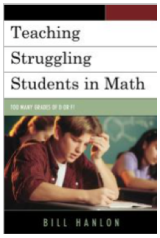
Nevada Public Education

Increasing Math Achievement

Bill Hanlon

Last in the nation again on the ACT. With common sense, we can do much better in math. But, we cannot add to the problems caused by the state.



A number of schools, both elementary and secondary, have purchased programs supposedly in alignment with SBAC testing. Unfortunately, these programs are not aligned with learning and understanding mathematics.

Nevada is ranked pretty close to last in education for a number of reasons, many of which have been out of educators' control and rests with the state.

But some issues, we can control. One issue we can control is sequencing the math so it makes sense and subskills are developed so students can be successful. Sequencing concepts and skills, especially in math, is important for student understanding, comfort levels and achievement. I find it irresponsible of teachers and administrators who allow concepts and skills to be taught in math before subskills have even been introduced – never mind mastered just because that's the order in which the book or program they purchased presents the material. That's just stupid.

It just makes sense, mathematically, that fractions, decimals, integers, ratio & proportion and percents should be introduced and taught sequentially. Some of the programs purchased by schools have students learning to take percents of numbers, which requires students to know how to multiply decimals, before they were taught how to multiply decimals. That's just sad. Sequencing matters in math.

A second issue is non-mastery of important facts and procedures. In elementary schools, memorizing basic arithmetic facts and procedures is pretty important for future success. In secondary schools, memorizing procedures and formulas like the Pythagorean Theorem, Quadratic Formula or solving higher degree equations are pretty important for future success.

Students of teachers leaving elementary school who have not memorized their basic arithmetic facts and procedures have set their students up to fail. There is no way that students can successfully compute with fractions, decimals, ratio & proportion, percents, exponentials, integers, polynomials or solve equations without those basic skills. Students who cannot add, subtract, multiply or divide with automaticity have the highest risk of being dropouts. Students entering middle school not knowing that 5+3 = 8 or 6x4 = 24 is just not acceptable.

Memorizing helps students absorb and retain information on which understanding and critical thought are based. The more sophisticated mental operations of analysis, synthesis, and evaluation are impossible without rapid and accurate recall of bodies of specific knowledge.

In all of math, concepts and skills taught in earlier grades are used to develop concepts and skills n later grades. The trig identity $\cos^2 x + \sin^2 x = 1$, the equation of a circle, the distance formula, and the Pythagorean Theorem are all the same formula, just written differently because they are being used in different contexts. Students should know that so this material is not taught in isolation.

Linking concepts and skills allows teachers to review and reinforce previously learned material and introduce new concepts using familiar language which makes students more comfortable in tier knowledge.

The standard addition, subtraction, multiplication and division algorithms, which are still required learning in the common core, are used when working with polynomials in algebra. As an example, the standard division algorithm is used to divide polynomials, in synthetic division, and synthetic substitution to evaluate functions or solve higher degree equations using the Rational Root Theorem.

Just who has determined that memorizing facts and procedures is not important? In math, like in all areas, practice is important. Some who don't think practice is important call it "drilling" students. They love cute little sayings like "drill kills". That very lack of drill, lack of practice, is costing our students dearly because they are so deficient in subskills and makes new learning very difficult as they progress through math.

Another area of concern is the lack of notes required in some schools. Some principals have determined that notetaking is a non-essential skill, is not part of instruction and is discouraged. Notes serve a number of purposes, they allow students to review and reinforce what they have learned, provides extra guided practice by re-doing solved problems in class, used to complete homework assignments, prepare for unit tests and prepare for high-stakes exams such as SBAC or the ACT/SAT.

I believe the state is most responsible for many of the educational woes in the south. The state has set up students in southern Nevada to fail. That fact can be clearly seen by how they have diverted money and not funded teacher training in the south as they have in the north.

The "marks" state bureaucrats have left on students by building personal resumes and all their educational reforms have resulted in "bruises" on our students. Our worst in the nation ranking is a result of their work. As educators, we don't need to add to that by not using common sense when teaching.

Bill Hanlon, is a noted speaker, an author, educator, consultant and coach for schools, former Director of the Southern Nevada Regional Professional Development Program, and is a national presenter for organizations such as AASA, ASCD, ALAS, NMSA, NASSP, NSBA, and NCTM. He was the coordinator of Clark County School District's Math/Science Institute and was also responsible for K-12 math audits. He served on the Nevada State Board of Education, Regional Director of the National Association of State Boards of Education (NASBE) and as a member of the National Council for Accreditation of Teacher Education (NCATE) States Partnership Board. He also hosted a television series, "Algebra, *you can do it!"* on PBS Las Vegas.

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