Hanlon's Razor

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

What works is work!

Strategies are Important – Alg vs Geo

Most math educators agree that using specific strategies helps students learn. Those strategies generally include; *go back to the definition, look for a pattern, make a table or list, draw a picture, guess and check, examine a simpler case, examine a related problem, identify a sub goal, write an equation, and work backward.*

Algebra teachers tend to use *look for a pattern, make a table, examine a simpler case, and write an equation* as strategies that form the basis for most of their instruction. As a result, students grow comfortable learning math with these strategies. Unfortunately, too many students learn algebra by rote memorization. That results in any variation of a problem causing great difficulty and frustration for students.

Teachers of geometry tend to use: *go back to the definition, draw a picture, examine a related problem, identify a sub goal, and work backward* as their primary strategies. Students and teachers who use those same strategies to teach or learn geometry that were successfully used in algebra often run into difficulty.

In geometry, students are typically required to use higher order thinking skills that are not being used in a typical algebra class. The geometry students who do not have a good visualization of the definitions, postulates, and theorems that are being introduced don't experience much success. As we expect students to learn these, they should also be able to draw a picture that reflects the information being taught as well as to measure the drawings and diagrams to explore, discover, and eventually commit to memory important theorems.

Students should be required to write their definitions, postulates and theorems on their homework, quizzes or tests, they should also be required to draw a corresponding picture. They should be asked to explain a concept, connect it previous learning, and write about what they understand or what may be causing them difficulty. If they can do that, they will be more successful learning geometry.

Algebra and geometry is filled with new terminology and notation, good teachers are mindful that student success in any subject is dependent upon them learning the language. All too often in math, the difficulties experienced by students has more to do with a lack of understanding of vocabulary and notation than the math concept being taught. The most successful math teachers take the time to ensure students are learning and using that vocabulary and notation and demonstrate its importance by testing students on it.

And while some problem solving / learning strategies are used more routinely in one subject area vs. another, the fact is all problem solving / learning strategies should be used at appropriate times in all of mathematics.

Teachers and students are frustrated with the deficiencies they see in students not knowing their basic arithmetic facts. As the students continually get promoted from 3rd to 4th, 5th to 6th, the next teacher always seems to identify the deficiency in basic skills. Because of this deficiency and the belief they can not teach their assigned curriculum until these deficiencies are addressed over and over again in grades 4, 5, 6, 7, 8 and even algebra teachers will spend the first few weeks of the school year reviewing before they start on their assigned curriculum.

That strategy of spending the first few weeks of each school year reviewing the basic facts doesn't work. The research says it doesn't work and specifically recommends against this practice. While some might want to argue with the research, I might suggest relying on your experience. Ask the teacher who had your students the year before if they spent time revisiting these facts. You will find they did. Upon further examination, you might come to the same conclusions of the researchers, that spending the first few weeks reviewing at the expense of your assigned curriculum shows no benefit to learning the basic facts.

Effective secondary teachers will link the concepts and skills they are assigned to teach to outside experiences and previously learned math. For example, linking addition of polynomials to place value, expanded notation and adding left to right. Multiplying polynomials to the 3rd & 4th grade algorithm for multiplying. Dividing polynomials to the long division algorithm. Solving linear equations to the Order of Operations, etc.

Strategies matter. The most successful teachers in elementary school know how to teach basic facts to mastery so students have immediate recall. Those teachers employ effective strategies such as when you subtract numbers that have consecutive even or odd numbers in the units column, the answer is always 8. As examples; 12 – 4, 13 – 5, 14 – 6, 15 – 7, etc. Recognizing these patterns help students learn their facts more quickly and painlessly than just memorizing.

To find strategies and worksheets that support those strategies, visit www.hanlonmath.com, link to USEFUL RESOURCES, then open the Strategies Math Facts. Students who seem to have the most difficulty with their math facts were often drilled with worksheets that didn't support strategies that help students succeed.

How teachers teach makes a difference. Teachers in middle school would not teach the rules of divisibility sequentially. They would probably group the rules for 2, 5, and 10. After mastering those, they would move along to the rules for 3 and 9, then to 6, and finally on to 4 and 8. That sequencing helps students learn.

The best teachers know that what is taught is important, but how it is taught and their resources to support those strategies are also important to increase student understanding and learning.