



International Journal of Research Publication and Reviews

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

Meeting the Needs of Learners in Elementary Schools: The Effectiveness of Differentiated Instruction

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ABSTRACT

This research focused on the effectiveness of differentiated instruction in meeting the diverse academic needs of students at elementary schools.

It particularly established the extent of differentiated instruction that is actually practiced in heterogeneous elementary classrooms in terms of instructional strategies and activities; and materials. Further, established the extent of differentiated instruction on the academic achievement of students in elementary schools in terms of level of engagement and assessment.

In addition, it established the strong relationship between differentiated instruction and student proficiency; the strong impact of differentiated instruction practices on students' proficiency. Moreover, this study identified the common problems encountered in applying differentiated instruction and the students' proficiency, and the intervention that would apply to address the problem. This research employed descriptive correlation research design in analyzing from the 330 respondents who were subjected to the quantitative approach with random sampling method.

Based on the result, the quantitative data indicated that the examined elements of differentiated instruction specifically teaching strategies and resources do not exhibit a statistically significant effect on student performance as measured by assessments.

These contrasting results highlight the complication of the research problem and suggest that future research should focus on identifying effective forms of differentiated instruction that can adapt to diverse student needs, integrating qualitative insights and broader variables that contribute to academic success. The challenges highlighted in the current study reaffirm the necessity for ongoing exploration and adaptation in instructional practices, fostering a more holistic understanding of student learning dynamics.

INTRODUCTION

Meeting the demands of students who hold diverse cultural, linguistic, and cognitive backgrounds has increasingly been a challenge educators face nowadays. Such conditions make the common teaching approaches or methods incapable of addressing these diversities. A student's participation, their understanding, or the quality of performance they offer can often remain divergent within a single learning class. That is why many schools aim to provide fair schooling to students across diverse groups based on individual demand by adapting and meeting their different requirements, hence adopting differentiated teaching.

Findings show that students in classrooms that implement differentiated instruction have better engagement, motivation, and academic performance, especially students with special learning needs. The study emphasizes the necessity of differentiated instruction in providing inclusive and equitable learning environments and provides practical suggestions for incorporating it into day-to-day teaching practice to better support all students independent of their learning style (Blessing, 2024).

This research investigated how differentiated instruction influences different aspects of learning in various elementary school contexts by conducting a thorough review of the literature, observations conducted in the classroom, and empirical data. In doing so, it will give educators the valuable information on how to best support an inclusive learning environment through an assessment of how well these teaching strategies close the achievement gaps between students from different backgrounds and skill levels.

The success of differentiated education depends on how it is implemented. Research often fails to analyze nuancedly the exact elements of differentiated instruction that are successful or unsuccessful. There is no clear idea of which differentiated instruction models and tactics are relatively more effective than others when used in different classroom contexts.

Statement of the Problem

"Meeting the Needs of Learners in Elementary Schools: The Effectiveness of Differentiated Instruction" is the title of a research study that aims to provide answers to a number of important questions regarding the application and effects of differentiated instruction.

Particularly, this research aimed to respond to the following questions:

1. What is the extent of differentiated instruction currently practiced in heterogeneous elementary school classrooms in terms of instructional strategies and activities; and resources?
2. What is the extent of differentiated instruction on students' academic performance in elementary schools in terms of level of engagement and assessment?
3. Is there a significant correlation between differentiated instruction and student's proficiency?
4. Does differentiated instruction have a significant impact on proficiency of students?

Theoretical Framework

A thorough knowledge of how diversified instruction can successfully meet the requirements of diverse learners is provided by the theoretical framework, which incorporates these theories. It is important to adjust training to developmental and contextual circumstances, according to constructivist and sociocultural perspectives. Constructivist learning theory stresses the importance of active, learner-centered education, in which students develop critical thinking skills, solve problems, and build upon their prior knowledge (Jumaah, 2024).

Multiple teaching strategies are required to approach a variety of learners, in line with Gardner's Multiple Intelligences Theory. Winandar (2023) outlined the multiple intelligences need to be used as this intelligence provides training and also helps in formulating problems and means of making decisions.

Differentiated Instruction Theory by Tomlinson offers useful tactics for putting these ideas into practice, and UDL and Bloom's Taxonomy give frameworks for creating and evaluating educational experiences. Differentiated instruction aims to enhance engagement, comprehension, and academic performance across diverse student populations (Blessing, 2024).

METHODOLOGY

The research design, study location, study participants, sampling strategy, survey instrument, data collection procedure, and statistical methods used in the study were all provided in this chapter.

Research Design

Quantitative data were gathered, analyzed, and subsequently. Distribution of surveys questionnaires were done. Descriptive analysis was utilized to gather, present, review, and analyze the data from the student responses in order to collect, present, review, and analyze the data. To determine how closely the two variables were correlated, this study used correlation analysis to further examine the results (Narjes, 2023).

Locale of the Study

The researchers conducted the study in selected schools within 3rd Congressional District of North Cotabato, SOCCSKSARGEN Region, Philippines.

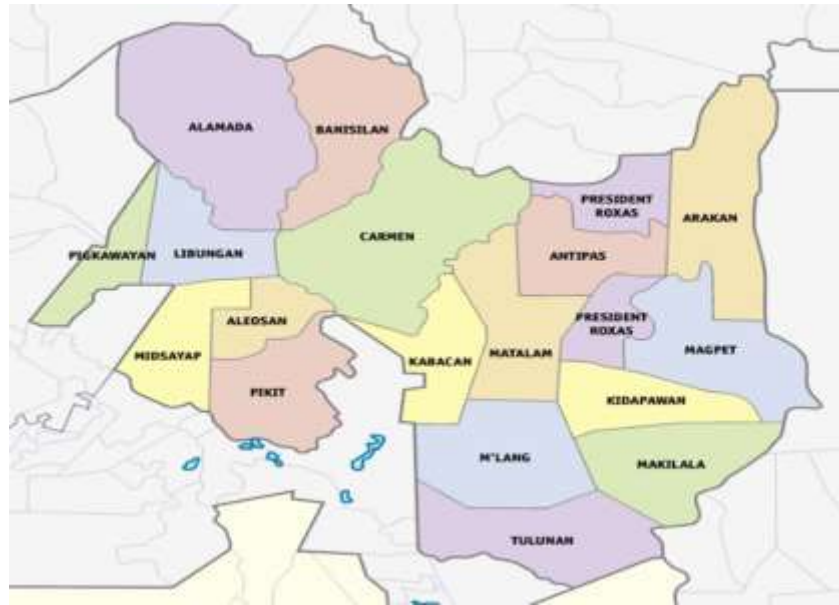


Fig. 2 Map showing the location of the study. (https://commons.wikimedia.org/wiki/File:Map_of_Cotabato_provinces_with_municipalities.svg)

South 6° 43' 52" N, North 7° 40' 51" N, West 124° 19' 23" E, East 125° 18' 53" E. Lowest elevation - 500m, Highest elevation 2928, Land/Water: coast, lakes (Hellerick, 2013).

Respondents of the Study

The respondents of the study were the selected elementary teachers who are teaching in Makilala Central E.S., Lanao Central E.S., Kidapawan City Pilot E.S., Felipe Suerte E.S., Kabacan E.S. and Matalam Central E.S. of 3rd Congressional District of North Cotabato, SOCCSKSARGEN Region, Philippines.

Table 1. Respondents from the Makilala Central E.S., Lanao Central E.S., Kidapawan City Pilot E.S., Felipe Suerte E.S., Kabacan E.S., and Matalam Central E.S.

| Cotabato Congressional District | Population Size (N) | Sample Size (n) |
|---------------------------------|---------------------|-----------------|
| Kabacan Central ES | 400 | 71 |
| Lanao Central ES | 60 | 11 |
| Kidapawan City Pilot ES | 581 | 101 |
| Makilala Central ES | 250 | 44 |
| Felipe Suerte ES | 300 | 53 |
| Matalam Central ES | 281 | 50 |
| Total | 1,872 | 330 |

Sampling Design

To choose the study's respondents, the researchers utilized basic random sampling, which involved drawing lots (Mishal, 2024). For purposes of ensuring accuracy and uniformity of the findings, this methodology provides every single elementary teacher within the population a fair opportunity for selection in the survey. The researcher applied Slovin's formula to determine both the population size and the sample size. To determine the population proportions and the sample size, the following formula for computation Slovin's formula was also used (Slovin, 1960).

Data Gathering Procedure

The researchers wrote a letter to the school principal stating the aim of carrying out this study in the process of gathering data for the factors to be covered in it. Further, it mentioned getting permission from the concerned respondents to gather data, detailing the aims of the study. The researchers proceeded to sent the questionnaires to the respondents after obtaining authorization. This process facilitated the fast gathering of data for interpretation.

Research Instruments

For independent and dependent variables of the study, the researchers employed a self-constructed questionnaire. Here, a printed survey questionnaire was employed which was distributed to the respondents during each room visit.

Data Analysis

Descriptive analysis like obtaining the weighted mean and frequency count was applied in summarizing, analyzing, and calculating the data to assess the level of differentiated Instruction based on teaching strategies and activities; and resources on the student's proficiency.

Pearson Product Moment correlation coefficient was utilized to determine whether there was any correlation between the variables introduced.

However, Multiple Linear Regression Analysis was employed to determine the study's significant indicators (Pearson, 1948).

Ethical Consideration

Participants were properly informed of the nature of the research, objectives, and research methods. Informed consent forms were provided and signed before they could participate. Voluntary participation was stressed, and participants have the right to withdraw at any time without penalty. All data gathered during the research (e.g., questionnaires, interviews) were not disclosed. Identifying information was anonymized so that participants cannot be traced back to certain data.

Data analysis was sensitive to the diverse backgrounds of the participants, ensuring that results are not skewed to favor any particular group. Any findings that may indicate ineffective practices or areas for improvement were used constructively, with the goal of enhancing educational strategies for future use.

RESULT AND DISCUSSION

This part of the study gives the discussions encompassing the actual data gathered about differentiated instruction and students' proficiency in elementary schools.

Differentiated Instruction in Diverse Elementary School

The first research problem focused on the level of differentiated instruction implemented in diverse elementary school classrooms in terms of teaching strategies and activities; and resources.

Teaching Strategies and Activities

Table 1 indicates the degree of differentiated instruction on the basis of teaching strategy and activities received a total weighted mean of 4.01 respectively. The finding suggests that differentiated instruction was practiced good with some room for improvement to address the various needs of the elementary learners. Each learner will be provided the level of challenge and support they need for learning as a result of these strategies.

The findings agree with the assertion of Berber (2021) that differentiation may be recognized as arranging teaching activities using different methods and techniques (e.g., centers, stations, layered instruction, learning agenda, learning contract, complex instruction) and taking into account the general principles of differentiation, learning content, process, and product, as well as students' readiness, interests and learning styles.

Table 4. Level of differentiated instruction implemented in diverse elementary school classrooms in terms of teaching strategies and activities.

| A. Teaching Strategies and Activities | Mean | Description |
|--|-------------|------------------------|
| 1. Differentiated instruction enabling teachers to adapt their lessons to students with different skill levels; hence, it may come along with techniques such as tiered assignments, . | 3.95 | Often available |
| 2. Encouraging cooperation and increasing student involvement, teachers can implement flexible grouping, in which students work with various classmates according to task needs. | 4.04 | Often available |
| 3. Regular using of formative assessments aids in directing activity differentiation, guaranteeing that students receive focused assistance or enrichment. | 4.01 | Often available |
| 4. Diverse learning styles are addressed and pupils are kept motivated by offering a variety of learning activities, such as tactile, visual, and aural options. | 4.11 | Often available |
| 5. All students can benefit from scaffolding, which includes dividing work into smaller, more manageable chunks and offering graphic organizers, as it allows them to gradually develop their knowledge and abilities. | 3.94 | Often available |
| Weighted Mean | 3.95 | Often available |

Scale:

| | | |
|--------------|--------------|--------------------|
| <i>Level</i> | <i>Range</i> | <i>Description</i> |
|--------------|--------------|--------------------|

| | | |
|---|-----------|-------------------------------|
| 5 | 4.21-5.00 | <i>Always available</i> |
| 4 | 3.41-4.20 | <i>Often available</i> |
| 3 | 2.61-3.40 | <i>Sometimes Available</i> |
| 2 | 1.81-2.60 | <i>Occasionally available</i> |
| 1 | 1.00-1.80 | <i>Never available</i> |

Resources

Table 2 illustrates the extent of differentiated instruction used in heterogeneous elementary school classrooms in the aspect of teaching resources and received a total weighted mean of 4.00 respectively. The finding reflects that elementary school teachers tend to use various teaching materials to stimulate pupils with various learning styles and capabilities.

The materials used in differentiated instruction are well chosen and modified to accommodate the various needs of elementary school children rather than being consistent. This method ensures easier accessibility and stimulates participation by offering resources and approaches that support personal progress.

Moreover, Vacalares (2024) proposed that teachers should have a moderate level of proficiency in applying differentiated instructional practices. It emphasizes the significance of supportive learning environments, ongoing professional development, and access to required resources for fostering academic achievement.

Table 3. Level of differentiated instruction implemented in diverse elementary school classrooms in terms of teaching resources.

| B. Resources | Mean | Description |
|--|-------------|------------------------|
| 1. Using various resources such as digital and non-digital tools, textbooks, multimedia resources, and others. The differentiated instruction targets diverse needs of learners and their learning preferences. | 4.03 | Often available |
| 2. In order to ensure that all students are provided with adequate access to the subject, teachers can provide resources in various levels of difficulty, for example, leveled reading materials or tailored worksheets. | 3.95 | Often available |
| 3. Kinesthetic and visual learners take to differentiated instruction best. It utilizes visual aids, manipulatives, and hands-on materials. | 4.01 | Often available |
| 4. Interactive websites and instructional applications are some of the technology resources that can offer personalized learning experiences. This will enable students to focus on their weak areas and move at their own pace. | 4.07 | Often available |
| 5. The teacher can choose several supplementary resources, such as podcasts, articles, and videos, to present different perspectives and facilitate better understanding of the topic for the students. | 3.95 | Often available |
| Weighted Mean | 4.00 | Often available |

Scale:

| Level | Range | Description |
|-------|-----------|-------------------------------|
| 5 | 4.21-5.00 | <i>Always available</i> |
| 4 | 3.41-4.20 | <i>Often available</i> |
| 3 | 2.61-3.40 | <i>Sometimes Available</i> |
| 2 | 1.81-2.60 | <i>Occasionally available</i> |
| 1 | 1.00-1.80 | <i>Never available</i> |

Overall Mean of Differentiated Instruction

Table 4 shows the mean extent of differentiated instruction in terms of teaching strategies and activities; and resources with a grand mean of 4.005, indicating as often available. It indicates that teaching strategies and activities have the highest weighted mean of 4.01, and it is followed by resources with 4.00 respectively.

The implications are that in differentiated instruction, materials are chosen and tailored specifically to cater to the varied needs of elementary students, while teaching strategies and activities are made flexible

The results conform to the statement of Ariyanti (2020) that differentiated instructional strategies in contemporary education address students' heterogeneity of learning needs by acknowledging their unique capacities, interests, and difficulties. Individualized strategies are used to maximize academic development and achievement, adapting instruction to meet different learning styles, interests, and levels of readiness. This strategy supports inclusive and active learning settings in which all students can succeed. Embracing equity, student agency, and individualized support, differentiated instructional techniques optimize overall learning performance, equipping each learner with the tools needed to reach their full potential.

Table 4. Overall Mean of Differentiated Instruction

| Differentiated Instruction | Weighted Mean | Description |
|------------------------------------|---------------|------------------------|
| Teaching Strategies and Activities | 4.01 | Often available |
| Resources | 4.00 | Often available |
| Grand Mean | 4.005 | Often available |

Scale:

| Level | Range | Description |
|-------|-----------|------------------------|
| 5 | 4.21-5.00 | Always available |
| 4 | 3.41-4.20 | Often available |
| 3 | 2.61-3.40 | Sometimes available |
| 2 | 1.81-2.60 | Occasionally available |
| 1 | 1.00-1.80 | Never available |

Differentiated Instruction on Students' Academic Performance

The second research problem focused on the level of students' academic performance in elementary schools in terms of engagement level and assessment.

Engagement Level

Table 5 shows that the extent of students' academic performance in elementary schools in terms of engagement recorded a combined weighted mean of 4.01 respectively. Outcomes stressed that extent of students' academic performance in elementary schools in terms of level of engagement are very satisfactory or proficient. Enhancing student engagement in elementary school classrooms through differentiated instruction has a positive effect on students' academic performance. Differentiated instruction creates a more productive and engaging climate by addressing multiple learning needs and offering multiple student-centered approaches.

Furthermore, one of the most important elements of this individualization is the adaptation of learning to learners' characteristics. (Lindner, 2020). In this regard, differentiated and personalized learning becomes more pertinent to ensure that all learners are able to access education based on their needs and potential (Gheysens, 2022).

Table 5. Level of students' academic performance in elementary schools in terms of engagement level.

| A. Engagement Level | Mean | Description |
|--|------|-------------------|
| 1. Students who have mastered the engagement skill tend to be participative in classes and shows high motivation, curiosity, and attention toward the topics and thus result in deeper learning and retention. | 4.03 | Very satisfactory |
| 2. Highly engaged students are characterized by high levels of passion and effort, often going beyond the call of duty to delve deeper into subjects and establish personal connections with the content. | 3.99 | Very satisfactory |

| | | |
|--|-------------|--------------------------|
| 3. Concentration, active participation in class discussions and use of skills independently would imply that a student had acquired or learned the important ideas, hence is displaying proficiencies of engagement. | 4.03 | Very satisfactory |
| 4. Students who are good at engagement control their learning by asking thoughtful questions, searching for other resources, and cooperating with peers for better understanding. | 4.01 | Very satisfactory |
| 5. Both the level of a student's reflective thinking and active participation in class activities provided a measure for making judgments regarding competence in engagement, and they reflect that students are not simply completing assignments but rather actively engaging with material at a critical level. | 3.99 | Very satisfactory |
| Weighted Mean | 4.01 | Very satisfactory |

Scale:

| Level | Range | Description |
|-------|-----------|-------------------|
| 5 | 4.21-5.00 | Outstanding |
| 4 | 3.41-4.20 | Very satisfactory |
| 3 | 2.61-3.40 | Satisfactory |
| 2 | 1.81-2.60 | Fair |
| 1 | 1.00-1.80 | Unsatisfactory |

Assessment

Table 6 indicates that the degree of students' academic achievement in elementary schools in terms of testing with a total weighted mean of 4.04 respectively. Findings indicate that the degree of students' academic achievement in elementary schools in terms of testing are very satisfactory or proficient. By employing varied, equitable, and personalized assessment methods, differentiated instruction influences student performance. Besides responding to a diverse student population, these practices promote a deeper and more precise understanding of student growth, which enhances academic achievement in elementary schools.

Moreover, teachers concur that teachers ought to research, discover and develop solutions based on the process from student needs assessment to identification, analysis and hierarchy of learning and teaching objectives, and subsequently to differentiated lesson design and implementation, evaluation and redesign based on the student needs (Stavrou, 2016).

Koutselini (2016) refers to the fact that if teachers make a distinction in content, process, products, or the learning environment, using continuous assessment and flexible grouping ensures this is an effective method of instruction.

Table 6. Level of students' academic performance in elementary schools in terms of assessment.

| B. Assessment | Mean | Description |
|---|------|-------------------|
| 1. Periodic formative and summative assessments show whether students have successfully learned the lessons through demonstrating understanding of the relevant learning objectives: Students who master assessment are ones who demonstrate significant ideas and concepts and skills at relevant times. | 4.03 | Very satisfactory |
| 2. Students who score well on tests can apply their knowledge in a variety of settings, demonstrating their ability to solve problems, make connections, and adapt to new situations. | 4.05 | Very satisfactory |
| 3. In addition to being able to assess themselves, students must also be able to have self-assess, identify areas of development, and make concrete improvements to their learning through practice and reflection. | 4.12 | Very satisfactory |
| 4. A good result in the evaluation does not only reveal the right answers but also shows an understanding of the mechanisms that work beneath them, which makes the pupils defend and explain their arguments. | 3.99 | Very satisfactory |

| | | |
|--|-------------|--------------------------|
| 5. Students who perform well on the assessment have a growth mindset and make use of positive feedback to improve their performance, as well as resilience in dealing with challenges. | 4.02 | Very satisfactory |
| Weighted Mean | 4.04 | Very satisfactory |

Scale:

| Level | Range | Description |
|-------|-----------|-------------------|
| 5 | 4.21-5.00 | Outstanding |
| 4 | 3.41-4.20 | Very satisfactory |
| 3 | 2.61-3.40 | Satisfactory |
| 2 | 1.81-2.60 | Fair |
| 1 | 1.00-1.80 | Unsatisfactory |

Overall Mean Level of Students' Academic Performance

Table 7 illustrates the grand mean level of proficiency seen in terms of assessment and engagement level with a grand mean of 4.01, which is very satisfactory or proficient. It indicates that assessment have the highest weighted mean of 4.04, and then comes engagement level with 4.01 respectively.

The efficiency of differentiated instruction with elementary students largely depends on the assessment type and how frequently it is utilized. Learning-based and personalized assessments usually benefit the students by imparting great value to their instructors by shedding insight into what they have comprehended or made progress with.

The results imply that teachers must utilize a variety of assessment strategies to meet the various learning styles and abilities, like formative evaluations, project evaluations, and self-evaluations. Through these, teachers will be able to have a more complete picture of student learning and make informed teaching decisions, hence resulting in better differentiated instruction and student achievement.

Table 7. Overall Mean of Level Students Proficiency

| Students' Academic Performance | Weighted Mean | Description |
|--------------------------------|---------------|--------------------------|
| Engagement Level | 4.01 | Very satisfactory |
| Assessment | 4.04 | Very satisfactory |
| Grand Mean | 4.01 | Very satisfactory |

Scale:

| Level | Range | Description |
|-------|-----------|-------------------|
| 5 | 4.21-5.00 | Outstanding |
| 4 | 3.41-4.20 | Very satisfactory |
| 3 | 2.61-3.40 | Satisfactory |
| 2 | 1.81-2.60 | Fair |
| 1 | 1.00-1.80 | Unsatisfactory |

Relationship of the Differentiated Instruction and Students' Performance

The third research question centered on differentiated instruction (i.e., instructional strategies and resources) and its association with students' performance along two dimensions: level of engagement and assessment.

Teaching Strategies and Activities on Engagement Level

The correlation coefficient is 0.021 with a probability of 0.698. This shows a very weak positive relationship between students' engagement levels and teaching strategies/activities. A high value of the probability (0.698) indicates that the correlation should be rejected, i.e., we cannot accept that teaching strategies are significantly affecting levels of engagement.

The findings demonstrate a "very weak positive correlation" (0.021, $p=0.698$) between teaching strategies/activities and student engagement levels. This suggests that the specific methods employed may have minimal influence on how engaged students feel in the learning process. The high probability

value (0.698) indicates that this relationship is statistically insignificant. This result invites reflection on the nature of the teaching strategies employed. They may not be sufficiently engaging or tailored to meet the diverse needs of students, thus failing to elicit a meaningful increase in engagement.

Furthermore, in support of the statement Hastomo (2024) concluded that student engagement in academic and classroom activities is a key predictor of successful learning. To achieve academic success, students must actively participate in learning activities, focusing on emotional, behavioral, and cognitive aspects. Engaging students involves investing time and effort in activities that align with the school's goals, encouraging them to participate.

Teaching Strategies and Activities on Assessment

The correlation coefficient is -0.017 with a probability of 0.748. This indicates a practically negligible negative correlation, which means that there is no significant relationship between teaching strategies/activities and students' assessment performance. The extremely high probability value (0.748) also supports this lack of significance.

Similarly, the correlation of teaching strategies/activities with student assessment performance is negligible (-0.017, $p=0.748$). This negative correlation, though very small, raises important questions about the effectiveness of the chosen instructional methods relative to student outcomes. The lack of a significant association indicates that merely adopting a variety of teaching strategies does not guarantee improved assessment results. This could imply that the quality of instruction (how methodologies are implemented) may be more critical than the methods themselves.

A substitute assessment is an approach centered around the learner in which emphasis is placed on the extent of application of knowledge and skills to life, considering individual characteristics of students (Caliskan, 2010). One of the methods of substitute assessment, which is differentiated assessment, is the method presented in this study for dealing with mixed-ability and multiple learning styles. Differentiation is a result of assumptions regarding differences between learners (Algozzine, 2007), such as background, characteristics, learning style, needs, preferences, interests, and abilities. The instructor's role, thus, has increased in a variety of ways to cater to these diversities.

In order to make sure the needs of differentiated learners are addressed, teachers have the duties to plan strategically to reach specified standards (Suprayogi, 2017). One of the duties is to implement the principle of differentiation in the practice of teaching and learning (Gregory, 2013). Differentiation in assessment is an alternative assessment approach which tries to deal with differences among students. Again and again, research has established that students differ not only by characteristics and background, but also by learning capacities, styles, preferences, needs, adult support, experience, and interests (Algozzine, 2007). Differentiated assessment thus offers such students flexibility in the development of skills, knowledge acquisition levels, and assessment types presumed by them (Varsavsky, 2013). Recent research that had the same idea also focuses on the necessity to change teaching and learning practices towards information and technology-based innovation (Anggraeni, 2018). When teaching and learning practices are changed, how learners are evaluated should also come along with it.

Resources on Engagement Level

The coefficient of correlation is 0.349 and the probability is 0.021. This is a moderate positive relationship between resource usage and student levels of engagement. The value of probability 0.021 shows that this is statistically significant on the 0.05 level, implying that efficient use of resources has more engagement among the students.

Conversely, the analysis reveals a "moderate positive correlation" (0.349, $p=0.021$) between the use of resources and student engagement levels. This statistically significant relationship confirms that when students are provided with appropriate resources—be they technological, physical materials, or informational support—they tend to be more engaged. This finding aligns with established literature that highlights the role of engaging materials and resources in fostering a dynamic learning environment. It suggests that educational contexts that prioritize resource availability and utilization are likely to yield higher levels of student participation and interest.

Differentiated instruction is the process of discovering the individual learning styles of every learner and then tailoring training to meet their needs (Gregory, 2017). Differentiating instruction involves "shaking up" the practices in the classroom to provide learners with more chances to take in information, make sense of it, and communicate what they have learned (Bender, 2017). In other words, differentiated instruction provides separate avenues for knowledge learning, concept processing or sense-making, and product creation, maximizing learning accomplishments for each learner (Sprenger, 2018).

Resources on Assessment

The correlation coefficient is 0.032 with a probability of 0.554. This indicates a very weak positive correlation between resources and student assessment performance. The high probability value (0.554) indicates that the correlation should be rejected.

However, significant degree of relation was noted between resources and students' level of engagement. This means that the more the resources are available in teaching the higher the level of engagement of the students.

The integration of technology and visual aids in education is often praised for its ability to enhance learning experiences. However, the practical aspects of such adoption must be critically examined. The assumption that technology is easily accessible and cost-effective for all educational environments is not always realistic. In contexts where resources are limited, the financial burden of procuring, implementing, and maintaining technology can be significant. Such costs may make it difficult for underfunded schools to adopt these tools, potentially exacerbating existing educational disparities rather than alleviating them (Selwyn, 2012).

Table 8 Correlation matrix showing the relationship of the differentiated instruction and students' performance.

| <i>Spearman Rho</i> | | | |
|------------------------------------|-------------|------------------|------------|
| Differentiated Instruction | | Engagement Level | Assessment |
| Teaching strategies and activities | Cor. Coef. | 0.021 | -0.017 |
| | Probability | 0.698 | 0.748 |
| Resources | Cor. Coef. | 0.349* | 0.032 |
| | Probability | 0.021 | 0.554 |

**Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level.

Overall, the findings collectively underscore the importance of “differentiated instruction”, specifically regarding resources, in promoting student engagement while simultaneously pointing to a complex and perhaps indirect relationship with student assessment performance. While effective resource utilization is impactful, the results challenge educators and researchers to look beyond traditional teaching strategies and consider a broader set of influences affecting student performance outcomes.

Shao (2024) suggested that by incorporating assessment into teaching, teachers can adapt their teaching strategies more flexibly to address the diverse needs of students, realizing a student-centered education model in the end. It establishes a theoretical foundation and provides practical recommendations to support the integration of teaching-learning-assessment in primary classrooms.

Influence of the Differentiated Instruction and Students' Performance Differentiated Instruction on Students' Engagement Level

The findings shown in Table 9 display the impact of differentiated instruction on students' performance, more so in terms of level of engagement. The results are as follows:

The intercept is 3.701, the standard error of which is 0.310. t-value = 11.922 and p-value (probability) = 0.000. It shows that the constant is significant statistically ($p < 0.05$) and presents the baseline level of participation if all other variables equal zero.

The constant term (intercept) of 3.701, which is highly statistically significant ($p < 0.001$), establishes a foundational level of engagement. This implies that, when considering all predictor variables at zero, students still exhibit a baseline level of engagement in the educational environment. Its high t-value (11.922) supports a strong confidence in this baseline.

Teaching Strategies and Activities

The coefficient (β) for teaching strategies and activities is 0.023, with a standard error of 0.051. The t-value is 0.459, and the probability is 0.646. This indicates that this variable does not have a statistically significant effect on students' engagement levels ($p > 0.05$). In practical terms, this suggests that the specific teaching strategies and activities employed in the differentiated instruction may not significantly impact student engagement.

The coefficient for teaching strategies and activities is positive but not statistically significant ($\beta = 0.023$; $p = 0.646$). This reveals that even though the variable is positively correlated with engagement, the lack of significance suggests that the methods used in differentiated instruction may not be the most critical factor influencing student engagement. This could indicate that while these strategies have their value, the impact may be more nuanced or context-dependent, and that educators should explore which specific strategies might be more effective.

Resources

The coefficient (β) for resources is 0.154, with a standard error of 0.054. The t-value is 2.852, and the probability is 0.029. This indicates that the availability or quality of resources does have a statistically significant positive effect on students' engagement levels ($p < 0.05$). Specifically, for every one-unit increase in the resources, students' engagement level increases by 0.154 units.

The positive and statistically significant effect of resources ($\beta = 0.154$; $p = 0.029$) highlights the crucial role that availability and quality of resources play in enhancing student engagement. This finding suggests that investing in educational materials, tools, and facilities could be a more fruitful approach to improving engagement levels among students. The tangible support afforded by quality resources can stimulate engagement more effectively than the strategies or activities alone.

The R-squared (R^2) value is 0.030, indicating that only 3.0% of the variance in student engagement levels can be explained by the model, which suggests that other factors not included in the model may also significantly affect engagement.

The R-squared value of 0.030 indicates that the model accounts for only 3% of the variance in student engagement and 97% of the variables are not found in the model of the study. This low percentage underscores a limitation: while the model identifies resources as a significant contributor, the majority of

variance in engagement remains unexplained. This implies that other factors, such as student motivation, socio-economic background, teacher-student interactions, classroom dynamics, or emotional support, might also play crucial roles in shaping engagement, and should be considered in future research.

The F-value of 2.569, with an associated probability of 0.032, suggests that the overall model is statistically significant, meaning that at least one predictor (in this case, resources) significantly contributes to the model in explaining engagement.

The significant F-value (2.569; $p = 0.032$) reassures us that the model as a whole is meaningful, affirming that at least one predictor, specifically resources, contributes to understanding engagement.

Table 9. Influence of the differentiated instruction on the students' performance in terms of engagement level.

| Differentiated Instruction | Coef. β | Std. Error | t – value | Probability |
|--|---------------|------------|-----------|-------------|
| (Constants) | 3.701 | 0.310 | 11.922 | 0.000 |
| Teaching strategies and activities | 0.023 | 0.051 | 0.459 | 0.646 |
| Resources | 0.154 | 0.054 | 2.852 | 0.029* |
| R ² = 0.030 F – Value = 2.569 | | | | |

Probability = 0.032*

* = Significant at 5% level.

Overall, the analysis suggests that while differentiated instruction shows potential for improving student engagement, the key driver appears to be the resources available rather than the teaching strategies and activities employed. It encourages a focus on ensuring sufficient quality resources as a priority for educators aiming to boost student engagement. Simultaneously, it highlights the necessity for further exploration into other influential factors that could clarify and enhance our understanding of student engagement within differentiated instruction frameworks. This is crucial for creating effective and responsive educational environments that truly engage students in their learning.

Differentiated Instruction on Students' Assessment

The findings presented in Table 10 gives an overview of the effect of differentiated instruction on student performance as assessed through tests. It gives valuable information regarding the efficacy of differentiated instruction in upgrading student performance as assessed through tests. The interpretation of the different components shows a number of key points that need further investigation and discussion. Following is the interpretation of the different components:

The constant (intercept) is 3.851, which represents the estimated mean score of student performance when all predictors are equal to zero.

The coefficient for "Teaching strategies and activities" is 0.007. This suggests that this variable has a very minimal positive effect on student performance, but the effect is almost negligible given its small value.

The coefficient for "Resources" is 0.041, indicating a slightly higher positive effect compared to teaching strategies and activities, but still minimal.

The analysis reveals that the constant (intercept) is 3.851, establishing a baseline average student performance score when predictors are absent. The coefficients for "Teaching strategies and activities" (0.007) and "Resources" (0.041) imply a slight positive effect on performance; however, the magnitude of these effects is so small that they may be regarded as practically negligible. This minimal impact raises questions about the types of teaching strategies and resources implemented. It is possible that the strategies used were not sufficiently robust or varied to yield a more substantial impact. Educators may need to consider alternative approaches or adaptations of existing strategies to enhance their effectiveness.

The standard error for each of the coefficients represents the average distance between the estimated values and the actual value. The standard errors in this case (0.051 for teaching strategies and 0.054 for resources) are quite large relative to the coefficients, suggesting that these estimates might not be very accurate.

The standard errors associated with the coefficients (0.051 for teaching strategies and 0.054 for resources) indicate a considerable degree of uncertainty in the estimates. If the standard errors are large relative to coefficient values, this can lead to imprecise interpretations of the effects. It suggests that the data may exhibit high variability and that other unaccounted factors could significantly influence student performance. Future research could benefit from a more extensive dataset or refined measurement techniques to deliver more precise estimates of the impact of differentiated instruction.

The t-value is a measure of how many standard errors the coefficient is away from zero. For "Teaching strategies and activities," the t-value is 0.134, and for "Resources," it is 0.755. Both of these are very low and indicate a weak relationship with student performance.

The t-values for both predictors are notably low (0.134 for "Teaching strategies and activities" and 0.755 for "Resources"), indicating that neither predictor is markedly different from zero. This lack of statistical significance suggests that the elements of differentiated instruction assessed in this study do not demonstrate a substantial relationship with student performance. These findings prompt a reconsideration of the effectiveness of the specific instructional strategies employed and may signal the need for enhanced professional development for educators in applying differentiated instruction.

The p-value for "Teaching strategies and activities" is 0.894, and for "Resources" it is 0.450. Both p-values are much higher than the common significance level of 0.05, indicating that neither of these factors significantly predicts student performance. This suggests that differentiated instruction in the form of these specific teaching strategies and resources does not have a statistically significant impact on assessment outcomes.

Both predictors yield high p-values (0.894 for "Teaching strategies and activities" and 0.450 for "Resources"), indicative of a failure to reach statistical significance at the conventional threshold ($p < 0.05$). These findings imply that the variables do not meaningfully predict student performance in assessments. The implications of these results may indicate that the particular measures of differentiated instruction evaluated in this research lack the necessary components to elicit a measurable improvement in student outcomes, emphasizing the need for additional or different variables in future studies.

The R^2 value is 0.020, meaning that only 2% of the variance in student performance can be explained by the model with these predictors (teaching strategies and resources) and 98% of the variation are not found in the context of the study. This indicates a poor fit for the model, as very little of the variability in performance is accounted for by the chosen variables.

The F-value of 0.899 along with a corresponding probability of 0.343 (ns) indicates that the overall model does not provide a significant improvement in predicting student performance compared to a model with no predictors. It suggests that the combination of differentiated instruction strategies tested has little to no effect.

The R^2 value of 0.020 is strikingly low, signifying that only 2% of the variance in student performance can be explained by the chosen predictors. This poor fit suggests that the model is inadequately capturing the complexities of student performance and that many other variables, such as teacher experience, student engagement, home environment, or socio-economic status, could be influencing outcomes. Furthermore, the F-value of 0.899, alongside a non-significant probability of 0.343, indicates that the model does not significantly improve upon a baseline model with no predictors. Such data compel educators and researchers to identify additional factors that could contribute to students' success in assessments.

Table 10 Influence of the differentiated instruction on the students' performance in terms of **assessment**.

| Differentiated Instruction | Coef. β | Std. Error | t – value | Probability |
|------------------------------------|---------------|----------------------------------|-----------|-------------|
| (Constants) | 3.851 | 0.310 | 12.417 | 0.000 |
| Teaching strategies and activities | 0.007 | 0.051 | 0.134 | 0.894 |
| Resources | 0.041 | 0.054 | 0.755 | 0.450 |
| $R^2 = 0.020$ | | F – Value = 0.899 | | |
| Probability = 0.343 ^{ns} | | ^{ns} = Not Significant. | | |

In summary, the findings indicate that the examined elements of differentiated instruction—specifically teaching strategies and resources—do not exhibit a statistically significant effect on student performance as measured by assessments. The implications of this analysis are profound; educational practitioners may need to explore various other strategies, interventions, or contextual factors that influence learning outcomes. Future research should focus on identifying effective forms of differentiated instruction that can adapt to diverse student needs, integrating qualitative insights and broader variables that contribute to academic success.