"Missing Pieces" in Math Education

www.biblicalchristianworldview.net

The impression most people have of mathematics, if it is a good one, is that it is practical in terms of paying bills, figuring a mortgage, paying taxes, balancing a checkbook, planning for retirement (although computer tools do most of this math for you anyway). A goodly number of people (too many, in my opinion) have bad feelings about math. They say:

"I hate math" or

"I've never understood math" or

"Math was (or is) my worst subject in school."

The reason for these negative responses is what I call the "missing pieces" in math education. For example, let's consider a basic algebraic equation:

$$16x^2 + 32x + 96 = 0$$

This equation (called a quadratic – from a Latin word, *quadrate*, meaning "to make square") is the typical "fodder" for Algebra I and Algebra II high school classes. Teachers instruct students in how to factor and solve such equations. Some students may even be required to memorize the quadratic formula for solving a general "second degree" equation in the form $ax^2 + bx + c = 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If, as an adult, these symbols and numbers bring back bad memories, then you are not alone! These dire recollections are generated by learning this material (or any other mathematical concept) in a vacuum (i.e., without a context or rationale for its study). Most modern mathematics educators now realize that students need to be given a rationale for "learning this stuff." Some teachers and some textbooks try to provide this rationale (using a wide variety of "motivational" gimmicks). Very few look at history to explain why quadratic equations popped up in the first place.

Teaching mathematics devoid of its history is the first missing piece in math education. Quadratic equations came into the forefront of scientific thinking as a result of the study of motion (e.g., free fall, projectile motion, the motion of planets). If you consider an object's motion in terms of time and distance, then these second degree equations describe the situation perfectly. Not only do they describe the situation, they enable the scientist to make predictions (e.g., the maximum height of a projectile, the time a projectile hits the ground, the distance a projectile travels before it hits the ground). Needless to say, 16th to 17th century army generals were interested in this type of analysis.

Astronomers like Johannes Kepler (1571-1630) used these "second degree" equations to mark the regulatory patterns of the motions of the heavenly bodies. He was able to take an ancient Greek geometrical idea (the conic sections: the circle, the ellipse, the parabola, and the hyperbola) and use a combination of algebra and geometry (called coordinate geometry) to trace out the paths of the planets using quadratic equations that describe ellipses. Galileo Galilei (1564-1642) and Isaac Newton (1642-1727) were able to trace the paths of projectiles or objects in "free fall" using quadratic equations that describe parabolas. In our jet age, scientists are able to trace the shock wave of a sonic boom using quadratic equations that describe hyperbolas.

The study of quadratic equations must be understood in the context of the "missing pieces" of history and science (particularly, the physics of motion). As I have already noted, very few math teachers do this (the reason why is because of the way these teachers are being prepared to teach the subject).

Now, even if all math educators were taught to teach these equations in the context of history and science, there would still be missing the most important piece in the puzzle. That critical piece, a piece missing for *every* public or government school, is the revelation of the God of Scripture. We have given an equation that is replete with a wide variety of symbols. This abstract mathematical construct reflects a real or concrete physical situation; i.e., the physics of motion. The physics of motion is governed by the law-word, the creation covenant, instigated and sustained by the God of Scripture (see Jeremiah 31:35-37). Since all of God's covenants are Christo-centric, then the motion of objects (whether terrestrial or celestial) are part of the "all things visible and invisible" that "cohere or hold together" in Christ (Colossians 1:15-17). You see, therefore, that when a student learns quadratic equations in the context of biblical revelation, then that student is two steps away from a glorious and transforming revelation of the person of Christ:

Step 1: Abstract equation.

Step 2: History and the physics of motion.

Step 3: Christ, in whom all things are sustained.

Exposing the student to the realities of a Christ-controlled creation is what biblical Christian education is all about. Since Christ is the source and sustenance of creation and since Christ is the foundation and the treasure of all wisdom and understanding (John 1:1-3; Colossians 2:3), then we dare not teach any subject, even quadratic equations, without a reverential submission to Him. If the biblical revelation of Christ is removed from the acquisition of any type of knowledge, then all we will know is surface or pseudo-knowledge. It is the revelation of Christ that brings true meaning, perspective, and purpose to every subject under study, even mathematics!