Differentiating Grade 3 Algebra

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Establishing early algebraic knowledge is an important step in students' mathematical literacy development. The National Council of Teachers of Mathematics (2000) recommends that students in grades 3-5 learn how to use algebraic symbols, understand relevant functions and relationships between different operations, build mathematical models, and interpret change across contexts. Research has shown that students who establish this foundational algebraic knowledge are better equipped to engage with more advanced mathematical concepts and real-world problems (Welder, 2012).

Differentiation describes a range of strategies that teachers can use to accommodate differences in students' readiness, interests, and learning profiles. Tomlinson's (2017) differentiation of instruction model further specifies that teachers can adapt learning content, processes, or products to meet students' varied needs. To do this effectively, educators can provide different levels of depth and complexity to appropriately challenge students (Kaplan, 2009), offer scaffolded opportunities for enrichment (Renzulli & Reis, 2014), and use flexible grouping based on student readiness (VanTassel-Baska et al., 2020).

If Aliens Taught Algebra Multiplication and Division Would be out of This World!

Recognizing the importance building students' early algebra skills with differentiated lessons, our team of educational researchers designed a pre-differentiated, enriched grade 3 unit aimed at developing students' pre-algebraic understanding. The unit is based on standards outlined by the National Council of Teachers of Mathematics (2000), Common Core State Standards Initiative (2010), and the Partnership for 21st Century Learning (2019), and it includes three sections: a) rounding, addition, subtraction, and mental math; b) multiplication and division; and c) numerical and visual patterns.

The unit was organized to help teachers provide a seamless flow of learning for students. Within the teacher manual, we outline big ideas, lesson objectives, materials, mathematical terms, mathematical practices, and differentiation strategies. The teacher manual further describes how teachers launch the lesson; prompt students to explore, examine and elaborate, debrief and look ahead; and assess student learning. Teachers who are interested in accessing and downloading the teacher manual, student notebook, and answer key may do so, free of charge, at the project website.

Incorporating the Unit in Your Practice

To make the most of the algebra unit, teachers should consider the following practices:

1. Use Assessments to Determine Student Readiness

The unit test should be administered at the beginning of the unit to assess students' background knowledge and readiness for the upcoming learning activities. Each lesson describes how information from the pre-test can be used to assign students to appropriate lesson tiers. Importantly, student readiness will very likely vary across tasks. Rather than assigning students to fixed tracks, the unit outlines flexible grouping strategies based on students' readiness for each activity.

2. Make Use of the Tiered Lesson Pages

Designing multiple differentiated lessons can be time-consuming. Whenever possible, make use of tiered lesson pages to provide students with tasks appropriate to their level of development. This will give all students the opportunity to be reasonably challenged above their present level of performance. In our unit, we provide three challenge levels for students who need (a) more scaffolds and less challenge, (b) moderate scaffolds and challenge, and (c) fewer scaffolds with greater challenge.

3. Consider Additional Scaffolds and Extensions

Even when they are working in the appropriate tier, students might still struggle with certain questions or require further challenge. If students are having difficulty, further scaffold their learning by providing visual aids, manipulatives, or hints. If students finish the lesson early, the unit includes super challenges that can push students to extend their learning and engage with more complex tasks.

4. Pay Attention to the Big Ideas, Mathematical Practices, and Lesson Objectives

The tiered student pages vary across student groups, whereas the big ideas, mathematical practices, and lesson objectives are consistent. Even though students will complete different tasks, they are still engaging with the same concepts. Derived from the National Council of Teachers of Mathematics (2000) and Common Core State Standards Initiative (2010), the lesson objectives and mathematical practices outline the content and skills students will develop in each activity. Big ideas synthesize these objectives, highlighting how they can be practically applied and transferred to new contexts. When differentiating, it is important to not lose sight of the bigger picture as it aligns students' learning even when they are engaging with different tasks.

5. Use Whole-Class Discussions to Highlight Mathematical Thinking

During the lesson launch, examine and elaborate, and debrief and look ahead sections, teachers prompt students to reflect on how they applied mathematical thinking throughout the lesson. Students' knowledge and skills might differ, but these whole-class discussions give all students an opportunity to share their thoughts, fostering a community of mathematical thinkers where all contributions are valued. Sample dialogue is provided to highlight how teachers can use talk moves to encourage productive mathematical discourse.

Conclusion

We are confident that this unit can inspire engaging and meaningful learning for your students, developing the knowledge and skills they need to think like mathematicians. In addition, the unit was designed to help teachers understand how to differentiate learning and provide all students with appropriately rigorous activities. If you are new to differentiation, you might look for other pre-differentiated units to further develop your understanding. If you have more experience with differentiation, consider how you might incorporate aspects of the unit into your broader practice. Regardless of where you are at, we encourage you to continue building your capacity to differentiate and provide appropriately challenging learning for each of your students.

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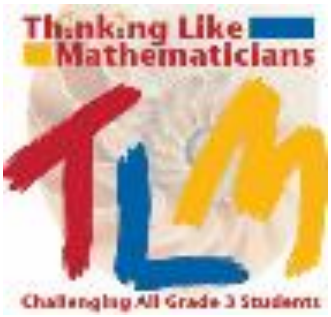

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