

Allowing Students to Show What They Know: Bridging the Differences in Math

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HOW DO WE TEACH MATH CONTENT?

Teachers must ensure that English Language Learners (ELLs) are receiving the same content as their peers. Although many believe that mathematics is a Universal Language, this is a presumption that can lead many students, to fall further and further behind their peer counterparts.

Many strategies are available to allow all students to access the mathematics curriculum, regardless of grade level. Some of the strategies that have been used by special education teachers for years are now finding their way into classrooms with ELLs with great success.

Good teaching practices and strategies are valuable for any student. Whether a student is an ELL, a special education student, or is just weak in numeracy skills, providing multiple ways for a student to access the curriculum is critical in allowing students to succeed.

VARIOUS APPROACHES

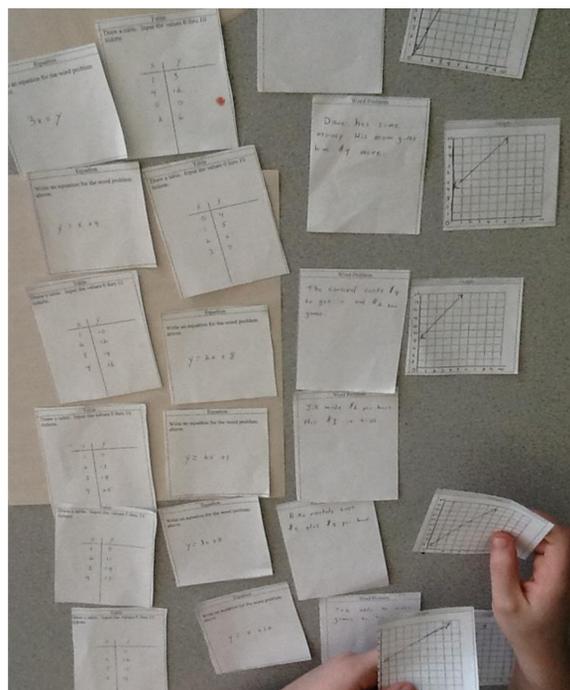
Methods available to use within the classroom for students who struggle with language may include:

- Create and maintain a culturally safe environment with predictable routines
- Use consistent formatting and words
- Pair verbal with written directions/content
- Include the use of guided notes and models
- Increase think time
- Thoughtful and deliberate seating and partnering with English proficient classmates
- Specifically teach math vocabulary
- Mindfully use all four language domains (listening, speaking, reading, writing)
- Use multi-sensory instruction
- Use slower speech; repeat and rephrase
- Check understanding often in varied ways
- Use of technology
- Use of personal glossaries
- Don't assume students with limited English skills can't learn math concepts and gain skills

ALGEBRA IN THE CLASSROOM

What can we do to make our curriculum accessible for ALL our students? The answer is simpler than you think!

In this Rule of 4 activity, twenty sets of real-life context examples (word problems) are given to the students. These sets include matching word problems, tables, equations, and linear graphs and can be used for instruction as well as for formative assessment.



As you can see, this Rule of 4 activity entails a great deal of content information. An activity such as this that includes multiple means of processing information, helps teachers pinpoint any breakdown in understanding whether it be in language understanding or mathematical content. Remember, you may have to take into consideration learning difficulties or gaps in content knowledge in addition to limited English skills.

General Accommodations for All Language Proficiency Levels

My ELL students need a long time to finish activities that involve English language, how do I handle that?

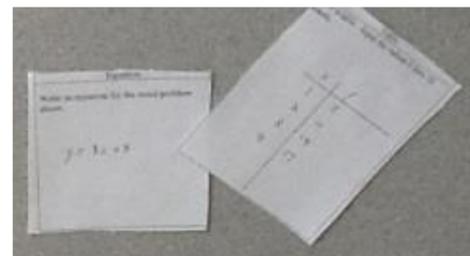
Instead of 20 sets to match, your students will still receive the mathematical content with less sets. Providing a reduced number of sets helps to keep the ELL students on pace with their classmates while keeping frustration levels low. Teachers will still be able to formatively assess students' math skills to adjust future instruction.

Proficiency Level of 3 or Higher

While most native English speakers will begin with the written word part of the Rule of 4, ELLs with a proficiency level of 3 or higher may be more comfortable using the table and accompanying graph to be able to match those to the real-world context.

Proficiency Level Below 3

Until students gain adequate proficiency with language, they must still receive the same content instruction as their English speaking peers. In addition to reducing the number of Rule of 4 sets used, further accommodations to a students' language proficiency can be made by only requiring students to match an equation with a table.



Providing a partnering opportunity with a language proficient peer allows for not only increased accessibility to the math, but also increases authentic language interactions. Limited English proficient students can match equations to tables while their peer partner reads aloud the real-life context problem and match these to the equations, tables, and graphs.

UNDERSTANDING EXPRESSIONS

Key Words Don't Unlock Anything

Perhaps in the early elementary years, students can be well served by learning a set of "Key Words" signifying what mathematical operation to use when analyzing a word problem. However, in the later elementary years and certainly at the secondary level, the cognitive and linguistic demands of word problems become far more complex and nuanced.

The following words are just a few of the words and phrases of the more than 20 that can be used to signify the need to use the operation of subtraction: less, less than, minus, decrease(d), decrease(d) by, reduce, lost, difference, dropped, how much less, fell, how much more, diminished, and subtract(ed) from. This is just an example of some of the subtraction signal words; the other operations of addition, multiplication, and division have almost as many words and phrases. Most word problems usually require multiple operations and steps as well!

VOCABULARY and HELPFUL TOOLS

The words of a mathematical concept such as *fraction* or *quadrilateral* are relatively easy to understand since pictures can accompany the words to enhance understanding. However, embedded action steps within a real-life contextual problem can be exceptionally difficult when a student has limited English proficiency.

In addition to building a personal dictionary or picture glossary, many students of varying levels of mathematical and English language proficiencies benefit from additional materials of support.

Vocabulary graphic organizers are helpful, as are other items used to help students actively navigate algebraic expressions, such as a "phrase translator." A form of this manipulative is often used in the lower elementary grades to assist students in learning their basic math facts, and it is easily adaptable to the secondary level.



Resources and Acknowledgements

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Rule of 4 problems provided by Rick Norris, Garfield Middle School, Revere Public Schools, Revere, MA.