Hanlon's Razor

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What works is work!

Vocabulary
Critical Thinking ~ CRT ~ Problem Solving
Writing

The nation has historically done poorly on constructed response questions as evidenced by NAEP results. It appears by just looking at the statistics, between 30 and 70% of our students have received a ZERO on most constructed response questions on the state's CRTs in mathematics during the last two years. From an AYP/ testing standpoint that can not be good news. From an educational standpoint, it is terrible news!

Students can not be expected to do well on these questions unless they have been taught how to answer them, been given practice, and they are provided feedback on how well they answered the questions.

On the state CRT, the constructed response questions are worth up to three points. The following rubric is used by the state to determine the points given for the response in grades 6, 7, & 8.

Score	Expectations
Full Credit	• Your response addresses all parts of the question clearly & correctly. You use & label the proper math terms in your answer. • Your response shows all the steps you took to solve the problem.
Partial Credit	• Your response addresses most parts of the question correctly. • Your response does not show all work or does not completely explain the steps you took to solve the problem.
Minimal Credit	• Your response addresses only one part of the question correctly and explains the steps you tool to solve that one part. In answering the remaining parts, the response is incomplete or incorrect. • Your response does not show all work or does not explain all the steps you took to solve the problem.
No Credit	• Your response is incorrect

The research suggests there is no more single important factor that affects student achievement than vocabulary. In mathematics, this has to be given greater emphasis on all grade levels if we expect students to be literate in mathematics and perform well on math tests. My experience with students not meeting success on the high school proficiency exam is they don't understand the language – it is not the concepts causing the difficulty.

In math, classroom teachers should teach their students to translate English to math and math to English explicitly. When reading word problems, key words, phrases, or ideas are often expressed in the questions which tells the students what operation they might use.

For instance, in elementary grades:

WORDS/PHRASES USED THAT GENERALLY SUGGEST ADDITION
sum, total, altogether, perimeter, in all

WORDS/PHRASES USED THAT GENERALLY SUGGEST SUBTRACTION
difference, words that are in the comparative form; words that end in "er", more, increased, decreased, left.

WORDS/PHRASES USED THAT GENERALLY SUGGEST MULTIPLICATION
product, area, volume, how many different ways…

WORDS/PHRASES USED THAT GENERALLY SUGGEST DIVISION
quotient, each one, per, person (thing)

As students become more confident and sophisticated in problem solving, these words can be omitted as long as the idea is expressed.

Example 1. How many toys does Bob have <u>altogether</u>?
Example 2. How many toys does Bob have?

Students have to be taught strategies to solve problems. They also have to be taught how to answer constructed response questions so they are rewarded for their knowledge – not penalized because they can not express it using correct vocabulary and notation.

Writing causes students to stop, think, reflect, visualize, review, organize, connect, analyze, remember and recall information. Writing should be a regular part of learning in the math classroom.

Feedback has to be given to ensure students are using correct vocabulary and notation when writing if they expect the writing to improve.

Improving student responses on constructed response questions is a clear blueprint to increase student performance on the state CRT in mathematics and meeting AYP.

Never attribute to malice that which can be adequately explained by stupidity