corresponding frequency, percentage, and descriptive remarks.

Table 8. Level of Learners' Cognitive Learning in Mathematics in terms of Knowledge

Scores	Frequency	Percentage	Descriptive Equivalent
17-20	39	46.43%	Excellent
13-16	11	13.10%	Very Good
9-12	15	17.86%	Satisfactory
5-8	19	22.62%	Needs Improvement
1-4	0	0.00%	Unsatisfactory
Total	84	100%	

Weighted Mean =14.11
SD=4.63
Descriptive Equivalent = Very Good

The results revealed that most students show a significant amount of understanding in math. Approximately 46.43 percent of the students scored between 17-20, which is considered excellent, while 13.1 percent scored between 13 and 16, indicating a very good result. 17.86% of students achieved a satisfactory score (9-12), while 22.62% are in need of improvement (5-8). See below for a breakdown of how each student performed. No student earned a score between 1-4 (unsatisfactory), which means that all students displayed at least a basic grasp of mathematics.

The overall mean score attributed to students (14.11) along with the standard deviation (4.63) implies that the students' level of knowledge overall is "very good". The mean score indicates an average understanding of fundamental mathematical concepts, but the standard deviation is on the high side compared to the actual mean score. This indicates the level of understanding among students varies.

In summary, while there may be some students who require additional support in math, the majority of students appear to demonstrate adequate knowledge. Since no student earned an unsatisfactory score, most students are in an acceptable range of knowledge; however, the variability in scores identifies that no one is performing equally and that continued instructional support will be needed to address each student's individual learning needs.

Table 9. Level of Learners' Cognitive Learning in Mathematics in terms of Analysis

Scores	Frequency	Percentage	Descriptive Equivalent
17-20	36	42.86%	Excellent
13-16	19	22.62%	Very Good
9-12	14	16.67%	Satisfactory
5-8	15	17.86%	Needs Improvement
1-4	0	0.00%	Unsatisfactory
Total	84	100%	

Weighted Mean =14.26
SD=4.52
Descriptive Equivalent = Very Good

Table 9 presents the level of learners' cognitive learning in mathematics in terms of analysis. The results revealed that 42.86% of students scored in the excellent range (17-20), demonstrating strong analytical skills in probability. An additional 22.62% scored in the very good range (13-16), while 16.67% achieved satisfactory scores (9-12). However, 17.86% of students scored in the needs improvement range (5-8), indicating challenges in analytical reasoning. No student scored in the unsatisfactory range (1-4), suggesting that all students possess at least basic analytical capabilities.

The overall weighted mean score was 14.26 with a standard deviation of 4.52, interpreted as "Very Good." This indicates that students, on average, demonstrate above-average analytical skills in mathematics, though performance variability remains evident.

Table 10. Level of Learners' Cognitive Learning in Mathematics in terms of Problem Solving

Scores	Frequency	Percentage	Descriptive Equivalent
17-20	37	44.05%	Excellent
13-16	16	19.05%	Very Good
9-12	18	21.43%	Satisfactory
5-8	13	15.48%	Needs Improvement
1-4	0	0.00%	Unsatisfactory
Total	84	100%	

Weighted Mean =14.33
SD=4.46
Descriptive Equivalent = Very Good

Table 10 presents the level of learners' cognitive learning in mathematics in terms of problem solving. The results revealed that 44.05% of students scored in the excellent range (17-20), demonstrating strong problem-solving abilities in probability. An additional 19.05% scored in the very good range (13-16), while 21.43% achieved satisfactory scores (9-12). However, 15.48% of students scored in the needs improvement range (5-8), indicating challenges in applying mathematical concepts to solve problems. No student scored in the unsatisfactory range (1-4), suggesting that all students possess at least basic problem-solving capabilities.

The overall weighted mean score was 14.33 with a standard deviation of 4.46, interpreted as "Very Good." This indicates that students, on average, demonstrate strong problem-solving skills in mathematics, with the majority of students performing at satisfactory levels or above.

Test of Significant Relationship between Specific Differentiated Instructional Strategies and the Value-Based Aspect of Learning in Mathematics

To test the significant relationship between specific differentiated instructional strategies and the value-based aspect of learning in mathematics in terms of learner's attitude, motivation and interest, was treated statistically using Jamovi 2.3.28 using the Pearson correlation coefficient.

Table 11 presents the relationship between specific differentiated instructional strategies and the value-based aspect of learning in mathematics, particularly learners'

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attitude, motivation, and interest, using the Pearson correlation coefficient.

Table 11. Specific Differentiated Instructional Strategies and the Value-Based Aspect of Learning in Mathematics

Specific Differentiated Instructional Strategies	Value-Based Aspect of Learning in Mathematics		
	Learners Attitude	Motivation	Interest
Flexible Grouping:			
Pearson Correlation	0.56***	0.15	-0.04
Significance(2-Tailed)	<.001	0.168	0.728
N	84	84	84
Tiered Assignments:			
Pearson Correlation	0.82***	0.15	0.12
Significance(2-Tailed)	<.001	0.188	0.293
N	84	84	84
Learners Situation:			
Pearson Correlation	0.44***	0.06	0.11
Significance(2-Tailed)	<.001	0.581	0.304
N	84	84	84
Compacting:			
Pearson Correlation	0.50***	0.14	0.24*
Significance(2-Tailed)	<.001	0.194	0.029
N	84	84	84

Note: *p<.05, ** p<.01, ***p<.001

Results revealed a strong correlation between different instructional strategies and value-based aspect of learning, but a limited correlation between instructional strategies and motivation and interest. Flexible grouping created moderate positive correlations to learner attitudes (r=0.56, p<0.001), indicating that the combination of variable grouping strategies provides a more favorable attitude toward mathematics; however, there was no statistically significant correlation to learner motivation (r=0.15, p=0.168), and there was a statistically significant negative correlation to learner interest (r=-0.04, p=0.728).

Tiered assignments had very high positive correlations with learner attitude (r=0.82, p<0.001), indicating that tailored tasks based on student readiness increase the likelihood of a positive attitude towards learning mathematics. However, there were no statistically significant correlations between tiered assignments and learner motivation (r=0.15, p=0.188) and learner interest (r=0.12, p=0.293).

With regard to the learners' situation, the correlation to learner attitude (r=0.44, p<0.001) demonstrated a moderate positive relationship between individual context and learner attitude. However, there was no statistically significant correlation between the learners' situation and learner motivation (r=0.06, p=0.581) and interest (r=0.11, p=0.304).

Learners' attitudes are positively and moderately correlated with compacting, indicating it's an adjustment strategy that enhances students' attitudes, while its relationship with motivation is not significant. However, there is a weak but significant positive correlation between compacting and interest which indicates that compacting may marginally increase students' interest in exchanging mathematics.

In summary, specific differentiated teaching strategies have a greater correlation to learners' attitude than motivation and interest. The majority of the differentiated strategies are significantly positively correlated with learners' attitude. In relation to motivation and interest, there are a much lower level of significant positive correlations. Thus, it may be concluded that there are effective differentiated instruction strategies to create a positive feeling about mathematics, but there are likely to need to be other strategies implemented in order to have a significantly improved level of motivation and interest in mathematics.

Test of Significant Effect between Differentiated Instructional Strategies on the Cognitive Domain of Learning in Mathematics

The significant effect of differentiated instructional strategies on the cognitive domain of learning in mathematics in terms of knowledge, analysis and problem solving was treated statistically using Real Statistics Data Analysis Tools using multiple regression analysis.

A multiple regression analysis was conducted to determine whether differentiated instructional strategies in terms of flexible grouping, tiered assignments, learners' situation, and compacting could significantly predict students' cognitive domain of learning in mathematics.

The overall significance of the regression model was determined by performing an analysis of variance (ANOVA) on the data collected from the participants.

The results from the individual analysis of the differentiated instructional strategies show that there are no significant predictors (in terms of the students developing knowledge) for any of the instructional strategies used in this analysis, specifically, flexible grouping (B = -0.18, t = -0.30), tiered assignments (B = 0.03, t = 0.04), student grouping (B = -0.17, t = -0.29), and compacting (B = -0.02, t = -0.02) based on these results, the p-values were all greater than .05 meaning the results are not statistically significant (meaning that they do not predict changes in students' mathematical knowledge).

Table 12. Regression Analysis on the Effect of Differentiated Instructional Strategies on the Cognitive Domain of Learning in Mathematics

	Unstandardized Coefficients		**t-value**	**Sig.**
	B	Std. Error		
Learners' Attitude				
(Constant)	5.43	2.83	1.92	0.059
Flexible Grouping	-0.18	0.60	-0.30	0.762
Tiered Assignments	0.03	0.75	0.04	0.967
Learners Situation	-0.17	0.57	-0.29	0.772
Compacting	-0.02	0.77	-0.02	0.983
Motivation				
(Constant)	4.92	2.61	1.88	0.063
Flexible Grouping	-0.52	0.55	-0.95	0.344
Tiered Assignments	0.46	0.69	0.67	0.503
Learners Situation	0.13	0.52	0.25	0.803
Compacting	-0.28	0.71	-0.39	0.697
Interest				
(Constant)	4.85	2.58	1.88	0.063
Flexible Grouping	-0.52	0.54	-0.96	0.342
Tiered Assignments	0.44	0.68	0.64	0.522
Learners Situation	0.15	0.52	0.28	0.777
Compacting	-0.26	0.70	-0.37	0.716

This means that differentiated instructional strategies, as reviewed in the research study, have not provided a significant effect on students' cognitive development of knowledge, including knowledge of mathematics however, they may have an instructional impact on some of the other aspects of student learning and do not appear to correlate with students' acquisition of mathematics knowledge; therefore, it is likely that other factors outside of differentiated instructional strategies may have a larger impact on determining whether students acquire mathematical knowledge.

The regression analysis on the effect of differentiated instructional strategies on students' cognitive learning in terms of analysis. The ANOVA results revealed that the regression model was not statistically significant, $F(4,79)=0.25$, $p=0.907$, indicating that the combination of differentiated instructional strategies does not significantly predict students' analytical skills in mathematics. Additionally, the individual coefficients for all four predictors were not statistically significant: flexible grouping ($B=-0.52$, $t=-0.95$, $p=0.344$), tiered assignments ($B=0.46$, $t=0.67$, $p=0.503$), learners' situation ($B=0.13$, $t=0.25$, $p=0.803$), and compacting ($B=-0.28$, $t=-0.39$, $p=0.697$).

These findings suggest that while differentiated instructional strategies may enhance student engagement and attitudes, they do not independently predict students' analytical capabilities in mathematics. This implies that developing analytical skills may require more targeted instructional approaches that explicitly focus on reasoning, pattern recognition, and critical evaluation of mathematical relationships.

The regression analysis on the effect of differentiated instructional strategies on students' cognitive learning in terms of problem solving. The ANOVA results revealed that the regression model was not statistically significant, $F(4,79)=0.25$, $p=0.907$, indicating that the combination of differentiated instructional strategies does not significantly predict students' problem-solving abilities in mathematics. Furthermore, the individual coefficients for all four predictors were not statistically significant: flexible grouping ($B=-0.52$, $t=-0.96$, $p=0.342$), tiered assignments ($B=0.44$, $t=0.64$, $p=0.522$), learners' situation ($B=0.15$, $t=0.28$, $p=0.777$), and compacting ($B=-0.26$, $t=-0.37$, $p=0.716$).

These findings suggest that while differentiated instructional strategies may create a supportive learning environment, they do not independently predict students' problem-solving capabilities in mathematics. This implies that effective problem-solving may require explicit instruction in heuristics, metacognitive strategies, and opportunities for productive struggle that go beyond the implementation of differentiated strategies.

Taken together, the results of the multiple regression analysis across the three cognitive domains demonstrate a consistent and clear finding: differentiated instructional strategies do not significantly predict students' cognitive learning outcomes in mathematics. For all three domains, the overall regression models were non-significant ($p = 0.984$ for knowledge; $p = 0.907$ for both analysis and problem solving), and none of the individual predictors (flexible grouping, tiered assignments, learners' situation, and compacting) reached statistical significance, with all p-values exceeding 0.05. The coefficients were either negative or near-zero, indicating that differentiation alone neither improves nor reliably predicts cognitive performance.

This consistency across three distinct cognitive levels suggests that while differentiated instruction may be highly effective for fostering positive attitudes, motivation, interest, and an inclusive classroom environment, its impact on cognitive development is limited. The findings imply that cognitive outcomes such as acquiring mathematical knowledge, applying analytical reasoning, and solving complex problems are influenced by factors beyond differentiation. These factors may include prior knowledge, explicit cognitive strategy instruction, metacognitive skills, deliberate practice, and opportunities for productive struggle elements that are not automatically embedded in differentiated approaches.

The alignment of these results with the works of Alt (2023) and Heacox (2018) further strengthens the conclusion that differentiation, while valuable, is not a standalone solution for cognitive achievement. Instead, a dual instructional model is recommended: one that uses differentiation to address learner diversity and affective outcomes, while simultaneously integrating explicit instruction in reasoning, heuristics, metacognition, and problem-solving processes to develop higher-order cognitive skills. Future research should explore how these two instructional approaches can be effectively combined and identify other key predictors of cognitive learning in mathematics.

IV. Conclusion and Recommendations

A significant relationship exists between differentiated instructional strategies and learners' attitude, but not with motivation and interest. Therefore, the null hypothesis is rejected for attitude but failed to be rejected for motivation and interest. This indicates that differentiated instruction effectively shapes students' attitudes toward mathematics but may not independently influence their motivation or interest.

Differentiated instructional strategies do not significantly affect learners' knowledge, analysis, or problem-solving skills. Therefore, we failed to reject the null hypothesis. This suggests that cognitive development in mathematics requires instructional approaches beyond differentiation, such as explicit cognitive strategy instruction.

Based on the findings and conclusions of the study, the following recommendations are offered:

School Heads may provide targeted professional development on how to implement flexible grouping and learner centered situational strategies more effectively.

Teachers may enhance the consistent use of flexible grouping and strengthen attention to learners' situation by ensuring that groups are intentionally matched to specific learning objectives and making more deliberate connections between mathematics lessons and students' individual interest and real life experiences.

Students may take greater initiative in expressing their learning preferences and sharing personal interests to help teachers tailor instruction more meaningfully.

Future Researchers may include additional variables influencing cognitive outcomes, use qualitative research

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methods to gain deeper insights and employ a larger scope or broader sample size for generalizable findings.

REFERENCE

[1]. Alt, D. (2023),. Gamification and student engagement in mathematics: A sustained interest study. Journal of Educational Technology Systems, 51(3),, 345-362.https://www.researchgate.net/publication/375867085_Student's_Engagement_and_Perception_of_Gamification_in_Mathematics

[2]. De Guzman, M. G. (2020),. Assessment of learning outcomes in the Philippine basic education curriculum. Rex Book Store. https://www.scribd.com/document/537663800/Modules-in-Assessment-in-Learning-1-for-PRI

[3]. Heacox, D. (2018),. Differentiation in middle and high school: Strategies to engage all learners. ASCD. ISBN-13: 978-1416626121 https://www.researchgate.net/publication/327390961_Differentiation_in_middle_and_high_school_Strategies_to_engage_all_learners