The Use of Tiered Assignments as Differentiated Instruction in a Multi-Grade Science Classroom

ABSTRACT

Teaching Science in a multi-grade classroom is inherently complex. Pupils are at different grade levels and possess varying degrees of understanding, prior knowledge, and developmental readiness. This study investigated the use of tiered assignments as a method of differentiated instruction in teaching Science within a multi-grade classroom comprising Grade 5 and Grade 6 pupils. Specifically, it aimed to: describe the implementation of tiered assignments in a multi-grade setting; determine their effectiveness in enhancing Science learning; and identify the challenges teachers face in applying differentiated instruction strategies. A mixed-method approach was employed, utilising both quantitative and qualitative techniques. Data collection tools included a pretest and posttest to measure academic progress, teacher-made activities designed to support tiered instruction, and interviews with teachers to gain deeper quantitative insights. Pupil's academic performance was analysed using mean percentage scores and standard deviation, while qualitative data from teacher interviews were examined through thematic analysis. The results revealed a notable increase in pupils' test scores, academic achievement, and engagement following the intervention. The Grade 5 learners achieved a mean score of 19.67**,** resulting in a mean percentage score (MPS) of 78.68%**.** Based on the three-tier system for lower grade levels, this falls under Tier 2**,** indicating that learners were at the developing level. In contrast, the Grade 6 learners obtained a higher mean score of 21.75**,** or 87% MPS**.** Using this tiered approach, the researcher was able to provide differentiated instruction that matched each pupil's readiness level. The variation in pretest scores helped inform this strategy, allowing teachers to give each learner the appropriate level of challenge and support. Based on these findings, the study recommends that schools adopt and consistently implement differentiated instruction and a tiered assignments strategy across various grade levels and expand their application to other subject areas beyond Science. It is also recommended that teachers, particularly those handling multi-grade classrooms, receive targeted training and professional development to effectively design and implement differentiated instruction strategies.

Keywords: *differentiated instruction, tiered assignments, multi-grade*, Teaching Science

1. INTRODUCTION

Multi-grade classes combine pupils of different ages, grade levels, and academic abilities in a single setting, all taught by one teacher. Handling two or more grade levels—such as Grades 1 and 2 or Grades 3 through 6—presents significant challenges because each grade has distinct learning content and complexity. For example, Science lessons in Grade 3 are fundamentally different from those in Grades 4 and 5, making it difficult for teachers to plan instruction that fits all pupils. Recent studies show that science teachers were still adapting to the new curriculum; they needed more time and training to master all the fields and to learn new teaching strategies because it is difficult to teach something in which one does not have the necessary mastery (Malahay, 2021; Grecu, 2023). To address these challenges, differentiated instruction has been introduced as a new teaching approach aimed at adapting learning experiences to the varied needs of pupils. Children who are the same age and come to school together do not necessarily have the same body size, hobbies, personality, likes or dislikes. Their abilities also vary; maybe some already understand a lot of things, but some don't understand anything. They have something different, because children have a lot of different things in them. They are born from different backgrounds, cultures, religions and habits, so that it will greatly affect everything in them. Classes characterised by cultural and linguistic diversity demand a variety of strategies to differentiate teaching so that the diverse and many needs of students can be met (Qorib, 2024; Meriyati et al., 2023). However, despite its introduction, many multi-grade teachers struggle to fully understand and apply the intricacies of differentiated instruction effectively.

Teaching Science in a multi-grade classroom is inherently complex [1]. Pupils are at different grade levels and possess varying degrees of understanding, prior knowledge, and developmental readiness. The role of a Multi-grade teacher is far different from that of a teacher in a mono-grade classroom. It can be challenging for him to deal with differentiated instructions, curriculum management, assessment and grading, classroom organisation and peer interaction (Fatima et al., 2024). As reflected in the experiences of this teacher navigating this complex learning environment. This teacher observed early on that the diverse range of content expectations and developmental readiness among pupils made it difficult to deliver lessons that were both inclusive and effective. For instance, while Grade 5 pupils were being introduced to foundational scientific concepts such as the properties of matter, Grade 6 pupils were expected to tackle more complex topics like ecological systems and environmental interactions. This disparity in learning levels often led to classroom imbalances. Some younger pupils showed signs of confusion and disengagement**,** struggling to keep up with advanced content. Conversely, older or more capable learners appeared unmotivated or disinterested when the material was overly simplified. These observations highlighted the limitations of a traditional, uniform approach to instruction, revealing that the one-lesson-fits-all model was not meeting the needs of all learners**.** These observations became the starting point of this teacher-researcher's journey toward exploring tiered assignments as an approach to differentiated instruction**,** which ultimately led to the conceptualisation of this study.

A key issue was ensuring that all tasks were equally meaningful and aligned with learning goals. Lower-tier tasks often focused on memorisation, while higher tiers promoted deeper thinking, raising concerns about fairness in learning outcomes. Inconsistencies in task design also made assessment difficult. Managing multiple activities within one classroom proved demanding, especially in giving clear instructions, supporting each group, and monitoring progress.

To address this challenge, differentiated instruction has emerged as an important approach. By using methods such as tiered assignments, teachers can adapt lessons to accommodate pupils' diverse abilities, interests, backgrounds, and motivation levels. Differentiated instruction allows teachers to provide appropriate levels of challenge and support for every learner, helping to keep all pupils engaged and progressing [2]. To meet pupils needs teachers use their knowledge of students' readiness, interests, and learning profile to differentiated by modifying four elements: the content(what is being taught), the process (how it is taught), and the product (how pupils demonstrate their learning) and affect/learning environment (how the learning setting responsive) [3].

Recent research supports the effectiveness of differentiated instruction and tiered assignments. Studies have shown that when approaches are properly implemented, particularly in primary and intermediate grades, they lead to improved pupil engagement, higher academic achievement, and more effective classroom management [4]. Additionally, differentiated instruction and tiered assignments enhance teachers' instructional practices and attitudes, promoting professional growth and satisfaction. Teachers who apply differentiated instruction and tiered assignments report better outcomes in terms of both pupil performance and their own confidence in managing diverse learners. Hence, the use of tiered assignments in Science aimed to meet the diverse learning needs of pupils in a multi-grade classroom by aligning tasks with their readiness levels. Activities were based on curriculum topics for both grade 5 and grade 6.

What truly affirmed the effectiveness of this approach was the pupil progress that the teacher observed, not just academically, but in pupils' attitudes toward Science**.** They no longer saw it as a difficult subject, but as an opportunity to explore and understand the world around them. Even pupils who had previously struggled began to participate more actively and expressed interest. These experiences, both the challenges and successes, shaped the direction of this study. They highlighted the need to systematically explore the use of tiered assignments as an approach to differentiated instruction in multi-grade Science classrooms. Hence, this study emerged from firsthand experiences and sought to examine how such an approach impacts pupil engagement, understanding, and performance in a setting characterised by diversity and complexity.

2. MATERIALS AND METHODS

2.1 Research Design

This study employed a mixed-method research design, combining both quantitative and qualitative approaches. The quantitative component focused on determining the significant difference in the scores between the pretest and posttest using prototype and innovative differentiated instruction. The qualitative component involved interviews with multi-grade teachers to gain deeper insights into their instructional practices and perceptions regarding the implementation of differentiated instruction.

2.2 Research Setting and Participants

The research was conducted at Cabangahan Elementary School, specifically involving a multi-grade class comprising Grades 5 and 6. Given the relatively manageable number of participants, the entire group was included in the study.

2.3 Research Instruments

To gather data effectively, the researcher utilised the following instruments:

- Teacher-Made Test: This test consisted of multiple-choice, true-or-false, and fill-in-the-blank items. It was used for both pretest and posttest assessments to evaluate pupils' academic performance before and after the implementation of differentiated instruction strategies.
- Interview Guide: A semi-structured interview guide was prepared and used to gather qualitative data from multi-grade teachers. This helped provide insights into their experiences and challenges with differentiated instruction through tiered assignments.

2.5 Validity and Reliability

To ensure content validity, the teacher-made test and instructional materials were reviewed by subject matter experts. These experts verified that the content aligned with the prescribed learning objectives and was suitable for the learners' grade level. The reliability of the test was ensured through a pilot testing process, and necessary revisions were made prior to the actual administration.

2.6 Data Collection Procedure

1. Pretest Administration: A pretest was administered to all pupil participants prior to the implementation of the differentiated instruction.
2. Instructional Intervention: Prototype and innovative differentiated instruction materials were used in teaching the identified lessons.
3. Posttest Administration: After the instructional intervention, a posttest was conducted to measure learning gains.
4. Teacher Interviews: Multi-grade teachers were interviewed after the instructional period to gather qualitative data regarding their experiences and observations.

2.7 Data Analysis

Quantitative data from the pretest and posttest scores were analysed to determine the significant difference in pupils' performance before and after the use of differentiated instruction. Qualitative data from interviews were thematically analysed to extract relevant themes and insights.

3. RESULTS AND DISCUSSION

Table 1. Mean Scores of Tiered Instruction Participants in the Pretest

Grade Level	Number of participants(N)	Mean Score	Instructional Approach
Grade 5	12	18.50	Prototype
Grade 5	12	19.67	Innovative tier 1- 3
Grade 6	18	18.94	Prototype
Grade 6	18	21.75	Innovative tier 1-2

Table 1 presents the mean scores of tiered instruction participants in the pretest. The pretest consisted of 25 items, with 10 true-or-false and 15 multiple-choice questions, assessing both foundational knowledge and conceptual understanding. The Grade 5 learners achieved a mean score of 19.67**,** resulting in mean percentage score (MPS) of 78.68%**.** Based on the three-tier system for lower grade levels, this falls under Tier 2**,** indicating that learners were at the developing level. This suggests that while they are showing progress and have a fair understanding of the concepts, additional support or targeted interventions may still be needed to move them toward mastery. In contrast, the Grade 6 learners obtained a higher mean score of 21.75**,** or 87% MPS**.** Using the two-tier classification for higher grade levels, this performance is categorised under Tier 1**,** meaning that learners were proficient**.** This demonstrates that most Grade 6 pupils have already achieved the expected level of understanding for the competencies assessed and are ready for more challenging or enrichment tasks. The data suggest that while both groups are progressing well, Grade 5 would benefit from reinforcement activities**,** whereas Grade 6 may proceed to higher-order applications and deeper learning engagements**.**

The greater mean scores among the tiered instruction group suggest that differentiated instruction and tiered assignments may have promoted deeper engagement and allowed learners to access tasks at appropriate levels of challenge.

Table 1a Mean Scores of Participants of Two Groups in Pretest

Group	N	Mean Score	Standard Deviation
Prototype (Grade 5) (Grade 6)	 12 18	 18.50 18.94	 1.90 2.09
Innovative (Grade 5) (Grade 6)	 12 18	 19.67 21.75	 3.14 3.50

As seen in Table 1a, before the implementation of the innovation, a pretest was conducted to assess baseline performance. The results indicated that the pretest scores between the two grade levels were not closely aligned. In the prototype category**,** Grade 5 had a mean score of 18.50 with a standard deviation of 1.90**,** while Grade 6 scored slightly higher with a mean of 18.94 and a standard deviation of 2.09**.** In the prototype category**,** both Grade 5 and Grade 6 pupils showed relatively lower mean scores. This indicates that many pupils were struggling with foundational concepts, and interest and mental ability were not recognised. Hence, teachers support workers, the environment and experts work together to create the best learning environment made by the individualised instructional approach. Also, in this setting, diverse pupils were appreciated for their individual abilities and given chances to exhibit those abilities through a number of assessment methods [5]. In contrast, the innovative category yielded higher mean scores: Grade 5 had a mean of 19.67 (SD = 3.40) and Grade 6 had the highest mean score of 21.75 (SD = 3.50). In the

innovative category**,** pre-test scores were notably higher, especially in Grade 6. This allowed for more focused tier: Tier 1 (On-Level): Even among higher-performing pupils, there were still those who needed consistent practice and occasional reinforcement. These pupils were given tasks that reinforced grade-level objectives but allowed for some choice and independence. Tier 2 (Enrichment Level): The top-performing pupils in this group engaged in enriched tasks, such as designing their own experiments, researching real-world applications, and teaching their peers. This level encouraged deeper critical thinking and creative exploration.

Using this tiered approach, the researcher was able to provide differentiated instruction that matched each pupil's readiness level. The variation in pretest scores helped inform this strategy, allowing teachers to give each learner the appropriate level of challenge and support. Over time, this method contributed to more balanced performance across pupils and encouraged greater engagement, especially among those who might otherwise feel left behind or unchallenged.

Table 2: Mean Scores of Tiered Instruction Participants in the Posttest

Grade Level	Number of participants(N)	Mean Score	Instructional Approach
Grade 5	12	18.50	Prototype
Grade 5	12	19.67	Innovative tier 1- 3
Grade 6	18	18.94	prototype
Grade 6	18	21.75	Innovative tier 1-2

Table 2 presents the mean scores of tiered instruction participants in the posttest. The 30-item posttest included true-or-false, multiple-choice, and fill-in-the-blank questions designed to assess a wide range of cognitive skills. Grade 5 learners obtained a mean score of 22.33**,** translating to a Mean Percentage Score (MPS) of 74.43%**.** According to the three-tier system used for lower grade levels, this falls under Tier 2 (Developing)**,** indicating that the learners have made notable progress and are approaching proficiency. Although not yet fully at mastery level, they are showing strong potential and would benefit from strategic reinforcement of key concepts. In contrast, Grade 6 pupils scored an average of 23.94**,** or 79.8% MPS, which places them in Tier 1 (Proficient) under the two-tier system for higher levels. This reflects a solid understanding of the content and readiness for higher-level tasks or extension activities. Overall, the results show positive posttest performance growth for both groups, with Grade 6 demonstrating mastery and Grade 5 trending upward toward it.

Table 2a Mean Score of Participants of Two Groups in Posttest

Group	N	Mean	Standard Deviation
Prototype			
(Grade 5)	12	21.17	2.6
(Grade 6)	18	21.22	2.7
Innovative			
(Grade 5)	12	22.33	3.32
(Grade 6)	18	23.94	4.09

Table 2 shows the results before and after the intervention. The multi-grade teacher administered a posttest to assess whether there was a measurable improvement in pupils' learning performance in Science. The results revealed that the pupils who received instruction through the innovative, differentiated approach

using tiered assignments achieved higher scores compared to those who were taught using the prototype (traditional) method.

For Grade 5, the group recorded a mean score of 22.33 with a standard deviation of 3.32, whereas the prototype group obtained a lower mean score of 21.17 with a standard deviation of 2.60. Similarly, for Grade 6, pupils in the innovative group achieved a mean score of 23.94 (SD = 4.09), compared to the mean score of 21.22 (SD = 2.70) for those in the prototype group. Based on these summative results, the data show that the multi-grade class of grade 5 and grade 6 pupils retained the information when using tiered assignments during the parallel teaching in Science lessons. These findings indicate a notable improvement in the academic performance of both grade levels after the application of differentiated instruction with tiered assignments. Similar to the idea with Gheyssens et al., differentiated instruction intends to maximise the learning outcome of all pupils in the classroom and decrease the achievement gap [6]. The higher mean scores mean that learners are better able to grasp and retain the content, while the wider range of scores, as reflected in the standard deviations, may point to increased engagement and the provision of appropriately challenging tasks tailored to individual learning needs. Hence, there are three pupils' characteristics: readiness, interest, and learning profile that must be addressed by a multi-grade teacher in order to differentiate instruction in the multi-grade classroom [7]. A pupil's level of background knowledge in a subject is referred to as readiness. Pupils are more motivated to learn when they are interested in the subject matter and when their individual learning needs are supported. Additionally, a pupil's learning profile includes factors such as learning styles, preferences, and environmental influences. By taking these key aspects—readiness, interest, and learning profile—into account, teachers can effectively differentiate their instruction to cater to each pupil's needs.

Table 3: Descriptive Statistics and T-Test Results for Pretest and Posttest

Grade Level	Test Type	Mean	Standard Deviation	N	t	df	Sig.
Grade 5	Pretest	18.72	1.995				
	Posttest	21.20	2.65	12	0.698	11	0.05
Grade 6	Pretest	20.71	3.320				
	Posttest	23.14	3.71	18	0.690	17	0.05

Table 3 presents the results of the pretest and posttest assessments conducted with a multi-grade class of Grade 5 and Grade 6 pupils. The table shows the mean scores, standard deviations, and the results of the t-test used to determine statistical significance. Although the t-test results indicate no statistically significant difference at the $p > 0.05$ level for either grade level, the mean score increases suggest a positive trend in academic performance following the use of differentiated instruction through tiered strategy. Grade 5 improved from a mean score of 18.72 (SD = 1.995) to 21.20 (SD = 2.65). Grade 6 improved from a mean score of 20.71 (SD = 3.320) to 23.14 (SD = 3.71). These increases, while not statistically significant, are pedagogically meaningful, indicating that the innovative instructional approach had a constructive impact on learner achievement.

The results confirm that when instruction is aligned with learners' readiness, interests, and cognitive abilities, pupils perform more effectively. Learners in the innovative group, who received instruction through differentiated, tiered assignments, outperformed those in the prototype group, who were taught through traditional, one-size-fits-all methods.

Further comparison revealed that the prototype group had more pupils categorised as dependent learners, while the innovative group saw more pupils progressing into higher performance levels. The data clearly illustrate that tiered instruction elevated performance across varying levels of learner ability.

This supports the conclusion that differentiated instruction, particularly through tiered assignments, is an effective approach for promoting academic achievement in Science. It fosters inclusivity and engagement

by allowing low-, medium-, and high-achieving pupils to access content in a way that matches their current abilities, while still pushing them toward growth.

CONCLUSION and RECOMMENDATIONS

The study confirms that differentiated instruction through tiered assignments is an effective strategy for improving the academic performance of Grade 5 and 6 pupils in multi-grade Science classrooms. By adapting lessons to pupils' readiness and learning needs, teachers can create more engaging, inclusive, and effective learning environments. Although improvements in performance were modest, they suggest a positive impact on learner motivation, participation, and understanding.

To strengthen the use of this approach, it is recommended that schools apply tiered instruction across subjects and grade levels. Curriculum guides should be made flexible, allowing the use of varied tasks, multimedia tools, and collaborative teaching strategies. Regular assessments should guide instruction, ensuring fairness and responsiveness to pupil needs.

Building strong relationships among teachers, pupils, and parents—through home visits, meetings, and communication—further supports the success of differentiated teaching. Schools should also invest in teacher training, peer collaboration, and innovative strategies like Interactive Learning Stations with Offline Digital Content (ILS-ODC), especially in resource-limited or low-connectivity settings. With these supports in place, tiered instruction can lead to more meaningful and effective learning for all pupils in multi-grade classrooms.

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