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The Art of Inclusivity in Teaching: Mathematics Teachers' Knowledge and Implementation of Differentiated Instruction

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Abstract

Addressing diversity in the classroom is one of the challenges that mathematics teachers face in preparing their daily lessons. Through differentiated instruction, teachers can bridge the gap and address students' diverse needs, eventually leading to the appreciation and application of mathematical concepts in their own lives. In this study, the researcher aimed to determine the level of knowledge of mathematics teachers on differentiated instruction and the extent of implementation of differentiated instruction in terms of content, process, and output; the significant difference in the level of knowledge of mathematics teachers on differentiated instruction when analyzed according to their demographic characteristics; the significant relationship between the level of knowledge of mathematics teachers and the extent of its implementation; the approaches applied in differentiated instruction by mathematics teachers in teaching mathematical concepts to achieve learning inclusivity, and how it enhances mastery of mathematical concepts. A sequential explanatory approach was used in this study. The respondents were the fifty-four secondary mathematics teachers from Arakan, North Cotabato., teaching junior or senior high school or both. Descriptive and Inferential statistics were employed to analyze the quantitative data, while thematic analysis was utilized for the qualitative data. The findings revealed that mathematics teachers have a high level of knowledge of differentiated instruction, and they implemented it to a high extent. Content was found to have a significant difference in terms of rank. Differentiated instruction deepened the learned topics, encouraged interactions in class, and developed higher-order thinking skills which helped improve students' mastery of the concepts.

Keywords: inclusivity, differentiated instruction, content, process, output

Background of the Study

A classroom is composed of diverse learners. Each has different learning needs that a teacher has always to consider. Mathematics learning can be fun when mathematical concepts are delivered to the level of learning of the students. This can be done by employing different activities that suit the needs of every learner. Eventually, this leads to the appreciation and application of mathematical concepts in their own lives.

In the same vein, differentiated instruction in mathematics allowed learners to make sense of the situation as they engaged in mathematical reasoning for knowledge construction, as revealed by the findings of Krishan and Al-rsa'i (2023). This is crucial as they are geared towards mathematical literacy (Ng, 2023). Hence, there is a need for teachers to apply scaffolding in teaching (McNeill & Polly, 2023) as learners have varied needs, abilities, and achievement levels (Bal, 2023).

Looking into the Philippine setting, differentiated instruction played a crucial role in basic reading (Suson et al., 2020). Likewise, Malacapay (2019) confirmed that there is a dire need to consider the learning preferences of the students for them to have a profound understanding of mathematical activities. It was found from the study of Tambaoan and Gaylo (2019), that differentiated instruction increased students' academic achievement and engagement since it also benefits students who struggle in mathematics, particularly in answering the fundamental operations (Aguhayon, et al., 2023).

Though inclusivity has been observed by teachers in the four corners of the classroom, there is still a dire need to explore this topic, especially among mathematics teachers in the local setting. Related studies on differentiated instruction are anchored on the utilization of digital video games (Hayak & Avidov-Ungar, 2020; Bang et al., 2023; Estaiteyeh & DeCoito, 2023), its influence on the academic performance of university students in mathematics (Rudhumbu & Dziva, 2023), and in addressing learning gaps (Aguhayon et al., 2023). Thus, a need to further explore this study.

Eventually, this research can contribute to a better understanding of how teachers reflect their learners' growth as they implement differentiated instruction. This may provide strategies for teachers' overall development in providing quality and inclusive education. Knowing the knowledge of teachers on differentiated instruction can have an impact on the delivery of mathematical concepts to students.

Statement of the Problem

This study aimed to determine the knowledge and the extent of implementation of mathematics teachers on differentiated instruction. Specifically, it sought answers to the following research questions:

1. What is the level of knowledge of mathematics teachers on differentiated instruction in terms of content, process, and output?
2. What is the extent of implementation of differentiated instruction in terms of terms of content, process, and output?
3. Is there a significant difference in the level of knowledge of mathematics teachers on differentiated instruction when analyzed according to their demographic characteristics?
4. Is there a significant relationship between the level of knowledge of mathematics teachers on differentiated instruction and the extent of its implementation?
5. How do mathematics teachers apply differentiated instruction in teaching mathematical concepts to achieve learning inclusivity?
6. How does differentiated instruction enhance mastery of mathematical concepts?

Method Used

This study employed the mixed methods research design (Ivankova et al., 2006), particularly the sequential explanatory approach. In this study, the researcher first described the level of knowledge of the respondents on differentiated instruction as well as the extent of its implementation. Findings were tested using statistical tools where a significant difference and relationship in their responses were taken. On the contrary, the researcher conducted in-depth interviews with the mathematics teacher participants. A phenomenological approach was undertaken. Data was collected through open-ended questions.

Sources of Data

Primary data was the main source of this research. The two types of data such as quantitative and qualitative data were considered. The quantitative data were taken from the responses of the respondents to the questionnaire, and the qualitative data were sourced through in-depth interviews.

Data Gathering Instrument

The data-gathering instrument is important in the explanation of the problem. In this study, the researcher first utilized the survey questionnaire which was modified from the study of Whipple (2012). This was used in the gathering of the quantitative data. The first part of the questionnaire requested the demographic characteristics of the respondents such as the grade level/s taught, highest educational qualification, rank, and years of teaching mathematics. The second and third parts of the questionnaire dealt with the level of knowledge of mathematics teachers on differentiated instruction, and the extent of their implementation, respectively. It was divided into three (3) indicators: content, process, and output. The respondents' responses were interpreted using the Likert Scale with the following descriptions: 1- very low, 2- low, 3- moderately low, 4- moderately high, 5- high, and 6- very high.

Likewise, interview guide questions were used in the gathering of the qualitative data. It involved sets of questions that were asked to the informants during the interview. The interview was done through the utilization of an audio recorder to ensure that all narratives could clearly explain the findings of the study. Aside from that, this was crucial for the transcription of the data.

Population and Sampling Technique

The researcher employed a complete enumeration of the fifty - four (54) mathematics teachers in the three districts of Arakan: East, North, and West, handling high school mathematics classes (in junior and/or senior high school) with bachelor's degrees in mathematics.

Meanwhile, criterion-based purposive sampling was utilized in the selection of the five (5) informants, where they have to be junior/senior high school mathematics teachers; and had at least 10 years of experience in teaching mathematics.

Statistical Treatment

The following statistical treatments were applied in this study. Descriptive statistics was employed to determine the level of knowledge of mathematics teachers on differentiated instruction and the extent of its implementation. Inferential statistics specifically the Analysis of Variance (ANOVA) was utilized to test the significant difference between the demographic characteristics and knowledge of mathematics teachers on differentiated instruction. Another statistical tool that was utilized was the Pearson Product Moment Correlation to investigate whether there is a significant relationship between the knowledge of teachers on differentiated instruction and the extent of their implementation.

Data Analysis

In analyzing the qualitative data, thematic analysis was used. Specifically, this study utilized the six-phase guide of Braun and Clarke (2006) which was a very useful framework for conducting this kind of analysis. Firstly, the researcher became familiar with the collected data. Secondly, initial codes were generated, and then themes were identified. Next, identified themes were reviewed whether this worked in the context of the entire data set or needed to be modified or developed. Meanwhile, the global, organizing, and basic themes were defined. Lastly, the researcher wrote an analysis of the results and their implications.

Level of Knowledge of Mathematics Teachers on Differentiated Instruction

The first research question provided the answer to the level of knowledge of mathematics teachers on differentiated instruction in terms of content, process, and output as presented in Table 1.

Table 1

Level of Knowledge of Mathematics Teachers on Differentiated Instruction

Indicator	Mean	Description
Content	4.98	High
Process	5.04	High
Output	4.95	High
Overall mean	4.99	High

Legend:

1.00 – 1.82 – Very Low

1.83 – 2.65 – Low

2.66 – 3.48 – Moderately Low

3.49 – 4.31 – Moderately High

4.32 – 5.14 – High

5.15 – 6.00 – Very High

It can be seen from the table that the mean for each indicator: content, process, and output, are 4.98, 5.04, and 4.95 respectively, which were described as high. The overall mean of 4.99 indicated the high level of knowledge of mathematics teachers on differentiated instruction.

The result implied that teachers understand the diversity of learners in presenting the content of the lessons. Teachers know how to differentiate instruction which enables the students to understand even the most complicated mathematical problems. In addition, they are well-articulated with the process which in turn is shared with their students. Furthermore, it showed that the teachers' varied activities lead to making students output at a high level of excellence.

In differentiated instruction, teachers know well the diversity of the learners. Therefore, teachers need to have a strong foundation of different approaches that accommodate these differences. It only indicates that every learner is important to be given equal opportunities. In addition, it stimulated a positive outlook among students which may help them to get acquainted with different skills important for their future educational endeavors (Meutstege et al., 2023).

Extent of the Implementation of Differentiated Instruction

The second research question determined mathematics teachers' extent of implementation of differentiated instruction in terms of content, process, and output as presented in Table 2.

Table 2

Extent of the Implementation of Differentiated Instruction

Indicator	Mean	Description
Content	4.90	High Extent
Process	4.93	High Extent
Output	4.89	High Extent
Overall mean	4.91	High Extent

Legend:

1.00 – 1.82 – Very Low Extent
1.83 – 2.65 – Low Extent
2.66 – 3.48 – Moderately Low Extent
3.49 – 4.31 – Moderately High Extent
4.32 – 5.14 – High Extent
5.15 – 6.00 – Very High Extent

From the table, it was shown that the extent of implementation of mathematics teachers in the three indicators: content, process, and output each had a mean of 4.90, 4.93, and 4.89 respectively. Each indicator was implemented to a high extent. The overall mean (4.91) entailed that mathematics teachers highly observed and implemented differentiated instruction in their respective mathematics classes.

The result implied that differentiated instruction has been the catalyst for bringing students with the vastness of opportunities to leverage their skills in mathematics. Despite the challenges in the planning and preparation for successful implementation, teachers showed great commitment to addressing the individual needs, capabilities, preferences, and intelligences of students inside the classroom. This is an indication that when teachers practice differentiated instructions in teaching mathematics, they can be certain that learning happens.

Tomlinson (2014) noted that learners need a learning experience that guides them to explore the content of the program, which includes activities that lead learners to meaningful learning, to reach their knowledge/thoughts, and also to reflect and demonstrate what they learn. In this context, differentiated instruction stands out as an important factor that meets the needs and interests of all learners (Smale-Jacobse et al., 2019). Adjusting teaching methods to accommodate student learning preferences helps to increase student motivation and performance (Macalapay, 2019).

Significant Difference in the Level of Knowledge of Mathematics Teachers on Differentiated Instruction when Analyzed according to their Demographic Characteristics

The third research question elaborated on the significant difference in the level of knowledge of mathematics teachers on differentiated instruction when analyzed according to their demographic characteristics in terms of grade level taught (Table 3.1), rank (Table 3.2), and years of teaching mathematics (Table 3.3).

Table 3.1

Significant Difference in the Level of Knowledge of Mathematics Teachers on Differentiated Instruction in Terms of Grade Level Taught

Source of Variations	Sum of Squares	Mean Square	df	p-value	Remarks
Content	3.436	0.430	8	0.142	Not Significant
Process	3.896	0.487	8	0.064	Not Significant
Output	2.970	0.371	8	0.426	Not Significant

The remarks of the analysis showed that there existed no significant difference in the level of knowledge of mathematics teachers on differentiated instruction when analyzed according to their demographic characteristics in terms of the grade level taught since the p-value of each variation is higher than the 0.05 level of significance. This rejected the hypothesis of the study. This implied that regardless of the grade level taught, mathematics teachers employed differentiated instructions. In the same vein, this can be associated with the mere fact that differentiated instruction has proven to be effective in carrying students' concerns toward learning.

Every teacher is unique because each employs varied activities that caters to the needs of their learners. In the context of differentiated instruction, teachers implement similar pedagogical practices (Gibbs, 2023). This consistency provides a more cohesive and aligned educational experience for every learner regardless of their grade levels. As such, they adopted a more holistic approach to training benefiting them at all paces of their teaching careers (Rudhumbu & Dziva, 2023).

Table 3.2

Significant Difference in the Level of Knowledge of Mathematics Teachers on Differentiated Instruction in Terms of Rank

Source of Variations	Sum of Squares	Mean Square	df	p-value	Remarks
Content	2.694	0.673	4	0.046	Significant
Process	1.795	0.449	4	0.163	Not Significant
Output	1.525	0.381	4	0.387	Not Significant

Among the sources of variation, content indicates a significant difference with a p-value of 0.046. This accepted the hypothesis of the study. However, process and output showed no significant difference with their p-values at 0.163 and 0.387 respectively. This implied that when analyzed

according to their demographic characteristics in terms of rank, the level of knowledge of mathematics teachers in terms of content differs; however, they have the same level of knowledge of differentiated instruction in terms of process and output.

Content concurs with the most important aspect of teaching. The higher the rank of teachers explains their wider perspectives about the subject matter. Rank indicates teachers' prowess in teaching the concept of mathematics which leads to students' understanding. Furthermore, the rank implied that they have been applying the same concepts of differentiated instruction and have known students' backgrounds especially those who struggled in learning mathematics.

In consonance with the findings of Zahra et al. (2023), teachers in different ranks may have varying levels of familiarity and competence regarding their adaptation to the curriculum. Some of them know how to modify the instructional materials, adjust to the pacing of learning, and incorporate different learning resources. Teachers in higher-ranking positions were mostly expected to understand different strategies because of the opportunities provided before them (Grecu, 2023).

Table 3.3

Significant Difference in the Level of Knowledge of Mathematics Teachers on Differentiated Instruction in Terms of Years of Teaching Mathematics

Source of Variations	Sum of Squares	Mean Square	df	p-value	Remarks
Content	5.776	0.321	18	0.324	Not Significant
Process	4.655	0.259	18	0.579	Not Significant
Output	6.772	0.376	18	0.424	Not Significant

The result showed that there is no significant difference with the sources of variations since their p-value is higher than the 0.05 level of significance. This means that the hypothesis of the study was rejected. This implied that regardless of their years of teaching mathematics, these teachers manifested their exemplary contribution in honing the students' mathematical capabilities. They ensured that the content, process, and output were applied in different approaches wherein they did not settle for a single one which made lessons too boring and less effective to students.

The years of teaching may not be the direct dimension that may affect the ability of teachers to influence students. In the application of differentiated instruction, teachers regardless of how new and old they are in the profession possess different approaches (Padmore & Ali, 2024). Conversely, the study of Suprayogi et al. (2023) revealed that years of teaching played a significant role in the delivery of the content of the lesson

Significant Relationship Between the Level of Knowledge of Mathematics Teachers on Differentiated Instruction and the Extent of its Implementation

The significant relationship between the level of knowledge of mathematics teachers on differentiated instruction and the extent of its implementation provided the answer to research question four as presented in Table 4.

Table 4

Significant Relationship Between the Level of Knowledge of Mathematics Teachers on Differentiated Instruction and the Extent of its Implementation

Variable	r-value	p-value	Remarks	Interpretations
Content	0.722	0.000	Significant	High Relationship
Process	0.796	0.000	Significant	High Relationship
Output	0.789	0.000	Significant	High Relationship

Legend:

Below ± 0.20 – Negligible Relationship

± 0.21 - ± 0.40 – Low Relationship

± 0.41 - ± 0.70 – Moderate Relationship

± 0.70 - ± 0.90 – High Relationship

± 0.91 - ± 1.00 – Very High Relationship

It can be seen from the table that there is a high relationship between the level of knowledge of mathematics teachers on differentiated instruction and the extent of its implementation. Their p-value of 0.000 indicated a significant relationship between the variables. This led to the acceptance of the hypothesis. It means that the increase in the level of knowledge on differentiated instruction has a corresponding increase in the extent of its implementation. It mirrored teachers' highest regard toward pedagogy where they provided different approaches in making mathematical concepts easy for the students to understand. Furthermore, this confirmed their undying commitment to making their lessons and activities suited to the needs of their diverse learners.

Correspondingly, teachers with higher levels of knowledge on differentiated instruction can introduce and implement the bodies of knowledge in their classrooms. Therefore, it was suggested that teachers have to invest in improving their knowledge to become successful in the implementation of

differentiated instructional strategies in mathematics. As well, there is a need to provide them with continuous learning opportunities that may deepen their knowledge. In this manner, they could refine their skills in differentiated instruction (Fanzeka et al., 2023; Qorib, 2024).

Approaches Applied in Differentiated Instruction by Mathematics Teachers in Teaching Mathematical Concepts to Achieve Learning Inclusivity

The fifth research question identified the themes of the approaches applied in differentiated instruction by mathematics teachers in teaching mathematical concepts to achieve learning inclusivity. Its global theme, organizing theme, and basic themes are presented in Table 5.

Table 5

Approaches Applied in Differentiated Instruction by Mathematics Teachers in Teaching Mathematical Concepts to Achieve Learning Inclusivity

Global Theme	Organizing Themes	Basic Themes
Approaches in Applying Differentiated Instructions in Terms of Content, Process, and Output to Achieve Learning Inclusivity	Conducting Pretest	The teacher determines students' abilities prior to the integration of differentiated instruction in mathematics.
	Giving of Formative Assessments	The teacher utilizes an approach based on the needs of the students.
		The teacher considers the abilities of the student when giving the assessments.
	Utilizing Contextualized Worksheets	The teacher contextualized the materials to be used by the students.
	Applying the Real-World Context	The teacher applies the context of the lesson in the real word setting.

Conducting Pretest. Differentiated instruction begins with understanding students' diverse starting points. The pretest helped identify the range of prior knowledge and skills among students, allowing teachers to recognize individual differences. The pretest results informed teachers about students' readiness levels, learning preferences, and strengths and weaknesses in mathematical concepts. With this information, teachers can contextualize their instruction to meet the diverse needs of each learner.

This organizing theme aligned with the statements of Informant 1. She affirmed that:

"Before I begin my lesson, I conducted a pretest to determine their capacity and abilities as students." (Informant 1)

The same context was shared by Informant 2. She stated that:

"I based it on the results of the assessments. I also assess their abilities through observation, diagnostic assessment, and based on the previous tasks given." (Informant 2)

Based on the pretest results, teachers can differentiate content delivery to meet the diverse needs of students. Pretests set the stage for continuous assessment throughout the instructional period. Teachers can use ongoing assessments to monitor individual progress, adjust instruction, and provide timely feedback to ensure optimal learning outcomes (Hayden et al., 2024). Finally, pretests help prevent misalignment between instruction and students' actual knowledge levels. Without a pretest, there is a risk of assuming a uniform starting point for all students, potentially leading to gaps in understanding or boredom for some students (Simanski, 2023).

Giving of Formative Assessments. To consider inclusivity, the teacher needs to be mindful of the assessments given. Generally, it aimed to provide the needs of the students in learning mathematics. Also, they need to be considerate when giving assessments. Considering student abilities ensured that assessments accurately measure proficiency levels. This approach prevents students from being assessed on content or skills that are beyond their current capabilities.

Teachers indicated in the interview that they considered students' abilities in giving the assessments. According to them, students vary across their classes. Some are fast, while some are slow. Thus, the application of differentiated instruction is necessary.

"*By differentiating activities based on the complexities of the lesson. I provided different activities to fast learners. These are more difficult than the slow learners. Sometimes, I used their mother tongue then the examples provided are those that can be found in their surroundings. These are contextualized for them to relate well".* (Informant 1)

Similarly, teachers provided different activities to students. The purpose is to allow everyone to have the participation in the class. As discussed,

"By giving tiered assignments/activities. Some students have already previous knowledge of the topic and some do not. To make everyone take part, I prepare activities at every level. They will have a self-assessment of their level based on their readiness and understanding." (Informant 2)

For Marlina et al. (2023), formative assessments helped identify specific learning gaps or areas where students may be struggling. In an inclusive setting, this information is crucial for implementing targeted interventions and providing additional support to ensure that all students can access the curriculum. The data from formative assessments can inform the creation of individualized support plans. Teachers can use this information to differentiate instruction, adapting teaching strategies and materials to accommodate different learning preferences and abilities (Adlit & Adlit, 2023).

Utilizing Contextualized Worksheets. Contextualized worksheets can be designed to appeal to different learning styles. Visual learners may benefit from graphics and charts, while auditory learners may find value in accompanying explanations. This approach caters to the diverse needs of students in an inclusive setting. It allows for differentiation based on students' readiness levels. Teachers can adapt to the complexity of questions or provide additional challenges to meet the diverse academic needs of students in the inclusive classroom.

The modification of the activity sheets has been shared by the informant. She articulated that:

"I am using contextualized worksheets/activity sheets. I modified the lesson by providing examples that can be found around them especially their culture which will motivate them to listen. There were students who could barely understand English so I translated the texts into their language for comprehensibility." (Informant 3)

In mathematics, contextualized worksheets bring real-world relevance to the learning materials (Grecu, 2023). This helps engage students by connecting abstract concepts to concrete, meaningful contexts, making the content more relatable and applicable to their lives. The use of contextualized worksheets often leads to increased student engagement. When learners see the practical applications of the concepts they are studying, they are more likely to be motivated and actively participate in the learning process (Johler & Krumsvik, 2022).

Applying the Real-World Context. Real-world contexts make mathematical concepts more relevant to students' lives. Connecting abstract mathematical ideas to practical, everyday situations helps students see the applicability of mathematics in solving real problems. The use of real-world contexts tends to increase student engagement. When students can relate mathematical concepts to situations they encounter in their daily lives, they are more likely to be motivated and interested in learning and applying mathematical principles.

From the transcripts, the informants revealed that:

"In giving performance tasks, I am giving them tasks to create a presentation of the content and application in real life. They have to apply the context of the lesson based on real-world settings and apply it to other learning areas. The student's preferences in this regard matter or their level of understanding." (Informant 2)

As well,

"So, to assess their understanding of the lesson, I am asking them the application of the lesson in their real life. I let them choose tasks that they can perform. I am also giving them enough time to finish their preferred tasks and use rubrics to rate their work." (Informant 5)

Real-world applications in mathematics often increase students' motivation and interest in the subject. When they see the practical implications and real-life significance of mathematical concepts, they are more likely to view mathematics as a valuable and interesting area of study. It contributes to the development of mathematical literacy. Students not only learn mathematical procedures but also gain an understanding of how mathematics is used to make informed decisions in various aspects of life (Bongabong et al., 2023; Malisiova et al., 2023).

Differentiated Instruction in Enhancing Mastery of Mathematical Concepts

The last research question answered the question of how differentiated instruction enhanced mastery of mathematical concepts. Its global theme, organizing theme, and basic themes are presented in Table 6.

Table 6

Differentiated Instruction in Enhancing Mastery of Mathematical Concepts

Global Theme	Organizing Themes	Basic Themes
Differentiated Instruction in Improving Mastery of Concepts	Deepen Learned Topics	The students can master the concepts of the lessons.
	Interactive in Class	The students can express themselves more.
	Develop Higher Order Thinking Skills	The students can actively engage in different mathematical concepts.

Deepen Learned Topics. The mastery of the lesson is the most important factor in mathematical learning. Deepening learned topics through differentiated instruction accommodates diverse learning styles. Visual, auditory, kinesthetic, and tactile learners can explore and internalize mathematical concepts in

ways that suit their individual preferences. Deepening learned topics recognizes and accommodates varied learning paces among students. Differentiated instruction allows students to progress at a pace that suits their individual rates of understanding, ensuring that no one is left behind or held back.

This theme is within the context of the responses of the informants. One of them underscored that:

"Their participation during the activities will lead to a deeper understanding of the topic. Since I am giving them a chance to choose what kind of activity they want, they can explore and become motivated to really perform since they were the ones who chose it." (Informant 1)

In the same vein, an informant stated that:

"Of course, when content is localized based on the needs and interests of every student, they can easily understand the lesson. In short, they can relate to it. It is frustrating on their side if they can barely comprehend the language. Contextualizing it with things found in their community helped them understand." (Informant 3)

In line with this, differentiated instruction encourages self-regulated learning. Students become more aware of their strengths and weaknesses, enabling them to take greater responsibility for their learning and develop effective strategies for deepening their understanding of mathematical concepts (Piticari, 2023). Teachers can assess students' progress regularly and adjust instructional strategies accordingly, ensuring that deepening learned topics remains a dynamic and responsive process (Ojong, 2023).

Interactive in Class. Interactive activities capture students' attention and increase their motivation to participate in the learning process. This heightened engagement is essential for creating a positive and receptive atmosphere conducive to mastering mathematical concepts. Interactive activities allow teachers to customize instruction based on students' readiness levels. Through differentiated approaches, students at different proficiency levels can participate in activities that appropriately challenge and support their understanding of mathematical concepts.

One of the informants stated the result of the utilization of differentiated instruction is the mastery of the concepts resulting in students' active involvement. She said:

"When we differentiate the content of the lesson based on the individual needs and abilities, students could express themselves more. As I said earlier, I used tiered activities to differentiate content. Then, it will, of course, enhance mastery of the concepts since they will work according to their abilities. It will not also make the topic too boring or too difficult since they were the ones to assess as to what level they are in." (Informant 2)

For Informant 3, students learned how to manage the situation which resulted in the mastery of the topic.

"Yes. Differentiated instruction enhances mastery in the way that students will be working based on their abilities. They will learn without any pressure. Then, the varied activities will excite them to explore more about the topic leading to mastery of the concepts." (Informant 3)

Interactive strategies promote peer collaboration (Zhang & Hwang, 2023). Students can work together, share insights, and explain concepts to one another. This collaborative approach supports a deeper mastery of mathematical concepts as students benefit from diverse perspectives and explanations. Similarly, interactive strategies support adaptive learning paths. Teachers can use real-time observations of student engagement and performance to adjust the level of difficulty or provide additional challenges, fitting the learning path to individual needs (Fakoya et al., 2023).

Develop Higher Order Thinking Skills. Differentiated Instruction supports varied learning paths. Students with different readiness levels can navigate through tasks that align with their current understanding. This allows them to progress at their own pace and develop higher-order thinking skills as they tackle more advanced concepts. Differentiated tasks can be designed to encourage students to explore the underlying principles, connections, and applications of concepts, promoting higher-order thinking.

During the course of the interview, it came out that the informant validated this theme.

"Output differentiation means we are giving a chance to the diverse preferences of learners in expressing their understanding of the lesson. In this way, they could develop their higher-order thinking skills since they need to think deeper into the output especially its application in the real-life setting Eventually, they will master the mathematical concepts taught." (Informant 3)

Informant 5 even supported this by saying that:

"Since they were to choose the tasks/output based on their understanding of the topic, they would be able to develop their critical thinking skills as well as the mastery of the given concepts. It will not frustrate them since it will be based on their own abilities. Also, the given rubrics will give them an opportunity to assess themselves." (Informant 5)

Differentiated instruction often involves problem-based learning approaches. As students engage in real-world problem-solving tasks, these not only enhance their mastery of mathematical concepts but also promote the application of higher-order thinking skills. In the same vein, students reflect on their thinking processes, evaluate their understanding, and identify strategies for improvement, contributing to the development of metacognitive and higher-order thinking skills (McLemore, 2023).

Conclusions

Based on the foregoing findings, the researcher concludes that teachers have a strong foundation in differentiated instruction leading to providing instructions that meet the diverse needs of learners. The high extent of implementation concluded that they applied the knowledge in their teaching practices. Teachers' rank was found to be important in having expertise in the delivery of the content of the lesson. Contrariwise, the significant relationship between the variables emphasized the importance of knowledge in driving the effective and widespread application of differentiated instruction during the teaching-learning process. Recognizing inclusivity in the classroom provided the total recognition of individual differences among students as they grasp the bodies of knowledge. Not all students have the same way of learning mathematical concepts; therefore, differentiated instruction increases mastery of the lesson and enriches mathematical proficiency.

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